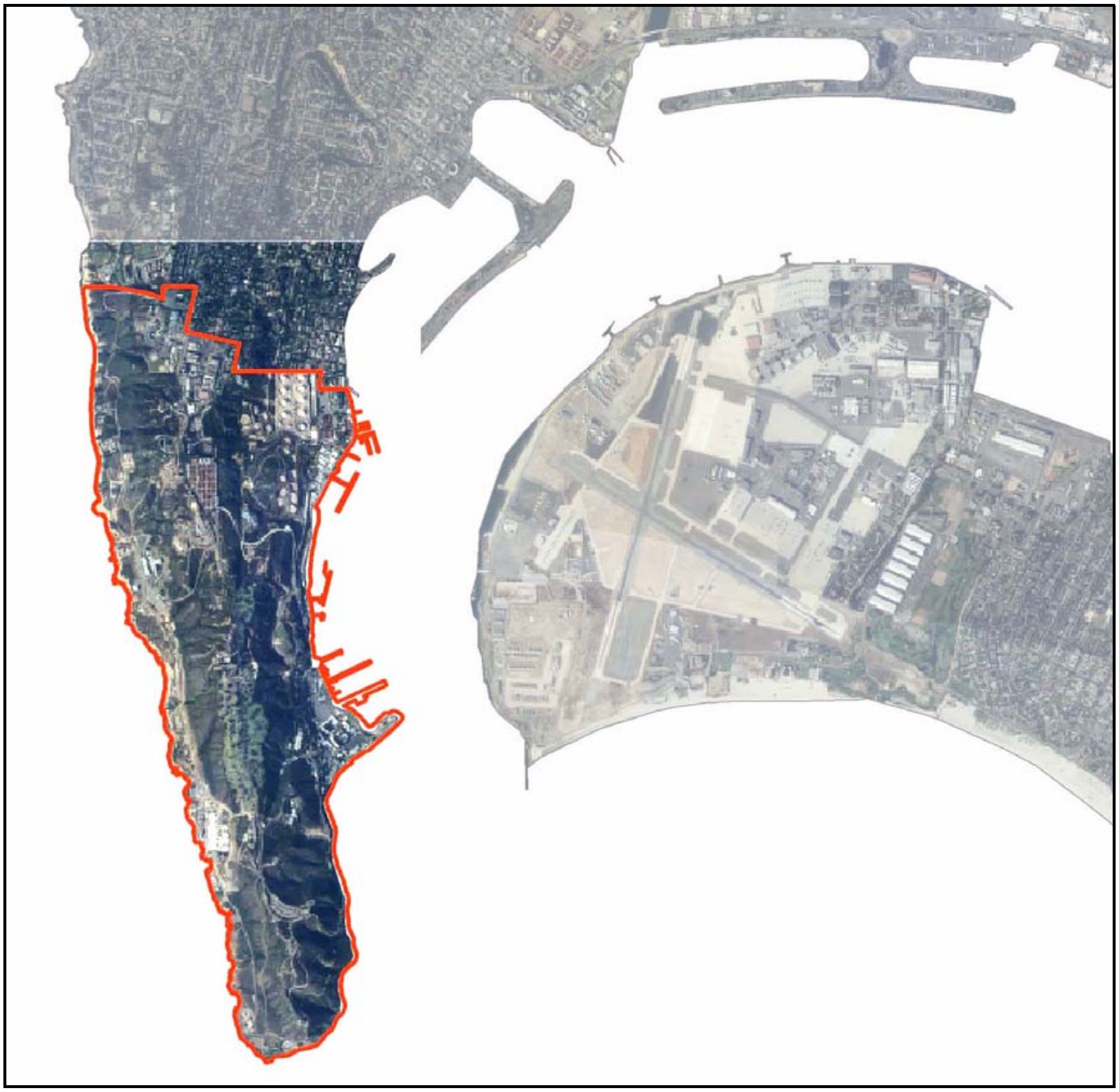
# Naval Base Point Loma
# and
# Cabrillo National Monument
# Joint Wildland Fire Management Plan



June 2006

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# Joint Wildland Fire Management Plan

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*Prepared for:* Cabrillo National Monument

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# Naval Base Point Loma and Cabrillo National Monument

# Joint Wildland Fire Management Plan

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# *EXECUTIVE SUMMARY*

The purpose of this Point Loma Joint Wildland Fire Management Plan is to protect personnel, facilities, and natural and cultural resources from the impacts of wildland fire; prioritize assets to be protected in the event of a fire; ensure the perpetuation of native terrestrial habitats, fire adapted plant communities, and rare species; and minimize the total cost of fire pre-suppression and suppression practices on lands owned by the U.S. Navy and National Park Service (NPS) on Point Loma.

The fire planning environment at Point Loma is characterized by a relatively small fragment of natural habitats, and low natural fire frequency due to coastal influence. However, the presence of fire adapted species demonstrates that these communities evolved with fire, and their composition and structure present fire risks. In addition, Navy infrastructure development has created a complex wildland urban interface with attendant fire protection problems. The fire management approach for Point Loma is relatively simple:

1. Provide for pre-suppression protection of structures through fire safe building construction and survivable space around each structure,
2. Implement fuel modification zones along public roadsides through strategic exotic species removal, and
3. Implement experimental prescribed fire plots on NPS lands to evaluate options for achieving ecological goals and managing native species populations.

The scope of this Plan is to address fire management in the natural wildland areas of Point Loma, and in the interface between the wildland and built environments. Chapter 1 presents the purpose, context, and goals of the Fire Plan. Chapter 2 describes the specific wildland fire management situation for Point Loma, and values at risk of damage due to wildland fire or due to fire suppression actions. The details of this Plan's fire management strategy are presented in Chapter 3, while Chapter 4 assigns responsibilities and means for implementing the management approach.

***Summary of Key Fire Management Issues***

1. The Navy in particular has a highly significant investment in facilities on its Naval Base Point Loma (NBPL) properties. Due to the upslope proximity of natural vegetation and steep, unstable terrain, a significant post-fire erosion or flooding problem could adversely impact this infrastructure, as well as the harbor and waters surrounding it.

2. Point Loma is unusual within southern California in that it has been fire-free for most of the 20th century. However, the potential for wildfire always exists under the right combination of climatic conditions and anthropogenic ignition, and cannot be eliminated.

3. A serious wildfire on Point Loma is most likely to occur under the most extreme weather conditions when wildland fire-fighting resources are already committed and unavailable.

4. The current staffing at the Federal Fire Department (FFD) does not meet standards of the National Wildfire Coordinating Group and compliance with Federal Fire Policy with regard to the recommended number of firefighters assigned to an engine while fighting a wildland fire.

5. Hazardous fuel conditions exist especially on northern- and eastern-facing slopes. These slopes are steep, with minimal access for fire-fighting, narrow and winding roads and many structures and military facilities at vulnerable mid-slope and top-of-ridge positions. The density of eucalyptus trees and their proximity to structures creates a hazardous fuel condition at the Fort Rosecrans Historic District.

6. There is evidence that the plant communities of Point Loma are changing due to an extended fire-free period, but it is not known if the current fire-free interval is outside the norms of the "natural" fire regime, and if any animal or plant has been permanently lost from the peninsula as a result. Certain species are decreasing in their amount of surface cover, while others are increasing. While some of these changes are probably induced by human activity, the major changes have occurred naturally as a result of competition for resources and stand age without fire. Shifts in species abundance and cover is expected to continue toward taller canopy dominants, and decreases in shorter-lived species of smaller stature, herbaceous understory species, and gap components are also expected to continue. There may be future effects on wildlife or microbiota that cannot be assessed because they are not known at this time.
7. Maintaining a natural fire regime is not possible in this wildland-urban interface (Map 2-2). The federal properties are isolated from most natural sources of ignition by urban development. The property also has a higher probability of human ignitions for the same reason.
8. The wildfire risks to succulents abundant in the maritime succulent scrub flora should be weighed against the risk of closure of the shrub canopy, erosion, or exposure to unplanned fires that burn on their own terms rather than within conservation objectives.
9. Effective wildland fire policy for Point Loma requires interagency coordination; however the primary interagency group, the Point Loma Ecological Conservation Area (PLECA), has not taken on wildland fire management as part of its mission.
10. Point Loma is rich in archeological and historic resources and wildfire poses a threat to these resources.

***Recommended Management Direction***

- This Fire Plan designates two Fire Management Units corresponding to the east side and west side of the spine or ridgeline of Point Loma, based on significantly different fuel conditions on the two sides.
- All fire management activities would have as the highest priority firefighter and public safety. Appropriate management responses for all wildland fires (regardless of ignition source) would be rapid containment and suppression to protect the public, check fire spread onto private property, and protect the natural, cultural and historic resources of the area.
- All unplanned wildland fires should be suppressed at the smallest size possible, but no larger than 10 acres, as efficiently and quickly as possible. All responses will be for the purpose of rapid control.
- In addition to an existing agreement between FFD and the City of San Diego for use of a firefighting helicopter, additional assurances of access to a firefighting helicopter should be sought with either the City of San Diego or the Navy's reserve helicopter wing (COMHELWINGRES HC-85) stationed at Naval Air Station, North Island.
- The standards for communication among agencies during use of a helicopter on Point Loma include that all agencies must be able to talk to each other from key locations on the peninsula immediately and on the same frequency. Communication systems must be such that reporting of a fire incident must reach Federal Fire within three minutes or less from time of first knowledge. The helicopter pilots must hear military frequencies, air-to-air frequencies and the Incident Commander on the ground.
- Fire-fighting using trucks from roads, firing out (initiating a fire containment line along a wildfire's flank rather than its leading edge), and water drops are the approaches expected for

suppression on Point Loma. No heavy equipment use is expected, such as constructing fire lines with bulldozers. Bulldozers are not a realistic suppression resource on Point Loma.

- To prepare for each fire season, an Annual Preparedness Meeting will take place each spring with all entities that provide fire protection services under written agreements. The meeting will involve the Federal Fire Department, National Park Service, City of San Diego, U.S. Navy personnel, and possibly U.S. Forest Service and Naval Air Station North Island (NASNI) Meteorological Division. Separately, the Annual Review and Update meeting and Joint Wildland Fire Management Plan 5-year update are more broadly scoped and will function for adaptive management and regularly revisiting the content of the Plan.
- Fire extinguishers should be mounted on Navy and NPS buildings, and these should be maintained and tested annually. Vehicles of Navy, NPS, and contractor personnel who regularly work in the wildland environment on Point Loma should be equipped with gloves, a shovel, and a pulaski.
- Prescribed fire should not be used for accomplishing fuels management objectives. Four experimental, 900 $m^2$ plots will be burned, on NPS land only, to test the plant community response to fire, to evaluate the use of fire for ecological restoration, to determine the most ecologically sound approach to fuels management, and for achieving conservation objectives of both the Navy and NPS.
- New fuelbreaks are not recommended under this Fire Plan. However, "survivable space" fuel management should occur as soon as funding permits around each structure where it is found to be necessary. Hand tools should be used for pruning, cutting and thinning out vegetation no more than 50 feet as measured horizontally from all sides of each building. A combination of 30 feet of irrigated green space (in developed areas of NBPL only), cutting back to four to six-inch height the most flammable species of vegetation, and thinning should provide for the "survivability" of the structures from radiant heat. A 50-foot buffer is only acceptable after a building-by-building assessment, since some buildings may require as much as 100 feet due to their position relative to burnable vegetation and the structural or human values at risk. In all case, vegetation management will be conducted outside the breeding season for migratory birds covered under the Migratory Bird Treaty Act, or the vegetation will be searched in advance for nests.
- The only defense against wind blown embers is a fire resistant structure. Special fire protection features are required for all structures occupied by people. Fire construction and design features are identified and required for all occupied structures in brush covered areas.
- For certain existing roadways, a buffer area along each side of the improved width of roads should comply with the requirements of a fuel modification zone, excepting single specimens of trees, ornamental shrubbery or cultivated ground cover. The width of the buffer area depends on road width, but each road will be evaluated on a case-by-case basis for the effectiveness of establishing fuel buffers. Annual maintenance of fuel modification zones should be completed by June of each year.
- FFD should inspect burning permits, industrial operations, powerlines, and occupied structures for compliance with (or adherence to) survivable space standards.
- Siting of new structures should be limited to areas with safe ingress and egress. In areas with heavy fuel load, provide setbacks from habitat areas or firesafe construction, and avoid mid-slope road locations and long lengths of access.

- The FFD should record all fires of any size, including: severity, intensity, extent, and ignition source. Fire history maps shall be maintained and updated annually by the Fire GIS specialist of the Mediterranean Coast Network. These records should be provided to all parties at the Annual Preparedness Meeting.
- Cabrillo National Monument (CNM) staff should regularly chart live-fuel moisture in key fuel species, and share these data with NBPL.This would also support fire weather prediction, since the start and end of fire season should be declared when live fuel moisture reaches about 120%. Weather data will be obtained from the METAR weather station located at NASNI in Coronado.
- Recommended research topics are summarized in Section 3.8.4.
- NBPL and CNM should, at a minimum, post signs asking visitors to prevent all fires. Visitor entry points should disseminate a brief fire prevention message. The Navy Public Affairs Officer for Commander Navy Region Southwest (CNRSW) and the NPS Fire Information Officer should conduct a joint educational initiative that emphasizes: prevention and safe response to fire; evacuation plans; trailhead brochures; fire-safe construction; and fire ecology interpretation.
- All planned fuel modification projects on U.S. Navy lands that fall within areas currently defined as an archaeological site must first undergo review by the CNRSW Archaeologist and Architectural Historian. To preserve historic structures and museum collections, every attempt should be made to comply with national building and fire codes. When warranted by the significance of a historic structure or a museum or collection, adequate fire detection, warning, and suppression systems, should be installed.
- Natural resource objectives related to fire management are set forth to ensure the sustainability of ecological resources, including the full range of native plant community structure and composition and native biodiversity including plants, animals, and microbiota. Endemics are emphasized, as is controlling exotics. Key objectives include:

  -Seek perpetuation of native plant communities such that the full range of species composition and structural diversity that was present before Europeans arrived is present or potentially present in the seed bank, while controlling the introduction and spread of exotic species.

  -Over the long term, restore the above- and below-ground plant and animal communities to a condition such that the species diversity and density of a reference condition (as can be surmised based on long-term monitoring plots and historic data) can be maintained.

  -Foster conditions such that disturbance processes (fire, drought-El Niño cycles, animal burrowing, invasive species introduction, etc.) function together to achieve the goal of ecological conservation. For example:

  A sufficiently long inter-fire period, at least 40 years in southern maritime chaparral, should be provided for obligate-seeding species to establish sufficient seedbank to replace their populations when a burn occurs.

  Lichens and other species dependent upon older stands should have refugia for recolonization after disturbance such as fire.

  Soil erosion due to fire should not exceed the rate of soil formation, about one ton per acre per year, and that sedimentation due to fire does not affect water quality of surrounding ocean and bay waters.

-Conduct rehabilitation of sites affected by suppression so that there is no permanent loss of natural or cultural resource values. NBPL and CNM should collect seed from mature plants to use in burned area emergency response if necessary.

-Conduct research and monitoring to guide fire management, improve the scientific soundness of decisions, and the future adaptive management of fire.

- Cultural resource protection is provided in several ways. Through the use of the Incident Command System and at the Annual Preparedness Meeting, the cultural resources map (Appendix D) will be reviewed by both NPS and CNRSW staff. Fire personnel will receive cultural resource protection briefing from the cultural staff of each landowner. All planned fuel modification projects on U.S. Navy or CNM lands that fall within areas currently defined as an archaeological site will first undergo review by the appropriate agency's cultural resource specialist. In the preservation of historic structures and museum and library collections, every attempt will be made to comply with national building and fire codes. When these cannot be met without significantly impairing a structure's integrity and character, change in the management and use of the structure should be considered to minimize potential hazards, rather than modify the structure itself. When warranted by the significance of a historic structure or a museum or collection, adequate fire detection, warning, and suppression systems will be installed. Pre-fire plans will be developed for historic structures and buildings housing museum or library collections. Unoccupied historic buildings on NBPL will not receive special treatment during fire suppression.
- Implementation strategies are discussed, including cost accounting and funding codes. A Fire Management Team, as assigned by the Superintendent of CNM and the Commanding Officer of NBPL, should meet annually to discuss areas of responsibility, review and update the FMP, discuss/evaluate fire management capabilities, and to review and, if necessary, revise agreements. Interagency coordination will take place functionally through the Annual Preparedness Meeting, the joint annual certification process for preparedness described in Chapter 4, with other matters addressed through the PLECA Working Group. An expanded PLECA Memorandum of Understanding (MOU) would be a useful mechanism for providing coordination, communication, and joint funding opportunities for fire management on Point Loma.

# Table of Contents


**1.0 Introduction** **1-1**

1.1 Purpose and Scope of Fire Plan 1-1
1.2 Missions of Naval Base Point Loma and Cabrillo National Monument 1-2
1.3 Location and Regional Setting 1-4
1.4 Land Ownership and Land Use Summary 1-6
1.4.1 Land Ownership and Jurisdictions 1-6
1.4.2 Land Use Summary 1-10
1.5 Legal Context of Fire Management 1-11
1.5.1 Federal Fire Policy 1-11
1.5.2 U.S. Navy Fire Management Policy 1-11
1.5.3 National Park Service Fire Management Policy 1-14
1.6 Planning Context for Fire Plan Development 1-15
1.6.1 Navy Planning Context 1-16
1.6.2 National Park Service Planning Context 1-18
1.6.3 Integrating the Navy and National Park Service Planning Processes 1-19
1.7 Goals of the Wildland Fire Management Program 1-20
1.8 Wildland Fire Management Capability, Roles, and Responsibilities 1-21
1.8.1 Fire Response Capability and Responsibility 1-21
1.8.2 Prescribed Fire 1-22
1.8.3 Responsibility for Natural and Cultural Resource Programs 1-23

**2.0 The Fire Environment and Values at Risk** **2-1**

2.1 Fire Environment 2-1
2.1.1 Climate 2-1
2.1.1.1 Fire Weather 2-3
2.1.1.2 Weather Cycles 2-4
2.1.2 Aboriginal Use of Fire 2-4
2.1.3 Fire and Fuel Harvesting in the Mission, Rancho, and Early Anglo Eras 2-5
2.1.4 Recent Fire History (1890 to Present) 2-6
2.1.5 Fire Type 2-9
2.1.6 Fire Season and Fire Size 2-9
2.1.7 Ignition Sources 2-9
2.1.8 Rate of Spread 2-10
2.1.9 Fire Spread Pattern 2-10
2.1.10 Fire Intensity and Severity 2-11
2.1.11 Fire Frequency and Return Interval 2-11
2.2 Fuel characteristics 2-12
2.2.1 Fuel Types 2-12
2.2.2 Fuel Models 2-13
2.2.3 Fuel Load 2-14
2.2.4 Wildland Fire Behavior Calculations for Hazardous Fuels 2-15
2.3 Values To Be Protected 2-17
2.3.1 Facilities (Real Property) 2-17
2.3.2 Cultural Resources 2-18
2.3.2.1 History of Point Loma 2-18
2.3.2.2 Archeological Resources of Point Loma 2-21
2.3.2.3 Historical Resources on Point Loma 2-21
2.3.2.4 Fire Management and Cultural Resources 2-22
2.3.3 Natural Resource Values 2-24
2.3.3.1 Watersheds and Geology 2-24
2.3.3.2 Soils 2-24
2.3.3.3 Air Quality 2-27
2.3.3.4 Water Resources 2-28

2.3.3.5 Water Quality 2-29
2.3.3.6 Plant Communities of Point Loma 2-30
2.3.3.7 Plant Communities and Fire Effects 2-33
2.3.3.8 Wildlife Habitat Valuation in the PLECA 2-40
2.3.3.9 Wildlife Populations and Fire Effects 2-42
2.3.3.10 Plant Populations and Fire Effects 2-50
2.3.4 Recreational and Scenic Values 2-62
2.4 Invasives and Fire Effects 2-62
2.4.1 Other Ecological Processes 2-65

**3.0 Fire Management Strategy 3-1**

3.1 General Management Considerations and Decision Context 3-1
3.1.1 Decision Framework for Evaluating Ecological Risk 3-2
3.1.2 Decision Framework for Evaluating Approaches to Fuel Hazard Management 3-3
3.2 Summary of Wildfire Management Issues 3-4
3.3 Goals and Objectives 3-6
3.4 Fire Management Units 3-8
3.5 Wildland Fire Suppression 3-10
3.5.1 Fire Danger Prediction 3-11
3.5.2Communication between FFD and Suppression Helicopter 3-13
3.5.3 Pre-attack Plan 3-13
3.5.3.1 Minimum Impact Suppression Tactics (MIST) 3-14
3.5.4 Extended Attack and Large Fire Suppression 3-16
3.5.5 Prevention First 3-16
3.5.6Preparedness Actions 3-16
3.6 Experimental Prescribed Fire and Wildland Fire Use 3-18
3.6.1 Experimental Prescribed Burn 3-19
3.6.1.1 Staffing 3-21
3.6.1.2 Air Quality, Smoke Management, and Visual Resources 3-21
3.6.2 Potential Impacts of Experimental Prescribed Fire 3-22
3.7 Fuels Management 3-23
3.7.1 Strategic Fuelbreaks Not Recommended 3-23
3.7.2 Prescribed Fire for Hazard Fuel Reduction 3-25
3.7.3 Mechanical Treatment for Hazard Fuel Reduction 3-25
3.7.3.1 Survivable Space 3-25
3.7.3.2 Eucalyptus Grove Replacement Trees 3-33
3.7.3.3 Building With Fire Resistant Materials 3-34
3.7.3.4 Roadside Management 3-36
3.7.3.5 Annual Maintenance and Compliance Inspection 3-37
3.8 Fire Reporting, Monitoring, Evaluation, and Research 3-37
3.8.1 Fire Reporting 3-37
3.8.2 Live Fuel Moisture Monitoring 3-37
3.8.3 Fire Effects Monitoring and Evaluation 3-40
3.8.4 Fire Effects Research 3-43
3.9 Public Safety 3-45
3.10 Public Education, Information, and Interpretation 3-45
3.11 Protection of Sensitive Resources 3-46
3.11.1 Cultural Resources 3-46
3.11.2 Sensitive and Other Natural Resources 3-48
3.11.3 Short and Long-term Rehabilitation Guidelines and Procedures 3-51

**4.0 Planning and Implementation 4-1**

4.1 Fire Management Responsibilities 4-2
4.1.1 Responsibilities 4-2
4.1.2 Interagency Coordination 4-5
4.1.3 Agreements 4-5
4.2 Fire Critiques and Annual Plan Review 4-5
4.2.1 Updating the Plan 4-6
4.3 Implementation Procedures 4-7
4.3.1 Funding Codes and Cost Accounting 4-7
4.3.2 Implementing Mechanical Fuels Reduction 4-9
4.3.3 Funding for Experimental Prescribed Burns, Monitoring, and Research 4-9
4.3.4 Task or Project Summary and Priorities 4-9

**5.0 References 5-1**

**Appendices**

Acronyms A-1
Photos of Fuel Hazard Conditions B-1
Species Detected on Naval Base Point Loma C-1
Cultural Resources D-1
Mutual Aid Agreements E-1
Example Burn Plan for Prescribed Fire F-1
Annual Meeting Minutes G-1
Fire Monitoring and Evaluation Protocols H-1
List of Preparers and Persons Consulted I-1
Environmental Assessment and Finding of No Significant Impact (FONSI) J-1

TABLE OF CONTENTS CROSSWALK NPS REFERENCE MANUAL 18 PAGE


**I Introduction**

1.1 Purpose and Scope of Fire Plan 1-1
1.2 Missions of Naval Base Point Loma and Cabrillo National Monument 1-2
1.3 Location and Regional Setting 1-4
1.4 Land Ownership and Land Use Summary 1-6
1.4.1 Land Ownership and Jurisdictions 1-6
1.4.2 Land Use Summary 1-10

**II Relationship to Land Management Planning/Fire Policy**

1.5 Legal Context of Fire Management 1-11
1.5.1 Federal Fire Policy 1-11
1.5.2 U.S. Navy Fire Management Policy 1-11
1.5.3 National Park Service Fire Management Policy 1-14
1.6 Planning Context for Fire Plan Development 1-15
1.6.1 Navy Planning Context 1-16
1.6.2 National Park Service Planning Context 1-18
1.6.3 Integrating the Navy and National Park Service Planning Processes 1-19

**III Wildland Fire Management Strategies**

**A. General Management Considerations**

1.8 Wildland Fire Management Capability, Roles, and Responsibilities 1-21
1.8.1 Fire Response Capability and Responsibility 1-21

**2.0 The Fire Environment and Values at Risk 2-1**
2.1 Fire Environment 2-1
2.1.1 Climate 2-1
2.1.2 Aboriginal Use of Fire 2-4
2.1.3 Fire and Fuel Harvesting in the Mission and Rancho Periods 2-5
2.1.4 Recent Fire History (1890 to Present) 2-6
2.1.5 Fire Type 2-9
2.1.6 Fire Season and Fire Size 2-9
2.1.7 Ignition Sources 2-9
2.1.8 Rate of Spread 2-10
2.1.9 Fire Spread Pattern 2-10
2.1.10 Fire Intensity and Severity 2-11
2.1.11 Fire Frequency and Return Interval 2-11
2.2 Fuel characteristics 2-12
2.2.1 Fuel Types 2-12
2.2.2 Fuel Models 2-13
2.2.3 Fuel Load 2-14
2.2.4 Wildland Fire Behavior Calculations for Hazardous Fuels 2-15
2.3 Values To Be Protected 2-17

2.3.1 Facilities (Real Property) 2-17
2.3.2 Cultural Resources 2-18
2.3.2.1 History of Point Loma 2-18
2.3.2.2 Archeological Resources of Point Loma 2-21
2.3.2.3 Historical Resources on Point Loma 2-21
2.3.2.4 Fire Management and Cultural Resources 2-22
2.3.3 Natural Resource Values 2-24
2.3.3.1 Watersheds and Geology 2-24
2.3.3.2 Soils 2-24
2.3.3.3 Air Quality 2-27
2.3.3.4 Water Resources 2-28
2.3.3.5 Water Quality 2-29
2.3.3.6 Plant Communities of Point Loma 2-30
2.3.3.7 Plant Communities and Fire Effects 2-33
2.3.3.8 Wildlife Habitat Valuation in the PLER 2-40
2.3.3.9 Wildlife Populations and Fire Effects 2-42
2.3.3.10 Plant Populations 2-50
2.3.4 Recreational and Scenic Values 2-62
2.4 Invasives and Fire Effects 2-62
2.4.1 Other Disturbance Processes 2-65

### B. **Wildland Fire Management Goals**

1.7 Goals of the Wildland Fire Management Program 1-19

### **C. Wildland Fire Management Options**

3.1 General Management Considerations and Decision Context 3-1
3.1.1 Decision Framework for Evaluating Ecological Risk 3-2
3.1.2 Decision Framework for Evaluating Approaches to Fuel Hazard Management 3-3
3.2 Summary of Wildfire Management Issues 3-4
3.3 Goals and Objectives 3-6
3.9 Public Safety 3-45
3.10 Public Education, Information, and Interpretation 3-45
3.11 Protection of Sensitive Resources 3-46
3.11.1 Cultural Resources 3-46
3.11.2 Sensitive Natural Resources 3-48
3.11.3 Short and Long-term Rehabilitation Guidelines and Procedures 3-51

### **D. Description of Wildland Fire Management Strategies by Fire Management Unit (Zone) (FMU/FMZ)**

3.4 Fire Management Units 3-7

## **IV. Wildland Fire Management Program Components**

### A Wildland Fire Suppression


3.5 Wildland Fire Suppression 3-10
3.5.1 Fire Danger Prediction 3-12
3.5.2 Communication between FFD and Suppression Helicopter 3-14
3.5.3 Pre-attack Plan 3-14
3.5.3.1 Minimum Impact Suppression Tactics (MIST) 3-15
3.5.4 Extended Attack and Large Fire Suppression 3-16
3.5.5 Prevention First 3-16
3.5.6Preparedness Actions 3-17


### B Wildland Fire Use


3.6 Experimental Prescribed Fire and Wildland Fire Use 3-19
3.6.1.1 Staffing 3-21
3.6.1.2 Air Quality, Smoke Management, and Visual Resources 3-22


### C Prescribed Fire


1.8.2 Prescribed Fire 1-22
1.8.3 Responsibility for Natural and Cultural Resource Programs 1-23
3.6 Experimental Prescribed Fire and Wildland Fire Use 3-19
3.6.1 Experimental Prescribed Burn Plan 3-19
3.6.2 Potential Impacts of Experimental Prescribed Fire 3-23
3.7 Fuels Management 3-23
3.7.1 Strategic Fuelbreaks Not Recommended 3-23
3.7.2 Prescribed Fire for Fuel Hazard Reduction 3-24


### D Non-Fire Fuel Applications


3.7.3 Mechanical Treatment for Fuel Hazard Reduction 3-24
3.7.3.1 Survivable Space 3-26
3.7.3.2 Eucalyptus Grove Replacement Trees 3-33
3.7.3.3 Building With Fire Resistant Materials 3-34
3.7.3.4 Roadside Management 3-36
3.7.3.5 Annual Maintenance and Compliance Inspection 3-37


### E. Emergency Rehabilitation and Restoration

## V. Organization and Budget


4.1 Fire Management Responsibilities 4-2
4.1.1 Responsibilities 4-2
4.1.2 Interagency Coordination 4-5
4.1.3 Agreements 4-5
4.2 Fire Critiques and Annual Plan Review 4-5

4.2.1 Updating the Plan 4-6
4.3 Implementation Procedures 4-7
4.3.1 Funding Codes and Cost Accounting 4-7
4.3.2 Implementing Mechanical Fuels Reduction 4-9
4.3.3 Funding for Experimental Prescribed Burns, Monitoring, and Research 4-9
4.3.4 Task or Project Summary and Priorities 4-9

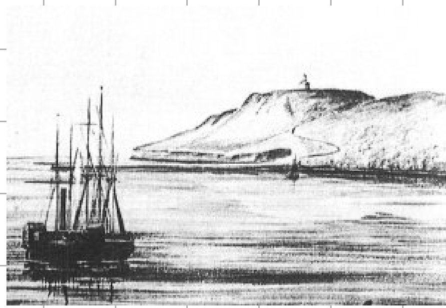
**VI. Monitoring and Evaluation**

3.8 Fire Reporting, Monitoring, Evaluation, and Research 3-37
3.8.1 Fire Reporting 3-37
3.8.2 Live Fuel Moisture Monitoring 3-37
3.8.3 Fire Effects Monitoring and Research 3-43

**Glossary**

**Appendix**

Acronyms A-1
Photos of Fuel Hazard Conditions B-1
Species Detected on Naval Base Point Loma C-1
Cultural Resources Map for Point Loma related to
Fire Management (confidential-not for public distribution)
and San Diego Metro Programmatic Agreement D-1
Mutual Aid Agreements E-1
Annual Preparedness Meeting Minutes G-1
Burn Plan F-1





# 1.0 Introduction

## 1.1 Purpose and Scope of Fire Plan

The purpose of this Joint Wildland Fire Management Plan (JWFMP or Fire Plan) for Naval Base Point Loma (NBPL) and Cabrillo National Monument (CNM) is to:

- Protect personnel, facilities, and natural and cultural resources from the impacts of wildland fire;
- Prioritize assets to be protected in the event of a fire;
- Ensure the perpetuation of native terrestrial habitats, fire adapted plant communities, and rare species; and
- Minimize the total cost of fire pre-suppression and suppression practices on lands owned by the U.S. Navy and National Park Service (NPS) on Point Loma.

The JWFMP is a strategic document that guides the full range of fire management related policy, management, and decisions, including evaluating the potential for allowing fire to play its natural ecological role. The scope of this Fire Plan is to address fire management in the natural wildland areas of Point Loma, and in the interface between the wildland and built environments.

Federal agencies owning land with vegetation capable of sustaining fire will develop a Fire Management Plan (FMP), according to federal wildland fire policy (USDI/USDA 1995, revised in 2001 and found at http://www.nifc.gov/fire_policy/docs/exsum.pdf). This policy was signed by the Department of Interior (USDI), and adopted by the Department of Defense (DOD) through DOD Instruction (INST) 6055.6 (Fire and Emergency Services Program October 10, 2000).

This Fire Plan provides a framework for managing wildland fire, which is a natural component of the ecosystem, such that firefighter and public safety are not compromised. It is consistent with the resource protection and management objectives of Naval Base Point Loma (NBPL) as described in its Integrated Natural Resource Management Plan (INRMP), and Cabrillo National Monument (CNM) as described in its General Management Plan (GMP) (USDI NPS 1996) and Resource Management Plan (RMP) (CNM 1998).

## 1.2 Missions of Naval Base Point Loma and Cabrillo National Monument

This JWFMP is intended to support the purposes for which both NBPL and the CNM were established. The Navy has a primary mission of national security, as set forth in Title 10 of the U.S. Code, which states that the U.S. Navy must be prepared to conduct prompt and sustained combat operations in support of national interest.The Navy's mission of natural and cultural resource conservation is performed within this context.The military mission of NBPL is to provide direct day-to-day operation of NBPL support functions and to ensure that NBPL serves the Pacific Fleet and tenant commands.The mission of each of the individual tenant commands on NBPL is unique. Specific mission statements for each tenant command and other federal, state, and city tenants are shown in Table 1-1, along with their major responsibilities.

*Table 1-1. Missions of major tenants of Point Loma. Source: U.S. Navy 2002. The military mission of NBPL is to provide direct day-to-day operation of NBPL support functions and to ensure that NBPL serves the Pacific Fleet and tenant commands.*

| Landowner/ Tenant | Mission |
|---|---|
| Naval Base Point Loma | |
| Naval Submarine Base San Diego (SUBASE) | The mission of SUBASE is to provide support to the U.S. Pacific Fleet Submarine Force and other sea-going and shore-based tenant commands. SUBASE provides shore facilities, three deep draft piers, industrial maintenance support buildings, the ARCO dry dock, bachelor quarters and dining facilities, submarine training facilities, torpedo retrievers and support craft, a torpedo/missile magazine complex, and the attendant support infrastructure of utilities, roads, and grounds. |
| Space and Naval Warfare Systems Center (SSC) | SSC's mission is to be the Navy's full-spectrum research, development, test and evaluation, engineering, and fleet support center for command, control, and communication systems and ocean surveillance and the integration of those systems which overarch multiplatforms. |
| Fleet Combat Training Center, Pacific (FCTCPAC) | FCTCPAC's mission is to provide training in the operation and employment of specified tactical combat direction and control systems in Naval warfare and to support operational commanders in the evaluation, development, and analysis of Naval warfare doctrines and tactics. |
| Fleet Industrial Supply Center (FISC) | FISC's mission is to provide logistics, business, and support services to fleet, shore, and industrial commands of the Navy, Coast Guard, and Military Sealift Command, and other U.S. and foreign government agencies. FISC San Diego supports operational readiness by teaming with regional partners and customers to provide material management, procurement, contracting and transportation services, technical and customer support, defense fuel products, and worldwide movement of personal property. |
| Magnetic Silencing Facility (MSF) | MSF provides magnetic silencing and deperming requirements, and check ranging and reporting procedures, using the basic principles and background of degaussing. When a ship has gathered more permanent magnetism than its degaussing coils can compensate for, the ship is referred to the deperming facility. The ship is wrapped in cable and high-voltage direct current passed through the cable. This action reduces the magnetism to a level that the onboard degaussing coils can handle. |
| Cabrillo National Monument (CNM), National Park Service (NPS) | The National Park Service was established by the Organic Act of 1916. The mission of the NPS is to preserve unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of the public. The Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world. |

The Organic Act of 1916 founded the NPS with the mission to perpetuate natural conditions and processes, preserve cultural resources, and provide for public enjoyment, as specified by the enabling legislation and other legal mandates.The agency has an overriding preservation mission rather than multiple use.

On Point Loma, the NPS owns and manages the CNM, an approximately 160-acre park, under the authority of 16 U.S.C. Section 1 et seq. The monument was established by President Woodrow Wilson (Presidential Proclamation No. 1255, October 14, 1913) under authority of the Antiquities Act to commemorate the first European discovery of what would become the western coast of the United States by Juan Rodriquez Cabrillo in 1542, who is thought to have come ashore on Ballast Point at the sheltered eastern side of Point Loma. The initial proclamation set aside one-half acre of land around the Point Loma Lighthouse for construction of a “heroic statue of Juan Rodriguez Cabrillo.”

The one-half acre monument was transferred from the War Department to the NPS in 1933. Additions to the monument have increased its size as well as its cultural and natural resource value. It was enlarged by 80.5 acres (Presidential Proclamation No. 3273) in 1959, and by 56.6 acres (Presidential Proclamation No. 4319) in 1974. Both documents state that "the additional land is essential to the proper care and management of the historical landmarks and historical objects of the area." A 16-acre parcel that the NPS had been administering since 1972 was transferred as excess Navy land to the monument in 2000. The 6.88-acre maintenance site (described in Point Loma (PLO) 5234 of July 14, 1972) on lands withdrawn from the Bureau of Land Management (BLM) was also included in this boundary adjustment. With each addition came lands with significant natural and cultural resources values.

With the expansion of the monument and the mandate of the NPS Organic Act and its amendments, the purpose of CNM has expanded to include the following:

- Commemorate the 1542 voyage of exploration and the accomplishments of Juan Rodriguez Cabrillo and communicate this story and its significance to visitors and local residents.
- Preserve, restore, protect, interpret, and enhance the significant cultural and natural resources within the park, and adjacent to the park on lands that are administered by the NPS, including the tide pools and CNM lands in the Point Loma Ecological Conservation Area (PLECA).
- Provide visitors the opportunity to enjoy one of the great harbor views of the world and to experience and understand the relationship humans have with their land and sea environment.
- Provide a safe, pleasant environment, accessible to all, in which to enjoy the resources and programs of the park.
- Maintain cordial, productive relationships with adjacent U.S. Navy commands, other federal agencies, city, county and state entities, and cooperating association, conservation, planning, and cultural organizations in the San Diego area.

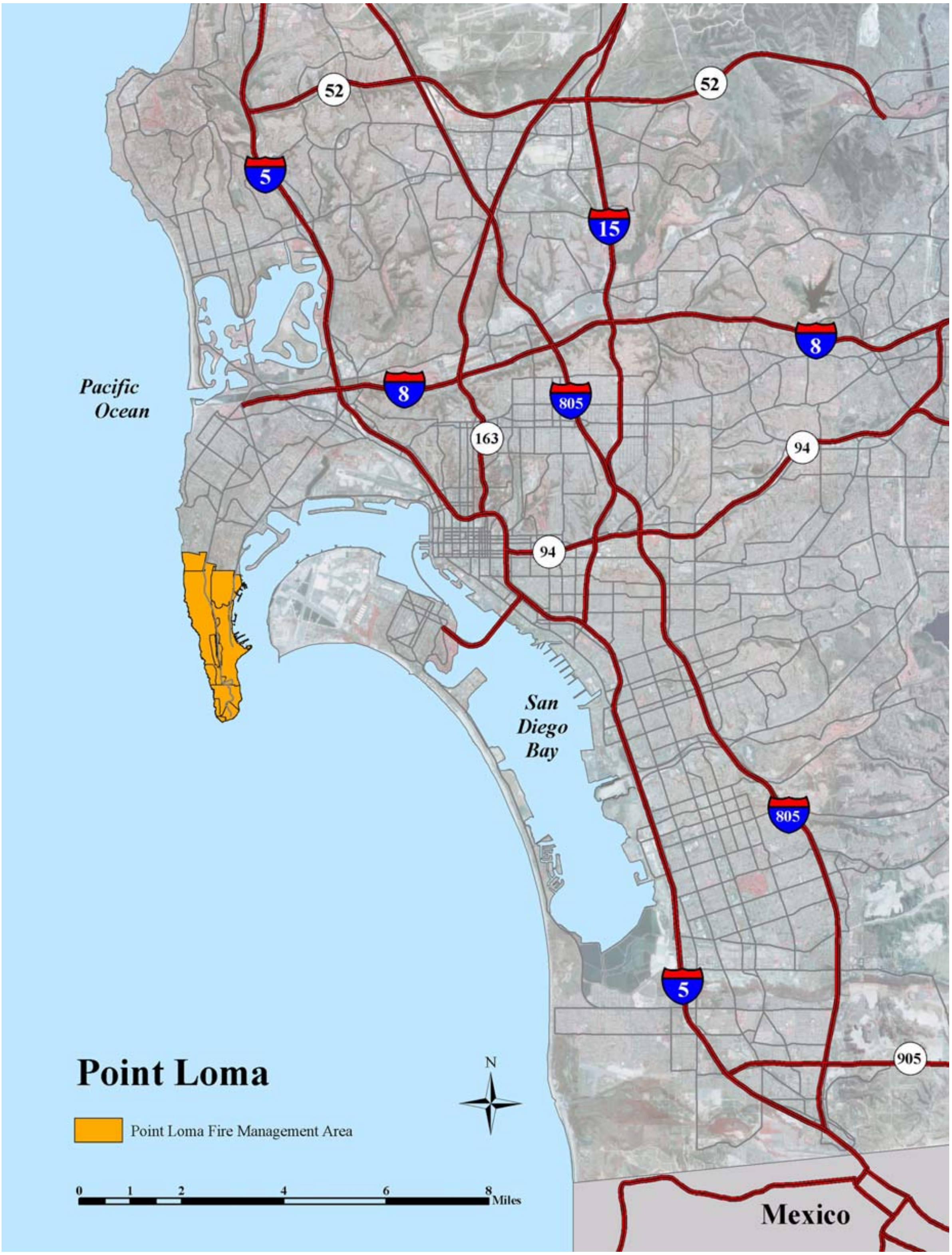
## 1.3 Location and Regional Setting

The Point Loma Peninsula extends four miles south into the Pacific Ocean, sheltering the entrance to San Diego Bay in metropolitan San Diego, California, approximately four miles west of the city’s downtown core. Access to the peninsula is provided by Catalina Boulevard/Cabrillo Memorial Drive and Rosecrans Street. Principal highways in the vicinity of Point Loma are Interstate 5 (I-5), which begins at the U.S.– Mexican border approximately 14 miles south of downtown San Diego and continues northward, and I-8, which provides access to eastern San Diego County and destinations farther east. Map 1-1 shows the regional location of the Point Loma Peninsula.

NBPL occupies a majority of land on the Point Loma peninsula and adjacent marine assets. NBPL lands, while administered by Commander Navy Region Southwest (CNRSW) on behalf of the Commander, Naval Installations (CNI), are occupied by seven major tenant commands. Five of these are located on the peninsula, one is located adjacent to San Diego Bay, and one on Marine Corps Air Station (MCAS) Miramar. For the purposes of this Fire Plan, the NBPL lands are those located on the Point Loma peninsula up to 300 yards seaward (beyond the mean lower low water line) along both sides of the peninsula. Map 1-2 shows the land ownership (all federal landholders) on Point Loma with jurisdictional boundaries.

CNM is located on the southern end of Point Loma within the city limits of San Diego. From its 420-foot elevation, the monument offers a magnificent view of San Diego and its bay and adjacent cities to the north, east, and south; Mexico to the far south; and the Pacific Ocean to the west. The property is bordered by Naval Submarine Base San Diego (SUBASE), on the north and northeast; Space and Naval Warfare Systems Center, San Diego (SSC) on the north, south and west; the City of San Diego PLWTP on the northwest; and the U.S. Coast Guard (USCG) Point Loma Light Station on the southwest. Access to PLWTP, USCG Light Station, and Battery Humphrey is through the park. Access to the park is along Cabrillo Memorial Drive, and is controlled by NBPL.

Other land uses on Point Loma include the City of San Diego's PLWTP, Ballast Point Coast Guard Station; Fort Rosecrans National Cemetery; residential neighborhoods of Point Loma, Loma Portal, and Ocean Beach; the Point Loma Nazarene University; a support facility for the University of California, Scripps Institution of Oceanography; Sunset Cliffs Park; and Shelter Island.




*Map 1-1. Point Loma regional location.*

# 1.4 Land Ownership and Land Use Summary

## 1.4.1 Land Ownership and Jurisdictions

Table 1-2 shows acreages of the major government landholders and tenants on Point Loma, totaling about 1, 511 land acres. In 1995 approximately 668 acres of Point Loma was designated as an ecological reserve, entitled the Point Loma Ecological Conservation Area (PLECA), to be protected and restored by the US Navy, National Park Service, and other land holders. Lands involved in the PLECA are summarized in Table 1-3. Jurisdictional boundaries are shown on Map 1-2, and those involved in the PLECA on Map 1-3.

*Table 1-2. Approximate acreages of major landholders and tenants on Point Loma.*

| Complex | Land | (Submerged Lands) Water | Total |
|---|---|---|---|
| Naval Base Point Loma | 1,226.5 | 418.4 | 1,645 |
| Naval Submarine Base San Diego | 325 | 99 | 424 |
| Space and Naval Warfare Systems Center, San Diego | 597 | 277 | 874 |
| Fleet Combat Training Center, Pacific | 94 | 41 | 135 |
| Naval Station Magnetic Silencing Facility | 19.5 | 1.4 | 21 |
| Fleet Industrial Supply Center | 191 | 0 | 191 |
| Public Works Center Housing | 2.6 | 0 | 2.6 |
| National Park Service | 160 | 0 | 160 |
| City of San Diego Point Loma Metropolitan Wastewater Department Treatment Plant | 42 | 0 | 42 |
| Department of Veterans Affairs/Fort Rosecrans | 71 | 0 | 71 |
| U.S. Coast Guard | 11.5 | 0 | 11.5 |
| U.S. Army Corps of Engineers | 0 | 120 | 120 |
| **Total** | **1,53.7** | **538.4** | **2,052** |

NOTE: Navy land acreages from INRMP (U.S. Navy 2002). An additional 254 acres of in-water resources are within the NBPL boundary, including 36 acres adjacent to FISC, 75 acres adjacent to MSF, 61 acres adjacent to SSC, and 82 acres adjacent to SUBASE. U.S. Army Corps of Engineers owns submerged land on west shore; this land is managed by NPS through a Cooperative Agreement DACA09-4-00-0001.

*Table 1-3. PLECA acreage, with boundaries as delineated in NBPL INRMP (Map 1-3).*

| PLECA Agency | Approximate Totals Based on NBPL INRMP |
|---|---|
| Naval Base Point Loma | 527 |
| National Park Service | 130 |
| City of San Diego Point Loma Metropolitan Wastewater Department Treatment Plant | 8.9 |
| Department of Veterans Affairs/Fort Rosecrans | 1.1 |
| U.S. Coast Guard | 1.5 |
| **Total** | **668** |

The U.S. Navy owns in fee the 1,226 acres of land and 418 acres of water that comprise NBPL lands on the Point Loma Peninsula. The land is owned by CNI and occupied by major tenant commands, five of which harbor burnable vegetation and therefore are addressed in this Fire Plan:

- Naval Submarine Base San Diego (SUBASE)
- Space and Naval Warfare Systems Center, San Diego (SSC [formerly NCCOSC, NRAD, and NOSC])

- Fleet Combat Training Center, Pacific (FCTCPAC)
- Fleet Industrial Supply Center (FISC) Fuel Depot
- Naval Station Magnetic Silencing Facility (MSF)

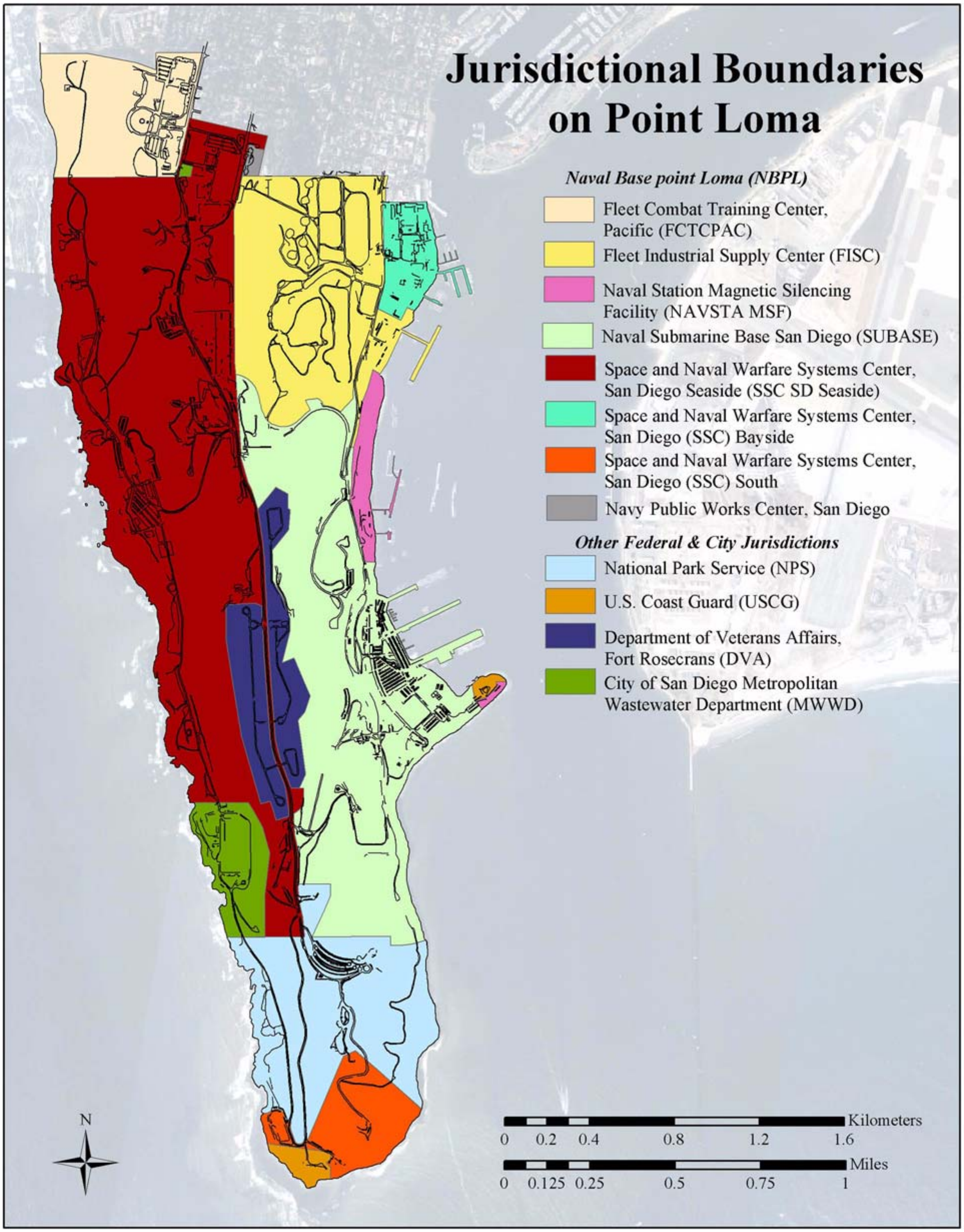
Several real estate agreements affect CNM land use:

- CNM administers submerged lands through a Cooperative Agreement with the U.S. Army Corps of Engineers (No. DACA09-4-00-0001). These constitute approximately 120 acres of rocky intertidal area (tide pools) on the west side of the monument. The area extends seaward 300 yards from mean lower low water (MLLW), and from the monument boundary with the PLWTP on the north to a point 300 yards east of the Point Loma Lighthouse.
- The Presidential Proclamations that expanded the monument also retained the right of DOD to continue to use CNM lands:

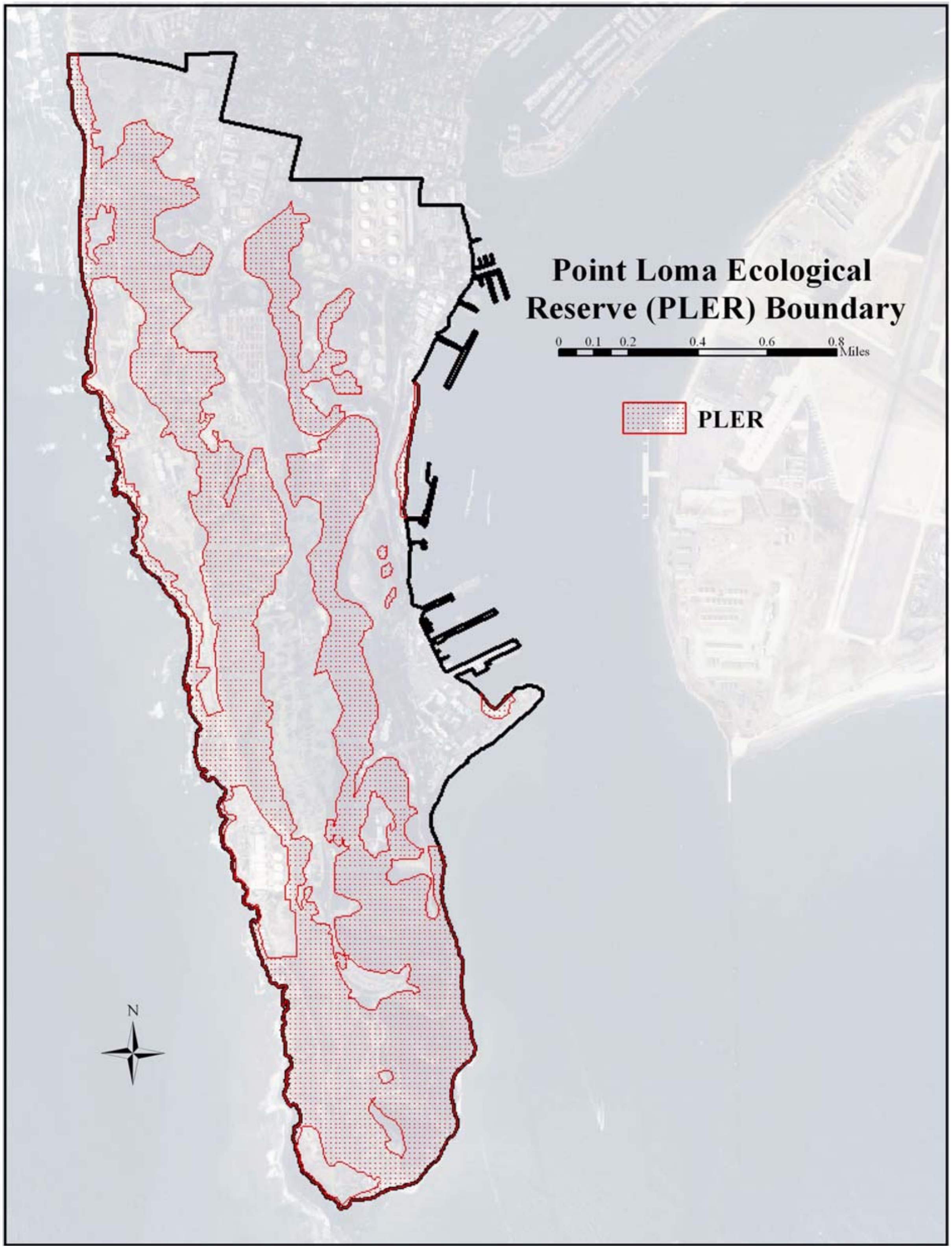
  > "The land... shall be subject... to the right of the Department of Defense to retain, for such length of time as required by it, the use of roads and utilities now being used by it, and the right to require that no activity will be conducted within the monument that would interfere with defense activities being conducted in the vicinity thereof."

- An Interagency Agreement between the NPS and the Navy (SUBASE), designates a portion of the land described in PLO 5234 as a buffer zone (explosive arc). Since the buffer zone precludes the "use" of the old maintenance building, the agreement provides a replacement structure within NBPL (new maintenance building). The building can be used for storage and other purposes, and persons can come and go from the site but they cannot stay in the area for long periods of time on a regular basis.
- Walking access to the Bayside Trail is provided by U.S. Navy license (N6871192RP02P73) for use of portions of the road to Battery Humphrey and Sylvester Road. This trail is a remnant of Sylvester Road on the Submarine Base.

The NPS has issued a Right of Way Permit to the City of San Diego for the construction, use, and maintenance of Cabrillo Road in exchange for access to the Pont Loma Wastewater Treatment Plant.




*Map 1-2. Jurisdictional boundaries on Point Loma.*




*Map 1-3. Point Loma Ecological Reserve boundaries.*

## 1.4.2 Land Use Summary

Table 1-4 summarizes land uses of major government landholders of Point Loma.

*Table 1-4. Land uses of major landowners, including tenants, of Point Loma. Source: U.S. Navy 2002.*

| **Landowner/** Tenant | **Land Use** |
|---|---|
| Naval Base Point Loma | |
| Naval Submarine Base San Diego (SUBASE) | SUBASE occupies approximately 325 acres (and 99 acres in the water) from the Point Loma ridge to San Diego Bay, mostly unstable hillsides with more than 25 percent slope. Of the existing land area, 114 acres are currently developed for operations, training, administration, housing, storage, and shops, while the remaining 180 natural acres are not suitable for development due to steepness of the terrain, or they function as necessary buffers between ordnance storage and handling points on SUBASE and all public access routes and facilities. These zones, known as Explosive Safety Quantity Distance (ESQD) arcs, minimize the risk to the public in the event of an explosive accident. Another constraint to development on SUBASE is the electromagnetic interference (EMI) free zone surrounding the deperming facility. |
| Space and Naval Warfare Systems Center (SSC) | SSC, one of the Navy's principal research, development, test, and evaluation centers, occupies the largest portion of land of the seven major tenant commands, with almost 600 acres in four locations: Topside, Bayside, Seaside, and South Tip. Approximately 176 acres are currently developed, while the remaining 435 acres are comprised primarily of maritime succulent scrub and chaparral. Approximately 277 acres of in-water resources are off SSC lands. SSC facilities include storage areas, research laboratories, and public works shops. SSC Bayside provides tide pool parking, waterfront access, and berthing capabilities for SSC's research activities, such as the marine mammal program. |
| Fleet Combat Training Center, Pacific (FCTCPAC) | FCTCPAC occupies 94 acres, plus 41 acres of in-water resources. Its facilities support training, operations, administration, and supply and storage. Development is limited to approximately 35 percent of the 94 acres because the undeveloped slopes exceed 20 percent. These steep slopes serve as an electronic warfare signal test range. |
| Fleet Industrial Supply Center (FISC) | The FISC property (191 acres) is mainly developed with fuel tanks and support facilities, but supports steep, vegetated hillsides of coastal sage scrub and chaparral. |
| Magnetic Silencing Facility (MSF) | MSF (21 acres, including 1.4 acres of submerged) Includes underwater sensor ranges which measure the distortion in the earth's magnetic field surrounding each ship which passes over the ranges. It is this distortion or electromagnetic anomaly, which could set off magnetic mines or allow the ship's detection. Non-developed portions of the property are restricted for development as part of an EMI free zone. |
| U.S. Coast Guard (USCG) | The Ballast Point Coast Guard Station occupies 2.8 acres adjacent to MSF and SUBASE where operations buildings support berthing for Coast Guard ships. The Coast Guard's lighthouse at the southwestern tip of Point Loma was built in 1891. The 8.7-acre parcel on which the lighthouse and associated buildings sit ("the Point Loma Annex") bisects SSC's South Tip area of use. |
| Department of Veterans Affairs (DVA) | DVA is a burial ground that existed on Point Loma prior to 1847, and became an Army Post cemetery in the 1860s. It became the Fort Rosecrans National Cemetery in 1934, and more than 80,000 veterans are buried here. The 71-acre site is a designated California State Historic Landmark Number 55. |
| City of San Diego Metropolitan Wastewater Department (MWWD) | MWWD's facility (42 acres) is located on the west side of Point Loma, between CNM on the south and SSC Seaside on the north. The main sewer interceptor from the City of San Diego runs the length of Point Loma to the plant, as does the solid waste (sludge) pipeline from Point Loma to the Metropolitan Biosolids Center at MCAS Miramar. The Plant was opened in 1963 and treats up to 190 million gallons of wastewater per day from a 450-square mile area. |
| Cabrillo National Monument (CNM) | The 160 acre CNM commemorates the first time that a European expedition set foot on what later became the west coast of the United States. On September 28, 1542, Juan Rodríguez Cabrillo landed at San Diego Bay. His accomplishments were memorialized on October 14, 1913 with the establishment of CNM. |

## 1.5 Legal Context of Fire Management

This section discusses the legal context of fire policy for both the Navy and NPS. Section 1.6 “Planning Context for Fire Plan Development” addresses the broader legal and planning setting.

### 1.5.1 Federal Fire Policy

The Federal Wildland Fire Management Policy and Program Review of 1995[1] established a new direction for wildland fire management that represents a significant departure from past management practices. Previous federal fire policy for areas with native vegetation was strictly to suppress all fires, and all fires were classified as wildfires. The philosophy behind this newer policy is to more effectively recognize the importance of fire in defining wildland landscapes and the need to consistently and professionally manage wildland fire and vegetative fuels. Through shared resources, improvement in the efficiency and effectiveness of wildland fire management is expected, especially as it relates to improving human safety within wildland management boundaries, and in ecosystem management. The intent of the new policy is to move beyond traditional fire suppression to integrating wildland fire into land management and environmental health planning. Major aspects of the new federal fire policy are summarized in Table 1-5.

### 1.5.2 U.S. Navy Fire Management Policy

Federal Fire Policy was adopted by the DOD Wildland Fire Policy Working Group in 1996. It was made DOD fire policy through DODINST 6055.6 (Fire and Emergency Services Program October 10, 2000). This Instruction requires that fire department and natural resources preparedness and response to wildland fires shall be in accordance with federal policy, and provides criteria for the allocation, assignment, operations, and administration of the DOD Fire and Emergency Services (F&ES) and Emergency Medical Service programs. It states:

> E2.5.9. Wildland Fire Preparation and Response. Fire department and natural resources preparedness and response to wildland fires shall be in accordance with the Federal Wildland Fire Management Policy and Program Review of 1995 and the Interagency Fire Management Agreement (reference (l)), except as covered under DOD Directive 3025.15 (reference (m)). The Department of Defense shall establish and maintain voting membership in the National Wildfire Coordinating Group to facilitate the development of policy, standards and training with the Federal wildland agencies. The Department of Defense shall establish and maintain a fire protection specialist position at the National Interagency Fire Center to represent DOD wildland fire requirements, coordinate the use of military assets through the Director of Military Support, and manage the wildland fire qualification system for the Department of Defense.

1. Following the disastrous fire seasons of 1987-1990s culminating in the Colorado Storm King fire, the Secretaries of Agriculture and Interior commissioned an interagency task force to examine current fire suppression policies and propose needed changes. The resulting National Fire Plan was signed by both Secretaries in 1995, and mandated that all federal agencies with wildlands prepare wildland fire management plans. The National Fire Plan was updated in 2000 and reissued in 2001.

*Table 1-5. Brief summary of federal wildland fire policies (USDI/USDA 1995, revised in 2001).*

**PRIORITIES**

Firefighter and public safety is the first priority. All fire management plans and activities must reflect this commitment.
Protection priorities are: (1) human life; and (2) property and natural/cultural resources. If it becomes necessary to prioritize between property and natural/cultural resources, this is done based on relative values to be protected, commensurate with fire management costs. Once people have been committed to the incident, these resources become the highest value to be protected.

**COST AND ECONOMIC EFFICIENCY**

Fires are suppressed at minimum cost, considering firefighter and public safety, benefits, and values to be protected, consistent with resource objectives.
Fire management programs and activities will be based on economic analyses that incorporate commodity, non-commodity and social values.

**ECOLOGICAL ROLE OF FIRE**

Wildland fire will be used to protect, maintain, and enhance resources and, as nearly as possible, be allowed to function in its natural ecological role.

**PLANNING**

Every area with burnable vegetation must have an approved Fire Management Plan (FMP). FMPs must be consistent with firefighter and public safety, values to be protected, and land and resource management plans and must address public health issues. FMPs must also address all potential wildland fire occurrences and include the full range of fire management actions.
Agencies will use compatible planning processes, funding mechanisms, training and qualification requirements, operational procedures, values-to-be-protected methodologies, and public education programs for all fire management activities.

**GUIDING PRINCIPLES**

- Safety is top priority.
- Plan for fire as an essential ecological process.
- Support land and resource management plans.
- Fire policy is established on a foundation of sound risk management.
- Fire management must be economically viable.
- Fire management is based on the best available science.
- Public health and environmental quality are considered.
- Coordination and cooperation are essential.
- Fire management involves ongoing standardization of policy and procedures.

The Office of the Deputy Undersecretary of Defense for Installations and Environment (ODUSD[I&E]) signed the review and update of the Federal Wildland Fire Policy of 1995. The ODUSD(I&E) is in the process of developing a “DOD Wildland Fire Strategic Plan” and a related DOD Instruction (Boice, *pers. comm.* 2003). Other fire program-related guidance is found under DODINST 6055.6-M (DOD Firefighting Certification Program December 1995, National Fire Protection Association “National Fire Codes”) and DOD 8910.1-M (DOD Procedures for Management of Information Requirements, June 1998). Naval Operations Instruction (OPNAVINST) 11320.23F also specifically establishes policies, standards, guidance, and responsibilities for administering the Navy-wide Shore Activities Fire Protection and Emergency Services Program.

Other Navy policies related to safety and security affect the management of wildland vegetation, and therefore, how fuels in this environment are managed. For example, security requirements along the perimeter fence lines are designed to provide visibility to detect intruders. These requirements for security of the Navy fence line and perimeter "clear zone" are in OPNAVINST 5530.14C (Navy Physical Security, 1 May 2001), and OPNAVINST 5530.13B (Physical Security Instruction for Conventional Arms, Ammunition, and Explosives, 5 July 1994 incl. CH-1 of 2 June 1999). OPNAVINST 5530.14C, Chapter 6 states:

- 0602a: Physical barriers will be established along the designated perimeter of all restricted areas.
- 0603a: Federal standards and specifications for chain link fencing are outlined.
- 0606a: Where fences are used as restricted area perimeter barriers, an unobstructed area or clear zone should be maintained on both sides of the restricted area fence. The purpose of such areas is defeated if vegetation is high enough to provide concealment of a person lying prone on the ground.
- 0606b: An inside clear zone should be at least 30 feet. Where possible, a larger clear zone should be provided to preclude or minimize damage from incendiaries or bombs.
- 0606c: The outside clear zone should be 20 feet or greater between the perimeter barrier and any exterior structures, vegetation or any obstruction to visibility.
- 0606e: All fencing should be kept clear of visual obstructions such as vines, shrubs, tree limbs, etc., which could provide concealment for an intruder.

The term "clear zone" does not dictate that the area is devoid of all vegetation. Rather, the height of vegetation is restricted so that intruders can be detected and a clear line of sight is available to security personnel. Height restrictions call for eight-inch vegetation along fence lines for 30 feet inside the fence and 30 feet outside. In addition, when a tree is rooted outside the 20-foot buffer, its branches may not span the fence line so that people might climb across. Security forces are required to check the fence line and the associated clear zone weekly for defects or signs of illegal intrusion.

In addition to the above security needs, vegetation clear zones are also required for safety reasons in areas with magazines for storing ordnance. These requirements for managing vegetative fuels are in Naval Sea Systems Command Ordnance Pamphlet 5, Volume 1 "Ammunition and Explosives Safety Ashore Regulations for Handling, Storing, Production, Renovation and Shipping." Vegetation may be no higher than 18 inches atop of, and within 50 feet of, the toe of ordnance storage magazines. There are also restrictions on the construction of buildings to be occupied by people, and others intended to limit the exposure of personnel to a three-dimensional "bubble" around magazines called an Explosive Safety Quantity Distance (ESQD) arc. This benefits natural and cultural resource protection by limiting development and access by humans.

Finally, and also to reduce the risk of fire, fuel storage tank areas at the Fleet Industrial Supply Center (FISC) Fuel Depot are maintained with mandatory clear zones as dictated in DOD 4140.25-M (DOD Management of Bulk Petroleum

Products, Natural Gas, and Coal). Since this is a *wildland* fire management plan and fire escape from these facilities is extremely unlikely, additional fire protection measures are not proposed in this document.

### 1.5.3 National Park Service Fire Management Policy

The legal authority for preparing and implementing the JWFMP for CNM is 16 United States Code (USC) 1 through 4, which is the 1916 Organic Act for the NPS, and the General Authorities Act of 1970, as amended, which established the national park system and clarified the authorities applicable to the system. The Organic Act states:

> "There is created in the Department of the Interior a service to be called the National Park Service...to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment for the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

These laws say that NPS may not allow the impairment of its resources and values except as authorized specifically by Congress. Impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources and values (NPS DO-55).

As a result of the adoption of 1995 federal wildland fire policy by the USDI, the NPS revised its policy on fire, which is now expressed in Director’s Order (DO) -18 "Wildland Fire Management," supplementing NPS Management Policies (1988). Reference Manual 18 (1999), issued by the Associate Director, Park Operations and Education, describes the technical details of wildland fire management requirements and procedures and provides definitions and expanded guidance of the information presented in DO-18.

According to DO-18, wildland fire may contribute to or hinder the achievement of park management objectives. All park service units with burnable vegetation must prepare a FMP to guide a program that is responsive to the park's natural and cultural resource objectives and to provide safety considerations for park visitors, employees, and developed facilities; and addresses potential impacts to public and private property adjacent to the park. The purpose of DO-18 is to:

1. Institutionalize within the NPS the new policies, organizational and operational relationships, and changes in law and reporting requirements reflected in the 1995 Final Report of the Federal Wildland Fire Management Policy and Program Review; and
2. Establish a framework by which the NPS will implement the report's principles, policies, and recommendations. The provisions of this DO supersede all previous NPS instructions, requirements and statements of policy relating to wildland fire management that may be in conflict.

DO-18 further states that the Environmental Assessment (EA) developed in support of the FMP will consider effects on air quality, water quality, health and safety, and natural and cultural resource management objectives. Until a FMP is approved, parks must aggressively suppress all wildland fires, taking into account the resources to be protected along with firefighter and public safety.

DO-18 also explains the history of how national fire policy has changed over the past century. From 1916 to 1968, national policy was strictly to suppress all fires. All fires, whatever their size or origin, were considered wildfires and suppressed as quickly as possible. The fact that the presence of fire and other natural disturbances was essential and normal for plant and animal communities was not recognized. Further evidence showed that lack of fire was a major contributor to increasing fuel accumulations, especially in forest communities. The Leopold Report (Leopold *et al.*1963) underscored the importance of restoring ecological processes. In response to that report, NPS fire management policy changed dramatically in 1968. Naturally ignited fires were recognized as “natural phenomena” and use of prescribed fire was accepted as a means of achieving resources and fuel reduction objectives. During the past 30 years the national program has developed in recognition of the complexity of fires on the landscape and the professional skills needed for fire management.

Building and fire codes for NPS historic structures is an issue of structural fire rather than wildland fire, and is dictated by DO-58, with guidance provided in Reference Manual 58. The Director’s Order states:

1. The National Park Service structural fire program will protect from damage or loss, to the greatest extent possible, cultural resources, including historic and prehistoric structures, museum and archival collections, and associated collection records.
2. Structural fire management programs involving cultural resources will comply with appropriate NFPA codes and standards.
3. Due to the many considerations involved in working with historic structures, all efforts to protect such structures must be multi-disciplinary in approach. It is important that all the disciplines involved in preserving and maintaining historic structures—such as Facility Management, Cultural Resources, and others—are included in decisions involving the structural fire safety of historic buildings.
4. Collection areas will be provided early warning detection and suppression systems in compliance with applicable National Fire Protection Association (NFPA) codes and standards.
5. Specific requirements for automatic suppression systems and detection equipment are provided in Reference Manual 58.

## 1.6 Planning Context for Fire Plan Development

As introduced in Section 1.5 “Legal Context of Fire Management,” this Fire Plan complies with relevant laws and regulations, and is consistent with key land management policy and planning documents of both the Navy and NPS. It is consistent with the National Historic Preservation Act (NHPA) (16 U.S.C. 470-1) in that it provides for protection of archeological and historic resources of the U.S. by specifically identifying how to protect them in the event of fire. It also meets requirements of the Endangered Species Act (ESA), the Clean Air Act (CAA) and Amendments, and the Clean Water Act (CWA). The Fire Plan is also consistent with the Migratory Bird Treaty Act (MBTA).

The National Environmental Policy Act (NEPA) requires documentation of how environmental choices are made. Since it is a federal action, every fire management plan must be accompanied by a NEPA document that evaluates the environmental consequences of the actions proposed in the Plan. An EA has been prepared to meet the requirements of NEPA, and is appended (bound separately) to this JWFMP.

### 1.6.1 Navy Planning Context

The legal authority for the Navy's protection of natural resources is the Sikes Act Improvement Act (SAIA) of 1997 (16 USC Section 670a), which directed that the Secretary of Defense shall carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. In keeping with the principal mission of DOD installations ensuring the preparedness of the U.S. Armed Forces, the SAIA mandates that an INRMP shall provide for no net loss of the capability of the installation's lands to support the military mission while providing for conservation and rehabilitation of natural resources. An INRMP is an ecosystem-based plan intended to guide installation commanders in managing their natural resources in a manner that is consistent with sustainability of those resources while ensuring continued support of the military mission.

This Fire Plan is consistent with the goals and objectives outlined in the NBPL INRMP and with OPNAVINST 5090.1B CH-4 (4 June 2003) "Environmental and Natural Resource Program Manual." As stated in the INRMP, these are:

"to provide guidelines for implementing an ecosystem-based program that provides for conservation and rehabilitation of natural resources in a manner that:

- Fulfills requirements set forth in the SAIA of 1997 (16 U.S.C. 670a et seq.), DOD Instruction (DODINST) 4715.3: Environmental Conservation Program of 5 May 1996, and OPNAVINST 5090.1B CH-2;
- Is compatible with the military mission;
- Integrates and coordinates all natural resources management activities;
- Provides for sustainable multipurpose uses of natural resources;
- And when appropriate, provides for public access for use of natural resources subject to safety and military security considerations."

The INRMP contains a number of objectives that may be summarized as follows:

- *Inventory and Monitoring.* Conduct baseline natural resource inventory and monitoring in coordination with adjacent landowners, with a shared database. Monitor and determine potential effects of land uses adjacent to the PLECA;
- *Vegetation.* 1) Conduct a wetland delineation on NBPL. 2) Update 1993 rare plant survey for NBPL. 3) Continue research and protection of the federally endangered Orcutt's spineflower *(Chorizanthe orcuttiana)*. 4) Prepare and implement an invasive exotic plant species control plan. 5)

Prepare and implement a detailed landscape plan and instruction. 6) Integrate native plant species into landscaped areas;

- *Habitat Restoration.* Prioritize and revegetate disturbed native habitats;
- *Fire Management.* 1) Prepare and implement a FMP. 2) Educate the Federal Fire Department regarding rare biological resources and cultural resources on Point Loma. 3) Prepare an instruction regarding a No Smoking policy for undeveloped and natural areas;
- *Soil and Beach Erosion.* Design and implement an erosion control and prevention plan for protecting resources;
- *Wildlife Habitat.* 1) Maximize wildlife use of the PLECA. 2) Minimize direct and indirect impacts to the PLECA. 3) Comply with Migratory Bird Treaty Act and support DOD Partners in Flight (PIF) program. 4) Develop CNRSW Heron Management Plan for installations around San Diego Bay and incorporate concepts that will update the 1995 Heron Management Plan. 5) Develop instructions for NBPL personnel regarding the "No Feeding" policy for wildlife. 6) Educate personnel via a brochure and/or instruction regarding harassment of wildlife and reporting protocol when encountering injured wildlife. 7) Implement measures to exclude or discourage wildlife from public buildings and facilities.

In addition to the above, NBPL is required to take an "ecosystem approach" to land management on its property, which includes management of wildland fire. OPNAVINST 5090.1B CH-4 describes the ecosystem approach:

> "Ecosystem management in DOD draws on a long-term vision of desired future ecological conditions, integrating ecological, economic and social factors. The goal of ecosystem management is to maintain and improve the sustainability and native biological diversity of ecosystems while supporting human needs, including the military mission.
>
> "It is Navy policy to incorporate ecosystem management as the basis for planning and management of Navy installations. This approach shall take a long-term view of human activities, including military uses, and biological resources as part of the same environment. The goal is to preserve and enhance ecosystem integrity, and to sustain both biological diversity and continued availability of those resources for military readiness and sustainability and other human uses...
>
> "Natural resources under the stewardship and control of the Navy shall be managed to support and be consistent with the military mission, while protecting and enhancing those resources for multiple use, sustainable yield, and biological integrity. Land use practices and decisions shall be based on scientifically sound conservation procedures and techniques, and use scientific methods and an ecosystem approach."

Similarly, compliance with cultural resource laws is guided by OPNAVINST 5090.1B CH-4, Chapter 23. Integrated Cultural Resource Management Plans (ICRMPs) define the processes for management of cultural resources on Navy Installations. They include management strategies to ensure Navy compliance with the National Historic Preservation Act, the Archeological Resources Protection Act (ARPA), and related legislation. An ICRMP is currently in the planning stages for Point Loma.

## 1.6.2 National Park Service Planning Context

Besides DO-18 which gives direction that a fire management plan is required, and Reference Manual (RM) 18 which guides the preparation of fire management plans, CNM uses other planning tools to fulfill its mission. Three plans relate to fire management: the General Management Plan (GMP), Resource Management Plan (RMP), and Vegetation Management Plan (VMP). CNM's General Management Plan broadly guides park management decisions and offers strategies for addressing issues and achieving management objectives over a 10- to 15-year period. The primary planning concerns identified in the GMP relate to the increasing significance of cultural and natural resources and the increasing impacts of visitor use on those resources. Other issues involve areas adjacent to the monument managed by the City of San Diego, the Navy, or the Coast Guard. Strategies include programs, actions, and support facilities necessary for proper management of park natural and cultural resources, appropriate visitor use, interpretation of resources, and efficient park operation. The cultural landscape analysis identifies and delineates the historic area of the Old Point Loma Lighthouse.

The approved RMP addresses a number of issues or problems, including:

- perceived deterioration of the scenic views of the park;
- increasing rarity, fragmentation, and isolation of vegetation communities;
- certain inventory and monitoring gaps; and
- declines in the intertidal zone.

The RMP recommends an inventory and monitoring program along with actions to restore and enhance natural and cultural resources. As co-managers of the PLECA, a park goal has been to broaden inventories to include all of the PLECA (Mediterranean Coast Network Biological Inventory Study Plan 2000). To protect the future integrity of the plant and animal communities, the park plans to learn about their status and health through inventories; long-term vegetation monitoring; and special studies of park flora and fauna as needed. CNM will develop a conceptual model for park inventory and monitoring; conduct surveys for rare, threatened, and endangered species; and establish a lichen monitoring plan. An examination of the impacts of roads and traffic on function of the plant and wildlife communities of the PLECA is planned. CNM expects to learn about what species have been extirpated from natural communities and examine the feasibility of reintroducing them.

With respect to fire, the RMP describes very high fuel loads on the east side of the park on north-facing slopes estimated to be over 90 years old (as determined by the U.S. Forest Service in 1980). A prescribed burn plan was expected to manage this fuel load (See Map 2-3 Vegetation Communities on Point Loma).

The VMP (1995 with updates through 2002) also discusses what it called the "senescence" of vegetation due to the exclusion of fire. The term 'senescence' is used to refer to ecologically derived structural changes in vegetation assemblages that result in the local extirpation of flora as seedbanks become depleted and established plants die off. The Plan suggests that, on Point Loma, this could potentially manifest itself as a decrease in species diversity due to the exclusion of fire as a natural ecological disturbance process in coastal sage scrub, and expects a future Fire Plan to address this issue.

The VMP identifies three management zones: Historic, Developed, and Natural. The primary objectives of the VMP are removing exotics, restoring coastal sage scrub, reducing water consumption, controlling erosion, using vegetation where possible to minimize the visual impact of all existing human-made structures, and efficiently using limited staff to implement the VMP. The Historic Zone at the Old Point Loma Lighthouse would be planted and restored to the historic conditions of the 1880s. In the Natural Zone, natural processes would be allowed to occur to maintain and enhance native habitats. Exotic plant species in the Natural Zone would gradually be removed, and native plants would be planted with seeds collected from the park and plants propagated from those seeds to reduce erosion and restore the coastal sage scrub habitat and heal the scars caused by removal of exotics. The Developed Zone (including the view building and administrative buildings, museum, auditorium, statue, main parking lot, and associated walkways) would be managed to provide an aesthetically pleasing environment and to keep visitors on paved surfaces and off the fragile soils. Only those exotics that will not escape from cultivation and that are drought tolerant would be used. In the areas on the periphery of the Developed Zone, exotics would gradually be removed and replaced with natives to save water, make more efficient use of limited human resources, and reduce the amount of time spent on maintenance.

Other objectives include improving preservation of the intertidal area by reducing public impacts, and monitoring tide pool health and impacts. Approximately 10 acres of tide pools at CNM are closed to all visitors for restoration and control purposes. The tide pools to the north of CNM are also off limits to the public. Erosion due to road runoff and social trails will be reduced by closing social trails and eroded areas to visitor use, replacing and scarifying soil, planting small native plants and seeding with natives, installing drip irrigation where necessary and covering replanted areas with erosion control matting. CNM monitors changes in its visual resources with a camera, and interprets the change for the public. CNM has little to no control over deterioration of the public view from the point.

### 1.6.3 Integrating the Navy and National Park Service Planning Processes

The Natural and Cultural Resources Office of CNRSW Environmental Department initiated this planning process jointly with the NPS. In a collaborative setting, the users, managers and agencies with responsibility for, or interest in, Point Loma resources, partnered together in the form of a Joint Fire Management Plan Working Group. During 2003, stakeholders came together regularly at meetings and in the field over the course of the year to identify and discuss issues, clarify how management is currently conducted, develop a sense of the desired fire management direction, and arrive at fire management implementation strategies.

This Working Group consisted of the representatives from CNRSW Natural Resource Office (NRO), CNRSW Cultural Resources Program, CNRSW Federal Fire Department, CNRSW Public Works Center, U.S. Navy SSC, Superintendent of CNM, CNM cultural and natural resources staff, support from the fire ecologist and fire management officer of the Santa Monica Mountains National Recreation Area (Mediterranean Coast Network office), and cultural resources and fire planning support from both the CNM and the NPS Pacific West Regional Office Cultural Resources Team,  Naval Facilities Engineeering Command Southwest (NAVFAC Southwest), and other tenant users of NPBL resources.

An ongoing means of integrating Navy and NPS joint interests in managing natural resources is through the PLECA Memorandum of Understanding (MOU). The policies of this Plan are, in the least, intended to be consistent with that MOU. The PLECA functions as a means to preserve and provide conservation banking arrangements for five signatory landowners. The MOU was established in 1995, and updated in 2005, under an agreement with the U.S. Fish and Wildlife Service (USFWS) to "ensure the long-term existence and perpetuation of these resources ...using the concepts of ecosystem management." The signatories of this conservation area are NPS, U.S. Navy, USCG, City of San Diego, and the Department of Veteran's Affairs (DVA). Implementation of the fire management strategies of this JWFMP may benefit from the interagency agreement regarding the PLECA.

The MOU states in the Terms of Agreement that it is: "effective for each party when signed by that party and shall extend for a period of 10 years from that date. It is the intent that the MOU will be renewed at the end of 10 years." The Commander, Navy Region Southwest is currently revising the MOU with input from the NPS, City of San Diego, and USFWS. The MOU is a logical entity for addressing at least some natural and cultural resource concerns related to wildland fire management in order to foster a consistent and effective approach.

## 1.7 Goals of the Wildland Fire Management Program

These goals are not listed in order of priority except for the first one. Fire management objectives related to these goals are listed in Chapter 3.

- Goal 1: *Provide for human safety as the first priority of every fire management activity.*
- Goal 2: *Protect the economic investment in facilities and infrastructure on Point Loma by strategically reducing the risk of ignitions and hazardous fuel conditions immediately adjacent to structures.*
- Goal 3: *Protect the cultural resources of Point Loma, including all historic, archeological, and commemorative resource values.*
- Goal 4: *Ensure the sustainability of ecological resources, including the full range of natural plant community structure and native biodiversity of plants, animals, and microbiota, emphasizing endemic species, while controlling exotic species.*
- Goal 5: *Suppress all unplanned wildland fires, regardless of ignition source, to the smallest size possible but no more than 10 acres, protecting all values at risk in a prioritized manner.*
- Goal 6: *Control fire risk and hazardous fuels such that ecological, cultural, and social values are not placed at risk from extreme fire behavior or fire management actions.*
- Goal 7: *Comply with policies of both the U.S. Navy and NPS with regard to fire planning and management programs.*
- Goal 8: *Implement a communication and education program that enhance understanding of the fire management mission and foster informed participation in fire management activities for both internal and external audiences.*

- Goal 9: *Develop and maintain staff expertise in all aspects of fire management.*
- Goal 10: *Effectively integrate the fire management program into all agency activities and operations.*
- Goal 11: *Foster and maintain interagency fire management partnerships and, as feasible, contribute to the firefighting effort at the local, state, and national level.*

## 1.8 Wildland Fire Management Capability, Roles, and Responsibilities

### 1.8.1 Fire Response Capability and Responsibility

The Federal Fire Department (FFD) is responsible for fire suppression and management on federal lands of Point Loma. It is generally the first responder on all federal properties, including CNM, and would be the Incident Commander in the event of a wildfire emergency. 911 calls placed by the staff at CNM are routed directly to the CNRSW dispatch (Regional Dispatch). Regional Dispatch calls FFD for fire and medical emergencies. The call box at the tidepools is monitored by CDSNet and its operators have been instructed to call CNM during working hours, and Regional Dispatch, after hours. All 911 calls from CNM pay telephones and cellular phones are routed to the City of San Diego.

The FFD's Commanding Officer is the Assistant Chief of Staff for Security and Force Protection for CNRSW, based in San Diego. The organizational chart for the FFD on Point Loma is depicted in Figure 1-1. While the Federal Fire Department on Point Loma has only two engines, about seven engines are available within approximately 45 minutes (from both FFD and the City of San Diego). Also, two brush trucks are available from 32nd Street and from North Island for pre-suppression work, such as standby support during a prescribed burn.

The National Wildfire Coordinating Group (NWCG) is a national operational group designed to coordinate programs of the participating wildfire management agencies. It is made up of the USDA Forest Service; four USDI agencies including the NPS; and State forestry agencies through the National Association of State Foresters. Based on NWCG guidelines, a minimum of four wildland-trained firefighters are required on each engine that responds to a wildland fire to effectively fight the fire. Engines with three persons can be used within their own area of responsibility, but cannot participate in out-of-area mobilizations. The current staffing at the Federal Fire Department does not meet the standard of the NWCG for compliance with Federal Fire Policy, in which four persons are required on each engine to fight a wildland fire efficiently and safely.

If a wildland fire occurs on Point Loma it would be managed as a wildfire under Unified Command. Federal Fire would likely be the lead agency. Fire staff from the NPS would respond from Santa Monica Mountains NRA to be the other part of Unified Command. Through the use of a task order, CNM can order resources from the Cleveland National Forest (CNF) to conduct the operation and reimburse the CNF for its costs (agreement number is Forest Service 02-IA-11132543-21 and NPS # F00001-03-0011). Federal Fire has a similar agreement with the CNF (IA-5-92-02-005 May 15, 1993 between Commander Naval Base Coronado and CNF, and related Operating Plan signed August 17, 1994). In addition, Federal Fire can request resources from the City of San Diego consistent with the agreement between the two agencies. Through its Mutual Aid Agreement with the City of San Diego, FFD has access to a firefighting helicopter with a water bucket. The City of San Diego, through their local Office of Emergency Services (OES) coordinator, could activate OES resources under the California statewide master Mutual Aid Agreement. This is generally only used for time periods under 24 hours, as reimbursement to OES cities becomes a major issue for longer periods. Typically, under such arrangements, if the City of San Diego ordered the resources it would pay the OES bill. If Federal Fire ordered them, it would pay the bill for OES resources. CNM, as the minority landowner, would likely not order firefighting resources directly; therefore, CNM would not contribute payment except as part of a cost-sharing agreement negotiated after the fire. This cost-sharing agreement would likely proportion costs based on acres burned by jurisdiction.

There is currently no mutual aid agreement between NPS and FFD.

### 1.8.2 Prescribed Fire

This Plan proposes four small experimental burns on NPS lands to evaluate the utility of prescribed fire in managing fuel loads and restoring native plant community structure and diversity on Point Loma (see Section 3.6). With respect to conducting these experimental burns, or the future use of prescribed fire, the following jurisdictional authorities apply. If a prescribed burn were to be conducted wholly on Cabrillo National Monument, the CNM Superintendent would have the final approval authority on the burn plan. Resources to implement the project would be ordered though a variety of different agreements.

On NPS jurisdiction lands, the existing agreement between the USDI and U.S. Forest Service (USFS) would be used. CNM can order resources from the CNF to conduct the prescribed burn operation and reimburse the CNF for its costs.

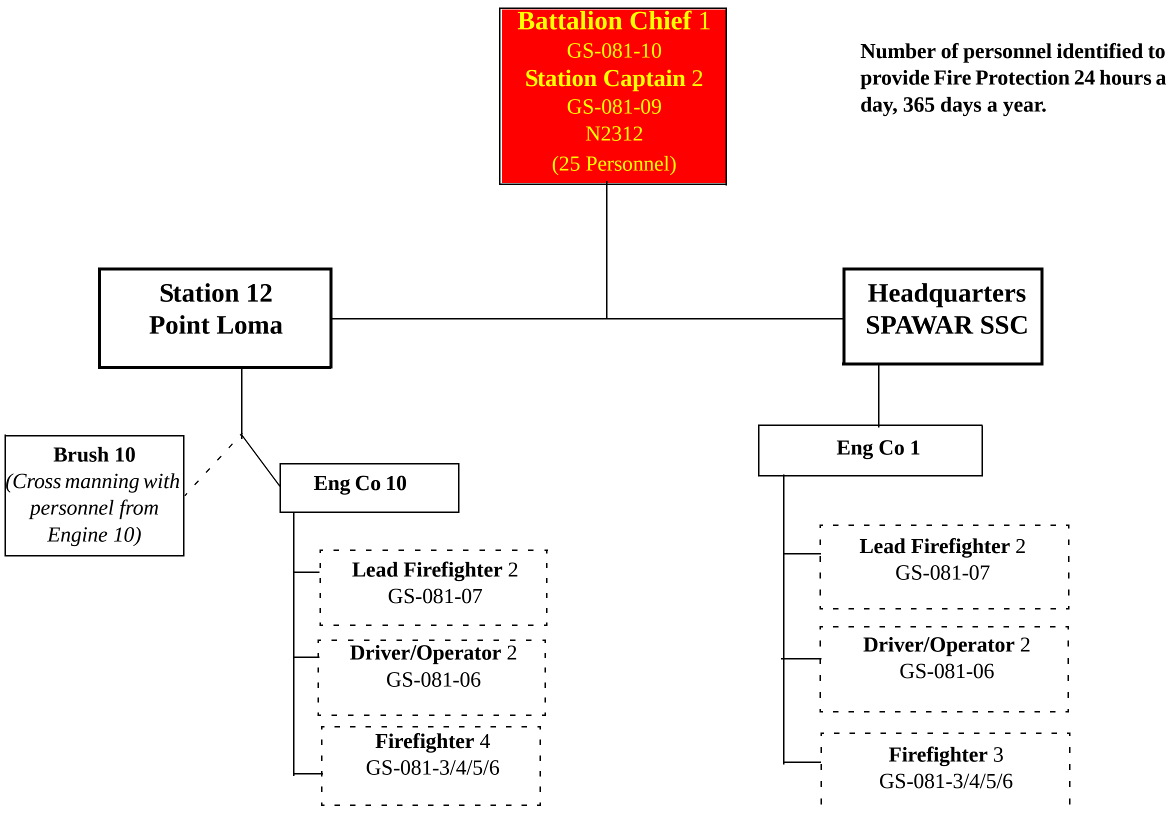



*Figure 1-1. Organizational chart for Point Loma Federal Fire Department Fire Suppression Division, Battalion.*

## 1.8.3 Responsibility for Natural and Cultural Resource Programs

The CO of NBPL reports to the Commander, Naval Region Southwest (see Figure 1-2.). The CO is responsible for ensuring the ability to carry out the military mission, and that activities and operations on NBPL fully comply with federal laws/regulations, and with DOD and DON policy. CNRSW is the Naval shore installation management headquarters for the southwest region, serving as regional coordinator for the Commander, U.S. Navy Pacific Fleet (COMPACFLT), which is headquartered in Hawaii. CNRSW provides support and direction regarding NBPL's environmental and natural resource programs via the chain-of-command and support staff. Staff at CNRSW serve as program managers and coordinators, and as such, are authorized to represent the Base and issue guidance within appropriate program areas. They are responsible for managing their respective programs in accordance with OPNAVINST 5090.1B CH-4, and applicable laws and regulations.

Finally, natural and cultural resource responsibility in the Navy rests with CNI, and CNRSW is its local representative for technical support. CNI, established on October 1, 2003, has the core responsibility for providing uniform program, policy, and funding for management and oversight of shore installation support to the fleet. Natural and cultural resources management, and non-operational NEPA documentation processes are considered shore installation management and within the purview of CNI.

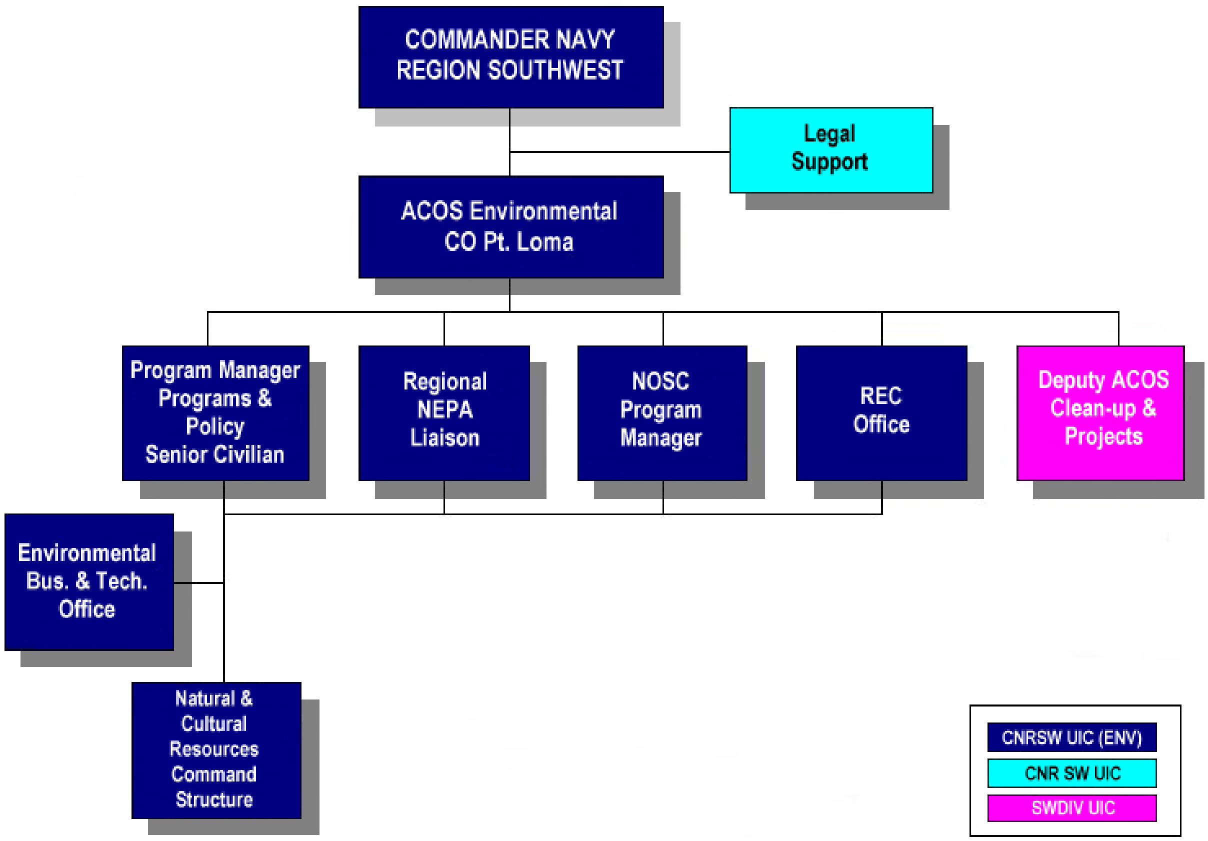
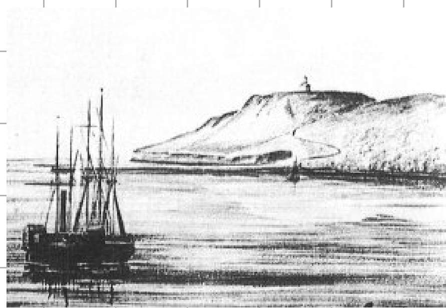



*Figure 1-2. Administrative organizational chart for Commander Navy Region Southwest as related to Naval Base Point Loma and this Fire Plan.*

At Cabrillo, the NPS and Superintendent of CNM are responsible for natural and cultural resource management. Support is available from the NPS Pacific West Regional Office in Oakland, and the Mediterranean Coast Network at Santa Monica Mountains National Recreation Area.





# 2.0 The Fire Environment and Values at Risk

This chapter describes the specific wildland fire management situation for Point Loma, and the values at risk needing protection from damage due to wildland fire or fire management actions.

## 2.1 Fire Environment

Understanding the impact of fire on the evolution of Point Loma vegetation and the ecological effects of fire on component species helps define fire management objectives that are consistent with ecological objectives.

"Natural" and historic fire regimes in southern California continue to be widely debated (Zedler 1995, Keeley and Fotheringham 2001, Minnich 2001), but there is much that we can interpret about the past fire regimes based on a modern analysis of the fire environment and its cultural context before the arrival of Europeans. Point Loma has significant areas dominated by plant species that have evolved with fire or are fire adapted (Section 2.3.3.10 ). Based on the presence of these species it can be assumed that fire has been a part of the peninsula's ecological development. However, the fire regime on Point Loma is different from more inland locations because climatic controls are different.

The following sections discuss both the modern and historic fire regimes and fire as a disturbance process that works synergistically or antagonistically with other disturbance processes (e.g. drought, climate fluctuation, urban development, frost, pathogens, disease and mass wasting, herbivory, overgrazing, fuel wood gathering), and that accounts for the distribution of Point Loma plants and animals today. It is important to discuss the historic context of fire, because there is no precedent for the "natural" conditions that managers want to foster today. The fire regime proposed in later chapters of this JWFMP is intended to affect species of concern, invasive plants, the distribution of plant and animal communities, in ways that promote the desired future conditions and management objectives described in Chapter 3.

### 2.1.1 Climate

The geographic position of southern California at mid-latitudes and its coastal setting have resulted in the development of a Mediterranean climate. The presence of a cold offshore current and semi-permanent high pressure system over the Pacific Ocean creates a mild climate that is similar to that found in parts of Europe, South Africa, and Australia, and is typified by mild, wet winters and hot, dry summers. For much of the year on Point Loma, the climate is typified by frequent early morning cloudiness with fog or a light drizzle, hazy afternoon sunshine, and daytime onshore breezes. The heaviest rainfall occurs in winter when the oceanic high-pressure center is at its weakest and at its farthest point south, allowing the fringes of mid-latitude storms to occasionally move through the area.

The temperature regime is cool and maritime, with relatively little seasonal or daily fluctuation, and with little frost. Point Loma experiences average daily temperatures ranging from 46 to 68 degrees Fahrenheit, with the highest temperatures occurring in August and September (Figure 2-1). San Diego averages 10.1 inches of rain annually, but rainfall totals can vary greatly from year to year (Figure 2-2). Most of the rain falls from November through April (Figure 2-3), and summers are often completely dry. Daily humidity averages approximately 70%. Dry-season conditions are moderated by frequent fog associated with ocean waters that are cooler than the air in late spring and early summer. Prevailing northwest winds are moderated by the Pacific Ocean.

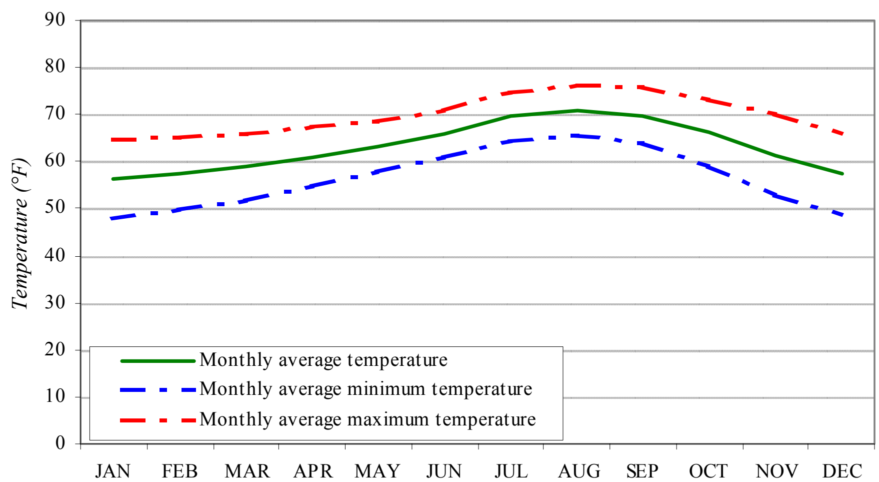



*Figure 2-1. Average monthly temperature regime from 1914 to 2003 (Data Source: Western Regional Climate Center, 2003, Lindbergh Field weather station).*

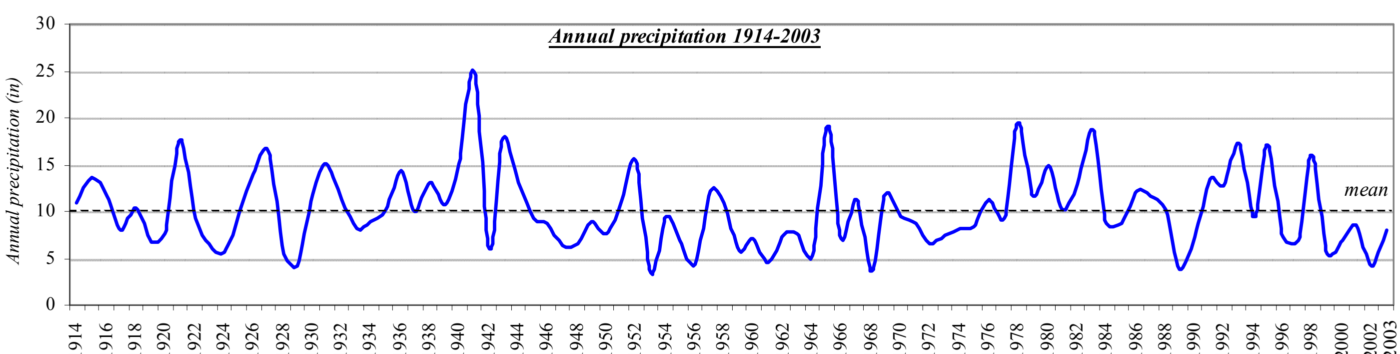



*Figure 2-2. Annual precipitation totals from 1914 to 2003 (Data Source: Western Regional Climate Center, 2003, Lindbergh Field weather station).*

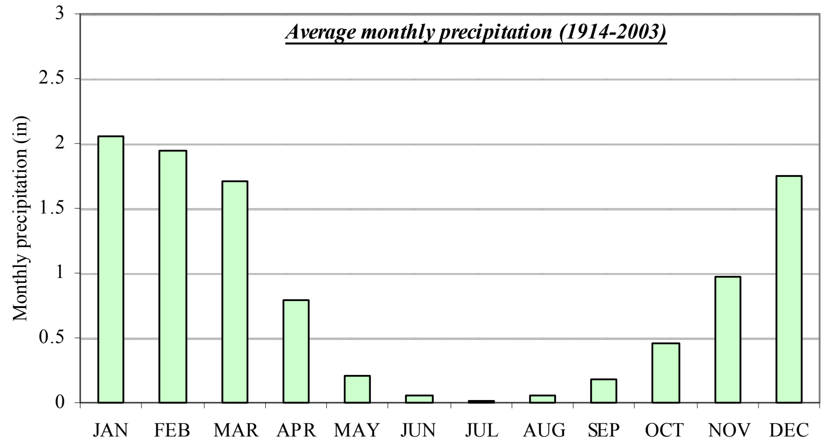
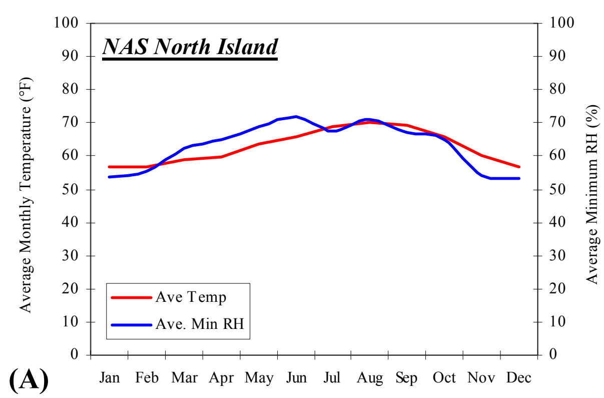



*Figure 2-3. Average monthly rainfall from 1914 to 2003 (Data Source: Western Regional Climate Center, 2003, Lindbergh Field weather station).*

## 2.1.1.1 Fire Weather

Temperature, relative humidity, and wind, among other factors, influence fire behavior. In southern California, extreme fire conditions typically exist from May through November. Dry, warm "Santa Ana" winds occur in the fall when vegetation is dry and soil protective cover is low. While average relative humidity decreases from April through August, mean maximum temperatures are reaching their annual highest levels. Prevailing winds at this time of year will tend to drive a fire from east to west. Point Loma's coastal location and geography partially eases the problem because the peninsula can pull in marine air during the day as land surfaces heat up, and create up-canyon breezes. At night, the breezes are drawn back down the canyons to the coast as land surfaces cool. Compared to inland portions of California, the fire hazard is generally lower in the summer on Point Loma because winds generally originate from the ocean and are more moisture-laden. Figure 2-4 illustrates the more moderate conditions that prevail on Point Loma when compared to inland locales.



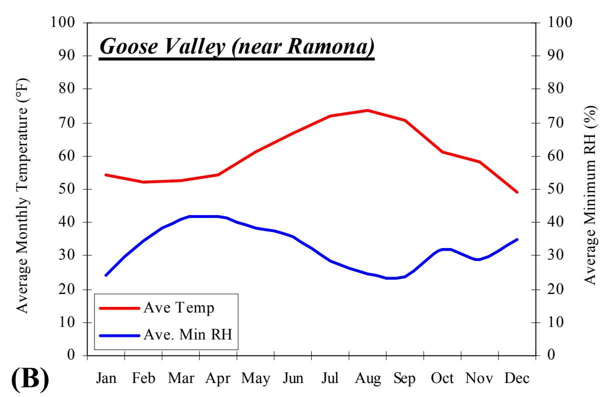




*Figure 2-4. Comparison of annual temperature and humidity regimes at two locales; (A) NAS North Island, representing a coastal locale similar to Point Loma, and (B) Goose Valley near Ramona representing a more arid inland regime.*

### 2.1.1.2 Weather Cycles

Weather cycles, from annual to long-term global climate change, have a significant bearing on the future fire environment and its relation to past disturbance regimes, vegetation patterns and wildlife populations. These influences are sufficiently great that fire planning should consider them on a regular basis. Annual variations in weather greatly influence species composition and biomass production, and this is especially noticeable in grasslands (Heady 1988), in the shrub interspaces and understory dominated by herbaceous plants, and in the post-fire recovery phase of plant communities.

El Niño and La Niña cycles, and decadal changes such as those from the Pacific Decadal Oscillation (see http://www.srh.noaa.gov/bro/pdo.htm), can affect the fire environment even in the short life of this Plan, such as by shifting the boundaries of plant communities. El Niño conditions occur periodically and are correlated with the shifting position of ocean currents and temperatures. El Niño brings a wetter than usual winter to southern California through heavy storms, and then drought cycles during La Niña periods. El Niño and La Niña events typically last from one to two years, infrequently longer.

Climatologists recently identified a much longer lasting water temperature shift in the Pacific which lasts on the order of decades, usually 20 to 30 years. This phenomenon has been named the Pacific Decadal Oscillation or PDO. When the PDO is in the cold phase, meaning surface layer water temperatures are colder than normal over a large area of the Pacific, La Niña events predominate. The reverse is true for the warm phase, that is, El Niño events predominate. Most recently, the PDO has been in the warm phase and El Niño events of unusual strength and long tenure have dominated. Each phase of the PDO has its unique impacts on global and U.S. weather. The cold phase of the PDO brings the risk of increased drought to the southwest.

## 2.1.2 Aboriginal Use of Fire

Understanding the context of human land use before and after European settlement sheds light on the role fire has played in the evolution of the local ecosystem since the beginning of the current Holocene period (the most recent geologic age for our planet earth, including all time since the last glaciation, beginning about 12,000 years ago). The human dynamic started with the earliest Native American occupation, and continued with European contact, Spanish colonization, American-period ranching, and military use beginning in the 20th-century.

To assess the probability that aboriginals ignited fires in the Point Loma vicinity, Zedler *et al.* (1995) summarized documentation of aboriginal burning in the area. Numerous accounts of intentional ignitions by native southern Californians exist (Lewis 1973). Jose Longinos Martinez, the first naturalist to visit California, wrote in 1792 (Simpson 1961 as cited in Zedler *et al.* 1995):

> "In all New California from Fronteras northward the gentiles have the custom of burning the brush, this for two purposes: one for catching rabbits, two, so that with the first light rain or dew the shoots will come up which they call pelillo and upon which they feed like cattle when the weather prevents their seeking other food."

Early explorers noted a similar practice in the San Diego area. Crespi, an early Franciscan, journaled in 1769:

"Thursday, July 20.–We set out about seven in the morning, which dawned cloudy, and taking the road straight to the north, we traveled by a valley about one league long, with good land, grassy, and full of alders. This passed, we ascended a little hill and entered upon some mesas covered with dry grass, in parts burned by the heathen for the purpose of hunting hares and rabbits, which live there in abundance" (Bolton 1927).

In 1774 Captain Fernando de Rivera wrote (cited in Burrus 1967 and Zedler *et al*. 1995):

"From the west came a blaze burning the field; and even myself went out, not because of danger to the houses, but in order to save the fodder. We succeeded in putting it out. The heathen were in the habit of supplying this work through their bad custom. After harvesting their seeds, and having no other animals to care for than their bellies, they set fire so that new grass may grow and to catch rabbits in the confusion of the smoke."

Indians near the Mission San Diego de Alcala continued to actively burn vegetation in 1793 (Pyne 1982 as cited in Zedler *et al.* 1995). On Point Loma itself around 1827, Duhaut-Cilly accompanied a group of Indians on a large rabbit hunt (Duhaut 1929 as cited in Zedler *et al.* 1995), although no use of fire was mentioned.

While the use of fire for hunting purposes by indigenous tribes in southern California is widely documented (Lewis 1973, Timbrook *et al.*1982, and Bolton 1927 as quoted in Zedler *et al.* 1995), there are no specific references to use of fire by natives on Point Loma. There is no reason to suspect differentiated burning on the peninsula compared to the rest of southern California because these tribal groups were in regular contact with one another through trade (Yatsko, *pers. comm.* 2003).

### 2.1.3 Fire and Fuel Harvesting in the Mission, Rancho, and Early Anglo Eras

In 1769 the San Diego mission was established, and this led to the removal of aboriginal residents from Point Loma. Then, in 1793 and as late as 1833, proclamations to prohibit the use of fire by the Indians were issued (Pyne 1982) due to increasing conflicts with European agriculture, livestock, and habitation. While the Indians fairly ignored this prohibition as it was poorly enforced, it demonstrates that fires had become problematic.

Chaparral shrubs have been used for heating fuel since aboriginal times, and supplied the population of San Diego at least into the 1830s (Zedler *et al.* 1995). Richard Henry Dana noted when he stayed in San Diego that the Indians were sent out to collect shrub wood for fuel (Dana 1936). The surveyor/botanist William Emory also described this use of fuel:

"On the San Diego Promontory [Point Loma] there is a dense and intricate growth of shrubbery, to which both the people of the town and from the shipping have for a long time resorted for fuel. The greater proportion is furnished by Eriodictyon, which is a large shrub of from eight to twelve feet in height, with a diameter of from two to four inches. The wood is very close-grained, but brittle, and is charged with a resinous matter, which causes it to burn readily, even when green. In this locality are also found the beautiful Ceanothus rigidus, Pitavia dumosa, Adenostoma fasciculata, and a species of scrub oak, all forming dense thickets" (Emory 1859, cited in Zedler *et al*. 1995).

It is believed that stands of toyon, lemonade berry, scrub oak, and manzanita may have been more prominent before the mid-1800s but were reduced for local hide tanning operations, firewood and construction, or by fires (Kelly and May 2001). Later, by the 1870s, the ridge area was reported as "...very meager, consisting of low, scrubby sagebrush" (Kelly and May 2001). Grazing by livestock, kept by operators of the lighthouse, may have contributed to the openness of historic vegetation along the ridge of the peninsula.

Newly arriving settlers continued burning for their own land management practices. Regarding San Diego County in 1887 and 1888, Fred E. Lewis reported to the Board of Forestry: "At least one-third of the land covered with brush, grass, and oak timber in the southern part of this County has been burnt off by settlers within the past eighteen months, doing a great deal of damage, not only as regards pasturage, timber, and bees, but also decreasing the reservoirs of water, which the absence of brush will effect, to a certain extent, the same as timber. These fires are caused by careless settlers, who at the time only intend to burn a few acres of brush, but everything being very dry at the time the fire soon gets out of their control, and the result is the fire takes everything before it. I have seen these fires spread five miles square in a few days. It is impossible to convict these parties without they are caught in the act."

Regionally, fire regimes changed when non-native species and domestic grazing animals were introduced to southern California during this period. Grazing animals are not thought to have had a direct impact on Point Loma except along the ridge as described above, but the non-native grasses that came with them did have a direct impact on the southern California landscape. Aggressive, colonizing grasses and forbs, mostly annuals, probably took permanent hold during periods of drought and heavy grazing, as occurred in the late 1800s (e.g. Burcham 1956). These species are most evident on Point Loma along roadsides, in grasslands and shrub interspaces, where the majority of species commonly visible are exotic annuals. In the first few years after a fire in coastal sage scrub, these annual grasses may provide a continuity of fuel that otherwise did not exist, and may change the modern fire regime even in this plant community that evolved with fire. The grasses provide light, flashy fuels that may extend the conditions under which shrubs will ignite, which can lead to a shorter fire return interval in coastal sage scrub. Compounding the change, shorter return intervals may alter the intensity at which fires burn.

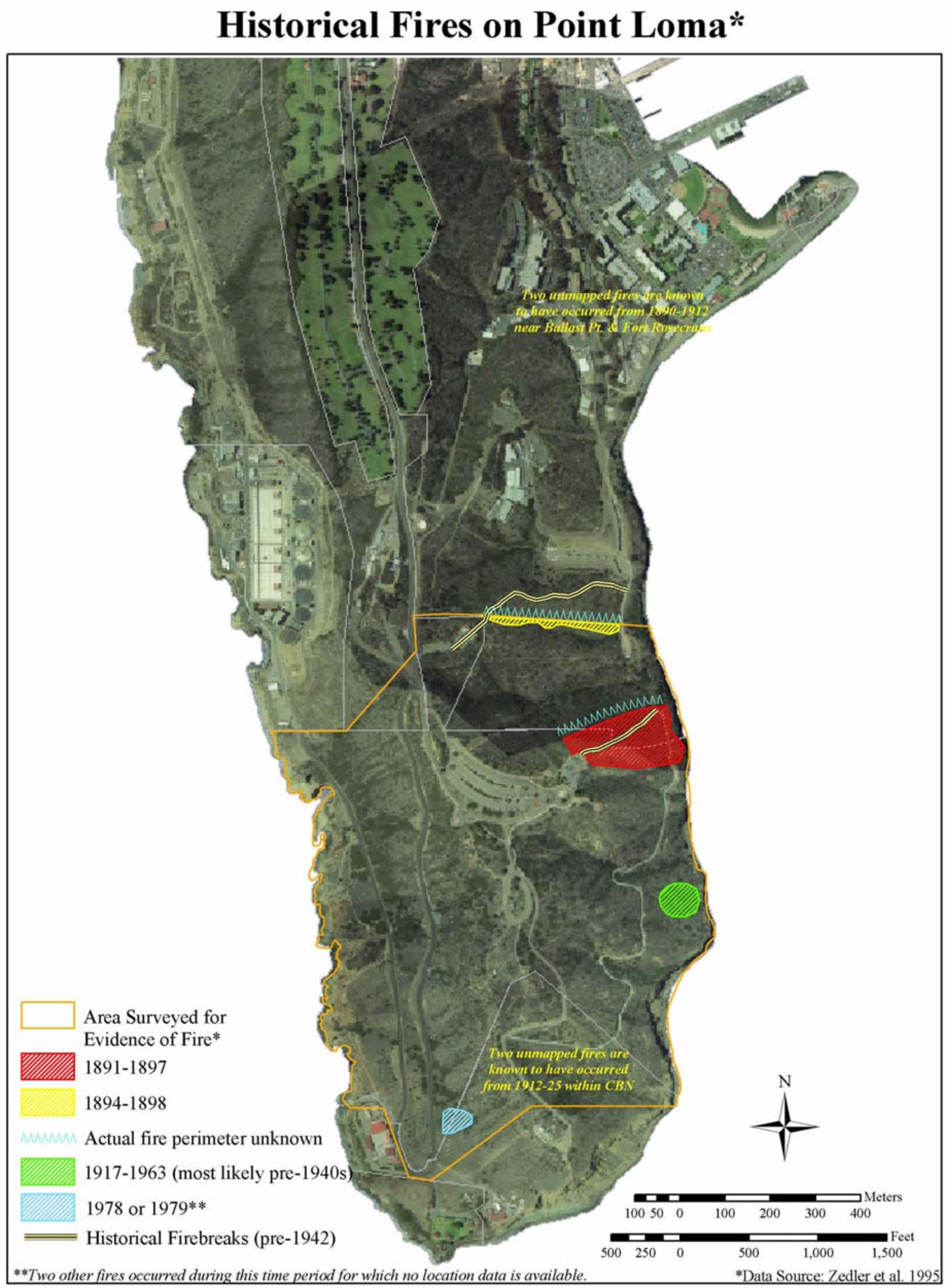
### 2.1.4 Recent Fire History (1890 to Present)

The peninsula has a long history of settlement and almost all recorded fires are thought to be caused by man. Climate, vegetation, paleo-ecological evidence and recorded fire history all indicate that the past fire regime (before European settlement) is one of infrequent small fires, and even less frequent large fires that consumed all the vegetation on the Point in a single event.

During investigations by Zedler *et al*. (1995), several small, historical fires were documented on Point Loma, and at least two additional fires are known to FFD (Smith, *pers. comm.* 2003) and to CNM (DiMattio, *pers. comm.*2003). Fire incident reports are filled out by FFD only if a firefighting asset was used to respond. Known fire history is summarized in Table 2-1. Only four of these fires have sufficient location information to appear on Map 2-1. Shrub stem-dating (Zedler *et* *al.* 1995) identified that there were additional fires besides those documented by historical anecdotes or photographs. In addition, firebreaks were plotted on a 1942 Fort Rosecrans Reservation Topography Map, and are shown on Map 2-1.

*Table 2-1. Documented fires on Point Loma (Zedler et. al.1995; Smith pers. comm. 2003, DiMattio, pers. comm. 2003).*

| Approximate Date | Mapped? | Description |
|---|---|---|
| 1890–1912 | No (text block on map shows approximate location) | Recorded in national archives for quarantine station near La Playa, north of Ballast Point. Fire threatened the station and prompted the operators to remove the brush around the building. In 1903 the San Diego Union reported a fire set by a tourist on Point Loma threatened military buildings at Fort Rosecrans. This may have been the same fire as reported in the national archives. |
| 1891–1897 | Yes | 1899 photos show a portion of this fire. The northern boundary of fire could not be determined. (CNM Archives Cat 979.498 acc 15) |
| 1894–1898 | Yes | 1899 photos show this fire. (CNM Archives Cat 979.498 acc 15) |
| 1912–1925 | No (text block on map shows approximate location) | Two fires were detected by determining the age of wart-stemmed ceanothus shrubs, which were estimated by ring counts to have germinated in 1912 and 1925. Fire boundaries could not be determined. |
| 1917–1963 | Yes | Ground evidence of burned lumber, stems, construction materials on eastern portion of CNM. Fire most likely occurred prior to 1940. |
| 1970–1980 | No | Two fires are known from about 1980 or earlier (C. Smith, *pers. comm.*), although record of precise location is not available. The largest was about 100 acres, starting on the coastal slope and contained at the top of the hill. The other was started by catalytic converter, probably in the late 1970s. It burned about 20 acres. |
| 1978–1979 | Yes | Started by catalytic converter. It burned about one-half acre along the Whale Road, and was quickly suppressed by CNM and FFD staff, as recalled by Park Superintendent. |




*Map 2-1. Known historical fires on Point Loma (Zedler et al 1995).*

### 2.1.5 Fire Type

Fires in shrublands like those found on Point Loma are typically crown fires that burn primarily through the canopy of the vegetation, in contrast to a surface-fire regime such as is expected in grassland or in forest vegetation types (Keeley and Fotheringham 2001). Crown fires in shrublands are higher intensity fires, but not all shrubland communities exhibit the same fire characteristics. For example, coastal sage scrub has a lower total biomass than does chaparral (i.e. shrub height and stem density are lower), and is generally more open, so tends to burn at lower intensity. In the shrubland interspaces where grasses and forbs prevail, a surface-fire regime may also have occurred. This is also possible because Native Americans were known to conduct spot fires in chaparral.

### 2.1.6 Fire Season and Fire Size

Fires occur from summer to winter in southern California. However, extreme fire hazard conditions commonly occur in late summer and fall due to dry vegetation and desiccating, high velocity winds coming from the northeast known as Santa Ana winds. Although temperatures on Point Loma are more moderate than in inland areas of San Diego County and humidities are higher, Santa Ana winds can result in high fire danger spikes on Point Loma as well as elsewhere in the County. These conditions foster a regional pattern of large fires that eventually burn themselves out after many weeks following ignition, with variable impacts on the landscape depending upon the intensity at which they burn (Moritz 1997, Weise *et al.* 1997, Keeley 2001). In the past, most or all of the vegetation on Point Loma may have burned in single fire events during such conditions, and this is still possible in today's fire environment.

### 2.1.7 Ignition Sources

Documented fires on Point Loma appear to have been caused by automobiles or other human origin. Future fires are also likely to have human origin, such as a flare or firework shot from a boat and landing on vegetation, or sparks generated by construction or landscape maintenance equipment. Also, undocumented immigrants sometimes land on Point Loma and, as in other locations, have been known to start campfires, which could get out of control.

Low-elevation coastal areas have the lowest non-anthropogenic fire frequencies in southern California due, in part, to the rarity of lightning strikes (Malanson and O'Leary 1982, Keeley 1982, Minnich 1993), although they are not absent (M. Wells as cited in Keeley 2002). While there are no recorded lightning-caused fires for Point Loma, both lightning associated with winter frontal systems and summer convective storms occur along the southern California coast, and lightning in the coastal areas peaks in September, close to when Santa Ana conditions occur (Keeley 2002). Lightning fires are documented on nearby Santa Catalina Island. Prior to organized fire suppression, infrequent Santa Ana wind-driven fires likely resulted from lightning ignitions that occurred weeks earlier and "held over" as slow burns or smoldering fires, flaring up when winds increased and fuel moisture dropped (Minnich 1987, Keeley *et al*. 1999). Santa Ana wind-driven fires may also have occasionally carried into the Point Loma area from the Palomar and Laguna Mountain Ranges that lie to the northeast (J. Keeley, *pers. comm.* 2003), although in the modern setting there is a significant amount of urban development that prevents fires from traveling this path. Nonetheless, fires on Point Loma are thought to have occurred at a very low frequency, and lightning-ignited fires are a possibility but not a high probability on Point Loma.

## 2.1.8 Rate of Spread

The largest and most destructive wildfires spread at extremely rapid rates which overwhelm the ability of firefighters to control them. The combination of dry fuels, steep topography, and weather conditions that support extreme fire behavior can occur and necessitate an accelerated suppression response. Expected rates of spread can be modeled (see Section 2.2.2), but specific models for Point Loma are lacking and examples from inland areas may not relate well to this coastal environment (R.Montague, *pers. comm*., Anderson 1982, Andrews et al.2003). The published fuel models most applicable to Point Loma show that a wildfire burning under extreme conditions, (more than 10 mph wind speeds when fine fuel moisture (grasses) is less than six percent), and driven by high velocity Santa Ana winds (up to 60 miles per hour) would be little influenced by vegetation structure or fuel loads. The spread of a fire under such conditions would instead be regulated by the interaction of winds and topographic features (Radtke *et al.*1982, Turner and Romme 1994, Keeley *et al.* 1999). Thus, under extreme weather conditions, fires could move rapidly over the peninsula from northeast to southwest, exhibiting extensive lateral spread. While there is no set definition of 'extreme weather conditions,' any combination of high temperature, low humidity and/or high winds greatly increases the risk of a rapidly spreading fire. Under the worst cases, the peninsula could be completely burned over by a fire in one hour (see Section 2.2.4).

## 2.1.9 Fire Spread Pattern

Recent studies suggest that large fires are a natural part of the fire regime of southern California, and not a result of modern fire suppression practices (Keeley and Fotheringham 2001). This is for the same reasons described above regarding the extremely hazardous conditions that occur in the fall in southern California. Point Loma is believed to be no exception to this pattern. However, many fires are driven by fuels alone rather than extreme weather, and such fires tend to remain small and more controllable. Such fuel driven fires have been the pattern for Point Loma within the recorded fire history (see Section 2.1.4), but large fires that moved onto the peninsula are likely to have been part of the fire regime before records were kept.

The realization that fuel loads do little to affect fire size during extreme weather conditions has instigated a debate about long-institutionalized practices of mosaic burning to reduce the age class of existing vegetation. This practice is intended to provide firefighters a better opportunity for wildfire suppression due to the reduced flame lengths that result from younger vegetation. However, the practice of creating age-class mosaics to manage fire spread has shown only a limited ability to prevent the spread of wind-driven fires, and 100 years of aggressive suppression activity has not decreased the occurrence of these large fires (Radtke *et al.* 1982, Dunn 1989, Davis and Michaelsen 1995, Moritz 1997, Conard and Weise 1998, Keeley *et al.* 1999, Mensing *et al.* 1999). Opponents of this argument say that cost-effective fuel treatment should occur only at strategic locations in the wildland-urban interface (Keeley 2002), which includes all of

Point Loma (see Chapter 3). It is important to note that this argument is focused on extreme weather conditions, not on fuel-driven fires which more typically occur in the summer rather than fall months, and require fire containment under more moderate weather scenarios.

## 2.1.10 Fire Intensity and Severity

Fire intensities (measured as the rate of thermal energy production) in coastal sage scrub are expected to be moderate but can depend on a highly complex relationship between topography, vegetation mosaics, and exposure to winds. Fire severity (effects of the fire on the ecosystem) is expected to be low to moderate, since most of the dominant shrub species are resprouters that can regenerate quickly after a fire. However, many stem succulents can be seriously impacted or killed by fire. Stem succulents are common in the maritime succulent scrub plant community on the peninsula, which occurs mostly on the west side.

Fire intensities in southern maritime chaparral are expected to be moderate to high, depending on shrub composition and fire weather. Fire severity (actual damage to resources) is expected to be low even under high fire intensities (Keeley 2003) in this fire-adapted community.

## 2.1.11 Fire Frequency and Return Interval

Southern California chaparral is generally believed to be resilient to fire return intervals ranging from 20 to 150 years (Keeley 2002), with average historic return intervals of 70 years in inland sites (Minnich 1983, Davis and Michaelson 1995, Conard and Weise 1989, Mensing *et al*. 1999). Specific locations may have shorter or longer intervals, depending upon local conditions, and within chaparral landscapes in general fire intervals are extremely variable (Zedler *et al* 1995). Aside from aboriginal burning, Point Loma has had much longer fire return intervals than are typical of more inland San Diego County, presumably due to frequent fog, higher humidities, higher moisture levels of cured fine fuels, lack of ignition sources, geographic isolation, and urban “firebreaks.”

Evidence collected by aging the stems of shrubs on Point Loma and on examining other fire records supports long intervals. A Catalina Island cherry tree (*Prunus ilicifolia* ssp. *lyonii)* was aged to when the missions were established in the 1700s, but had what was believed to be a fire scar from about 70 years ago (Zedler *et al.* 1995). It is speculated that the areas capable of supporting stands of wart-stemmed ceanothus (*Ceanothus verrucosus*), but where no plants exist today, may have a fire free interval of at least 144 years, the date the lighthouse was established (Zedler 1995). As of the establishment of the lighthouse there are no memories or records of large fires on Point Loma. In addition, there are no descriptions of the vegetation on Point Loma at the time the lighthouse (1854 – 1855) was constructed.

Following construction of the lighthouse there is evidence of several smaller, high-intensity fires that occurred where two stands of wart-stemmed ceanothus currently exist (Zedler 1995). These two stands are 77 years old and 90 years old as of July 2003, which suggests no high intensity fire has entered these stands in the last 77 to 90 years.

## 2.2 Fuel characteristics

### 2.2.1 Fuel Types

Fuel load (biomass), fuel structure (the arrangement and density of fuels), and fuel type (grass, shrubs, trees, etc.) interact to influence intensity and frequency of wildfire. Plant communities that have similar ignition, combustion, and fire spread characteristics can be grouped together to represent a fuel type.

The plant communities found in a given area are the first guide to the existing fuel types. Table 2-2 illustrates a rough grouping of the plant communities of Point Loma according to fuel type. As can be seen from this table, the primary fuel type is low shrubs. Complicating the assessment of fuel types on Point Loma is the presence of exotic species, including many trees, that have been planted in the last century for various reasons. These exotic species include: gum trees (*Eucalyptus* spp.); Monterey cypress (*Cupressus macrocarpa*); Torrey pine (*Pinus torreyana*); Bishop pine (*Pinus muricata*); bottlebrush (*Callistemon* sp.); hottentot fig (*Carpobrotus* spp.); Australian tea tree (*Leptospermum laevigatum*), myoporum (*Myoporum laetum),* karo (*Pittosporum crassifolum*), New Zealand Christmas tree (*Metrosideros tomentosa*); natal plum (*Carissa grandiflora*); and pink melaleuca (*Melaleuca nesophila*).

*Table 2-2. Plant communities fuel types of Point Loma (acres) based on vegetation surveys in 1993. Nomenclature for communities is based on Holland (1986) with revisions suggested by Oberbauer (1996). Land cover types for ASW and FITCPAC were digitized by RECON from a January 2001 aerial photograph. Nomenclature for plant species follows Hickman (1993).*

| **Fuel Type / Plant Community** | **Naval Base Point Loma** (acres) | **Cabrillo National Monument** (acres) | **Other Ownership** (acres) | **Total** (acres) |
|---|---|---|---|---|
| ***Low shrublands*** | ***602.5*** | ***132.1*** | ***15.7*** | ***750.3*** |
| Southern coastal bluff scrub | 36.1 | 14.5 | 3.1 | 53.7 |
| Maritime succulent scrub | 275.6 | 86.3 | 12.4 | 374.3 |
| Diegan coastal sage scrub | 118.3 | 23.0 | 0.2 | 141.5 |
| Diegan coastal sage scrub/southern maritime chaparral | 55.3 | 0.6 | <0.1 | 55.9 |
| Southern maritime chaparral | 116.2 | 5.7 | <0.1 | 121.9 |
| Maritime succulent scrub/southern maritime chaparral | 1.0 | 2.0 | 0 | 3.0 |
| ***Woodlands and Forests*** | ***18.3*** | ***0.2*** | ***0*** | ***18.5*** |
| Torrey pine forest | 1.2 | 0 | 0 | 1.2 |
| Eucalyptus woodland | 17.1 | 0.2* | 0 | 17.3 |
| ***Others*** | ***610.2*** | ***25.5*** | ***109.2*** | ***744.9*** |
| Southern Foredunes | 1.6 | 0 | 0 | 1.6 |
| Ruderal | 91.0 | 2.8 | 7.0 | 100.8 |
| Cultivated/landscape | 109.6 | 3.8 | 7.2 | 120.6 |
| Cemetery | 0 | 0 | 65.2 | 65.2 |
| Developed | 382.6 | 15.5 | 27.2 | 425.3 |
| Intertidal | 25.4 | 3.4 | 2.6 | 31.4 |
| **Total** | 1231.0 | 157.8 | 124.9 | 1513.7 |

* Eucalyptus trees have since been removed from CNM.

### 2.2.2 Fuel Models

Fuel models allow for mathematical calculation of fire spread and fire intensity by treating vegetation types as a standard fuel complex with predictable behavior assumptions based on the amount of combustible material present and an array of fuel characteristics (distribution, form, density, loading, depth, diameter, etc.). There are currently 13 standard fuel models in use in the U.S., ranging from short grass habitat to various forest types, plus five custom fuel models specific to California (Anderson 1982, Andrews *et al.*2003). Using standard fire behavior modeling software such as Behave or BehavePlus, it is possible to evaluate potential fire behavior under various weather and fuel conditions.

Of the 13 standard fuel models described by Anderson (1982), Fuel Model-6 is most applicable to the vegetation currently found on Point Loma, representing mature chaparral less than six feet tall (Photo 2-1). Fuel Model-2 is currently found in some locations on Point Loma, mostly the west side, but would also represent conditions during a post-fire recovery period where scattered low shrubs would be intermixed with grasses and forbs (Photo 2-2). Of the U.S. Forest Service models for southern California, models SCAL-15 and SCAL-18 both may be applicable to the vegetation on Point Loma, where SCAL-15 (Photo 2-3) represents mature chamise chaparral and SCAL-18 (Photo 2-4) represents mature coastal sage brush. These two models may be used to represent conditions on the west and east sides of Point Loma, respectively. The parameters used by these four models are given in Table 2-3. As can be seen in Table 2-3, the four fuel models differ greatly in the fuel loading parameters, which will greatly influence the resulting fire modeling predictions.

*Table 2-3. Fuel model parameters for four fuel models representing the vegetation communities of Point Loma (Sources: Anderson 1982, Andrews* et al. *2003).*

| **Model Parameters** *(defined below)* | **Fuel Model-2** *(Photo 2-1)* | **Fuel Model-6** *(Photo 2-2)* | **SCAL-15** *(Photo 2-3)* | **SCAL-18** *(Photo 2-4)* |
|---|---|---|---|---|
| **Fuel Model Description** | **Grass, forbs and shrubs** | **Chaparral <6 feet tall** | **Mature Chamise chaparral** | **Coastal sage scrub** |
| 1-hr (Dead) Fuel Load <0.25 in. diameter *(tons/acre)* | 2.0 | 1.5 | 2.0 | 5.5 (3.0)* |
| 10-hr (Dead) Fuel Load 0.25-1.0 in. diameter *(tons/acre)* | 1.0 | 2.5 | 3.0 | 0.8 |
| 100-hr (Dead) Fuel Load 1-3 in. diameter *(tons/acre)* | 0.5 | 2.0 | 1.0 | 0.1 |
| Live Herbaceous Fuel Load *(tons/acre)* | 0.5 | 0.0 | 0.5 | 0.75 |
| Live Woody Fuel Load *(tons/acre)* | 0.0 | 0.0 | 2.0 | 2.5 (1.5)* |
| Fuel Bed Depth *(feet)* | 1.0 | 2.5 | 3.0 | 3.0 (1.5)* |

*The default values used for these parameters by this model seem excessive for representing conditions on Point Loma, so the number in parentheses was used instead in the fire behavior calculations given below.

Parameter Definitions:

1-hr (Dead) Fuel Loads: accumulated fuel <0.25 inches in diameter, including shrub leaves, cured herbaceous vegetation, and dead twigs and stems.

10-hr (Dead) Fuel Loads: accumulated dead fuel 0.25-1.0 inches in diameter.

100-hr (Dead) Fuel Loads: accumulated dead fuel 1.0-3.0 inches in diameter.

Live Herbaceous Fuel Load: accumulated load of live forbs and grasses.

Live Woody Fuel Load: accumulated load of live shrubs.

Fuel Bed Depth: mean height of vegetation (including gaps in the shrub canopy).

*Photo 2-1. Fuel Model-6, mature chaparral.*

*Photo 2-2. Fuel Model-2, grass, forbs and short, sparse shrubs on western slopes of Point Loma.*

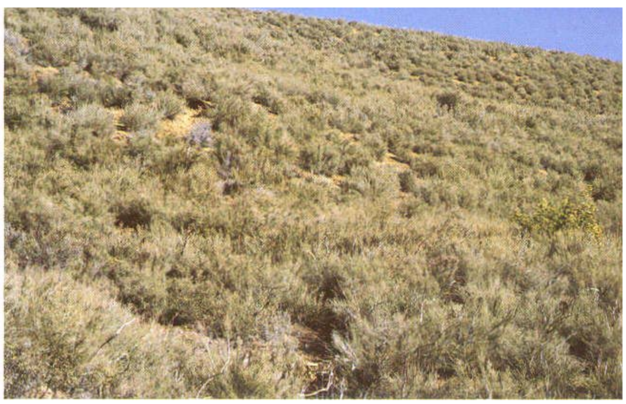


*Photo 2-3. Fuel model SCAL-15, mature chamise chaparral.*

*Photo 2-4. Fuel model SCAL-18, coastal sage scrub.*

## 2.2.3 Fuel Load

Fuel load is the term used to characterize the amount of combustible materials present in a given area, and is generally expressed in units of tons of fuel per acre (Andrews *et al.* 2003). Five separate components that represent both live and dead fuels constitute the total fuel load for a given fuel model (Table 2-3). Both the total fuel load and the relative proportions of the five components, in conjunction with fuel moisture levels, will greatly determine fire behavior. If fuel moisture is high, then the vegetation will not burn regardless of the fuel loading.

The western slope of Point Loma has a much lighter fuel loading than the eastern side or north-facing slopes due in part to greater heat loading (resulting in higher aridity). Much of the vegetation on the west side is less than two feet in height due to constant salt pruning by on-shore winds. Furthermore, areas of the east side appear not to have burned for much longer than a century (Zedler *et al.* 1995). Any fires occurring on the western side of the peninsula will burn with less intensity than on the eastern side or on north-facing slopes where the fuel load is greater. Therefore, the east side has the greatest potential for a disastrous wildfire due both to the lack of access and heavier fuel loading and upslope winds under

Santa Ana conditions. There are numerous structures and facilities between the eastern shoreline and the main ridge top that are potentially at risk from this hazard. There are fewer mid-slope structures and facilities on the west side.

For the purposes of fire management, these contrasting slopes on the Point Loma peninsula have been broken into two Fire Management Units, or FMUs (See Section 3.4 for details). Fuel and fire management concerns for the Eastern FMU and Western FMU of Point Loma are described in Table 2-4.

*Table 2-4. Fuel and fire management concerns on eastern and western flanks of Point Loma.*

| Fire Management Unit (FMU) | Control Problems | Values at Risk |
|---|---|---|
| East Side | Steep slopes, heavy fuels, minimal access, narrow and winding roads and many structures and military installations at mid-slope and at top of ridge. | Extensive military infrastructure at mid-slope and along the main ridge top; the CNM Visitor Center. |
| West Side | Flashy fuels, steep slopes, ingress is limited north of SD wastewater treatment facility, many structures along the ridge top including old wood structures. | Extensive military infrastructure and administrative facilities along the main ridge top on the north end of the Federal property. |

In addition to the natural plant communities present on the Point, another fuel-related concern is the amount of non-native vegetation that has been planted close to structures. For example, there are large eucalyptus trees planted upslope from the Historic District Officers Quarters. When burning, these trees send out large amounts of firebrands, which under windy conditions can create new spot fires miles ahead of the fire front (Commonwealth Scientific and Industrial Research Organization [CSIRO] 2000). Also, some eucalyptus species produce large amounts of broken branches, leaf litter and foliated bark that pile up around the trees and act as a receptive host for wind-blown embers. Wind-blown eucalyptus leaf, bark, and limb litter was a major factor in the loss of structures in Scripps Ranch during the Cedar Fire of October 2003. Some specific examples of hazardous fuel conditions are provided in Appendix B, Photos 8-26.

## 2.2.4 Wildland Fire Behavior Calculations for Hazardous Fuels

***Initializing the Model Runs***

The four fuel models described above were used to simulate fire behavior under varying weather conditions using the BehavePlus fire modeling software. Three sets of weather conditions were used:

- Prevailing summer conditions, calm winds (6 miles per hour [mph] mid-flame wind speed);
- Above average summer conditions; moderate winds (12 mph mid flame wind speed);
- Extreme, Santa Ana wind conditions (24 mph mid-flame wind speed).

Under “Prevailing summer conditions,” dead fuel moisture model parameters (i.e. the percent moisture content of the 1-hr, 10-hr, and 100-hr dead fuels) were set at 4-8% moisture, while for the “Above average” and “Santa Ana” conditions dead fuel moistures were set at 2-5%. Live fuel moisture was set at 60% for the "Prevailing conditions" and 50% for the "Above average" and "Santa Ana" conditions. Lowering the fuel moistures in this way represents the desiccating effects of strong winds on the fuels present.

### *Fire Behavior Summary*

The predicted fire behavior for all four fuel models under the above weather conditions is given in Table 2-5. Under prevailing summer condition, the rate of spread of fire, and the resulting 30 and 60 minute fire sizes, are greatest for Fuel Model-2. However, due to the heavier live fuel loads of the SCAL models, the fireline intensity and flame lengths for those two models are greater. Rate of spread is slower in these two models due to the effects of the fuel moisture parameters that go along with those fuel loads.

*Table 2-5. Fire behavior predictions for four different fuel models and three different weather conditions.*

| Model Outputs | Fuel Model-2 | Fuel Model-6 | SCAL-15 | SCAL-18 |
|---|---|---|---|---|
| **Fuel Model Description** | **Grass and shrubs** | **Chaparral<6 feet tall** | **Mature Chamise chaparral** | **Coastal sage scrub** |
| ***Prevailing Summer Conditions*** | | | | |
| Rate of Spread *(feet/min)* | 75.6 | 61.3 | 37.1 | 27.6 |
| Fireline Intensity *(btu/ft/sec)* | 656 | 534 | 993 | 1,050 |
| Flame Length *(feet)* | 8.9 | 8.1 | 10.8 | 11.0 |
| 30-Minute Fire Size (*acres*) | 38.9 | 25.3 | 9.2 | 5.1 |
| 60-Minute Fire Size (*acres*) | 155.8 | 101.3 | 36.8 | 20.3 |
| ***Above Average Summer Conditions*** | | | | |
| Rate of Spread *(feet/min)* | 312.8 | 183.7 | 96.4 | 65.6 |
| Fireline Intensity *(btu/ft/sec)* | 3173 | 1886 | 3,020 | 2,851 |
| Flame Length *(feet)* | 18.4 | 14.5 | 17.9 | 17.5 |
| 30-Minute Fire Size (*acres*) | 405.1 | 138.2 | 37.8 | 17.4 |
| 60-Minute Fire Size (*acres*) | 1,620.4 | 552.8 | 151.0 | 69.5 |
| ***Extreme Santa Ana Conditions*** | | | | |
| Rate of Spread *(feet/min)* | 1,065 | 437.6 | 187.8 | 119 |
| Fireline Intensity *(btu/ft/sec)* | 10,808 | 4,493 | 5,882 | 5,171 |
| Flame Length *(feet)* | 32.3 | 21.5 | 24.4 | 23.0 |
| 30-Minute Fire Size (*acres*) | 2,668.0 | 453.0 | 84.0 | 33.9 |
| 60-Minute Fire Size (*acres*) | 10,671.1 | 1,811.1 | 336.0 | 136.6 |

btu = British thermal unit

As the fire weather conditions worsen, fire behavior in all four models obviously becomes more extreme, particularly in Fuel Model-2. All fire behavior outputs increase much more quickly with Fuel Model-2 than with any of the other three models. Even under just above average conditions, a fire in Fuel Model-2 could burn over one thousand acres in one hour. Under Santa Ana wind conditions, fires in Fuel Model-6 also would also burn over one thousand acres in an hour. The above model outputs do not take into account the small wildland acreages involved and the fact that the fuel conditions on Point Loma represent a mosaic of both flammable vegetation and developed or landscaped areas as well as some habitat types such as coastal bluff scrub that would slow wildfire spread.

The model outputs in Table 2-5 illustrate the potential for a catastrophic wildfire and highlight the need to adequately protect structures and resources from these types of wildfire events. The worst possible flame lengths the peninsula could experience would result from a Fuel Model-2 under Santa Ana conditions due to the extreme combustibility of the fuels present (predominantly in the 1-hr [Fine Fuels] category). A maximum flame length of 32.5 feet for Fuel Model-2, with an additional 15–20 foot safety factor, yields a minimum of approximately 50 feet of fuel treatment around each structure. Therefore the protective measures described in Chapter 3 were arrived at with this in mind.

The structures on the east side of Point Loma are at greater risk from a Santa Ana wind driven fire. A fire that started along the road at the base of the west slope under Santa Ana conditions would still spread upslope, but would be working against the wind and would, therefore, be less of a risk to upslope structures. However, under prevailing southwest Santa Ana wind patterns a fire started at the bottom of the east slope would quickly move up slope, threatening structures along the ridgetop.

## 2.3 Values To Be Protected

### 2.3.1 Facilities (Real Property)

More than 550 acres, or about 37% of the Point Loma federal properties are developed or landscaped (see Table 1-2). Examples of the infrastructure include public access routes, buildings for operations, training, administration, housing, classrooms, storage, and shops; fuel tanks and support facilities; ordnance storage and handling points with ESQD safety zones; research laboratories; public works shops; waterfront access and berthing capabilities; an open air pool known as the Transducer Evaluation Center (TRANSDEC) for testing hydrophones; and underwater sensor ranges that measure the distortion in the earth's magnetic field surrounding each ship that passes over the ranges.

The Ballast Point Coast Guard Station operates a lighthouse and support buildings. Fort Rosecrans National Cemetery, managed by the DVA, is a landscaped cemetery designated as California State Historic Landmark Number 55. Its location also unofficially provides a natural ridge-top fuelbreak.

Facilities at CNM include a visitor center complex composed of a view building, auditorium, exhibit room, administration building, scenic overlook with the statue of Cabrillo, and 300-vehicle parking area; the Old Point Loma Lighthouse; the Whale Overlook shelter; entrance station; the 25-vehicle Ocean View parking area; a restroom building constructed in the 1930s near the lighthouse; the "old" maintenance building used for storage and the museum storage facility; 21 concrete, metal, and wood U.S. Army WWI and WWII era base-end and battery commander's stations, searchlight shelters and power generating stations; 44-

vehicle Tidepool parking area; 13-vehicle Coast View parking area; 30-vehicle Sea Cove parking area; and a "new" maintenance building on Navy land, which the Navy built for the NPS after construction of the Submarine Base torpedo magazine and repair facility placed the Old Maintenance building within the ESQD arc. The monument also contains trails, roads, and overlooks.

***Wildland-Urban Interface***

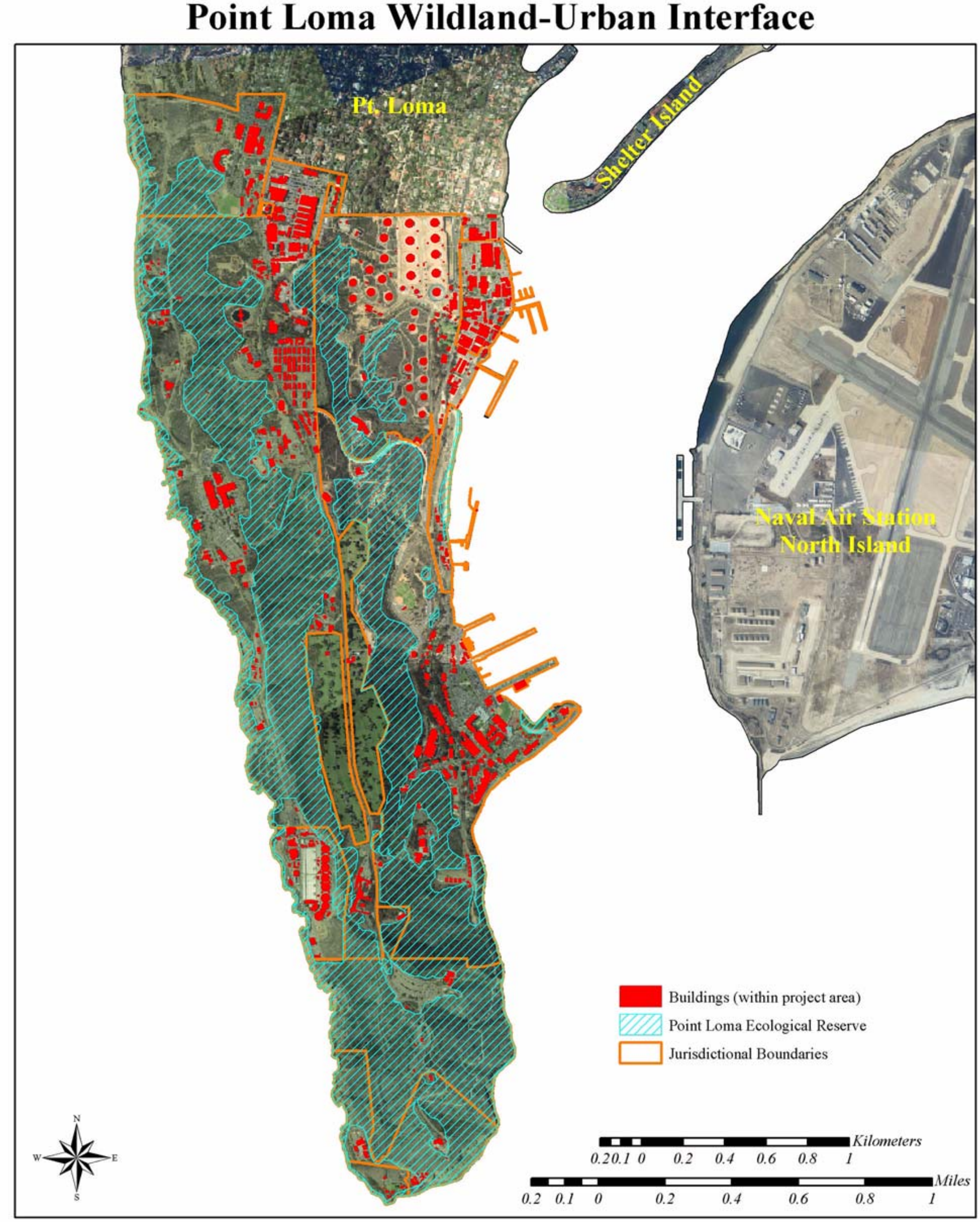
Throughout San Diego County, the encroachment of homes, businesses, and industries into wildland environments is increasing. This trend is creating an expanded wildland-urban interface, where structures are located next to large stands of native vegetation. Because of their location, these structures have become highly vulnerable to wildland fire. Firefighting in these areas is complicated by having to address both structural and wildland fire issues, and is typically focused on protecting buildings and saving lives. None of the natural habitats on Point Loma are far enough from existing buildings to be considered out of the wildland-urban interface. The interspersion of structures and natural habitats on Point Loma is shown in Map 2-2.

## 2.3.2 Cultural Resources

Point Loma has a rich cultural heritage spanning aboriginal, Spanish, Mexican, and American periods of occupation of the peninsula. In this Fire Plan, all National Register-eligible properties are considered, as well as other properties or resources that represent the history of the area, even if they are not eligible for listing. A Point Loma Cultural Resources and Fire Management Map is presented in Appendix D. This map will be provided to the cooperators in this Fire Plan, but is *exempt from public distribution under the Freedom of Information Act.* The San Diego Metro Programmatic Agreement on Cultural Resources is also in Appendix D.

### 2.3.2.1 History of Point Loma

The pattern of aboriginal occupation appears to have been affected by changes in sea level and periodic El Niño cycles which affected the availability of food sources such as shellfish, fish, and marine mammals (e.g. Miller 1966). At the start of the Holocene, over 10,000 years ago, it appears that sea level was approximately 18-20 meters below where it is today (Masters cited in Gallegos and Kyle 1988), resulting in the submergence of some archeological sites. There is evidence of aboriginal inhabitants on Point Loma since at least 9,000 years ago (Timbrook *et al.*1982). Kitchen middens confirm that the intertidal shoreline and estuary provided primary subsistence to these people (Gallegos 1988). However, to some extent, coastal hunter-gatherers used other food sources such as acorns, antelope, deer, rabbits, and grass seed (Heizer and Elsasser 1980). The earliest peoples to inhabit the peninsula represented what is referred to as the La Jolla complex. By around 2,000 years B.P., this society was either replaced or assimilated by the Yuman culture, which occupied the area up to the time of the first European contact (U.S. Navy 1995a).




*Map 2-2. Wildland-Urban Interface of Naval Base Point Loma.*

The first European to see the area now known as San Diego, Juan Rodriguez Cabrillo, arrived on September 28, 1542 (U.S. Navy 1995a, 1996). He landed upon what is now called Ballast Point and claimed all of the surrounding area for Spain, naming the area San Miguel. It would be sixty years, however, before any other Europeans would visit the area. When the English explorer Sir Francis Drake landed north of San Francisco and claimed that area for England, Sebastion Viscaino was sent by Spain to reassert Spanish claims in the south (U.S. Navy 1995a, 1996). During his visit in 1602, Viscaino made the first detailed maps of San Diego Bay and explored the surrounding lands and renamed the area San Diego de Alcala. It would, however, be another 150 years before the first permanent settlements were established.

By the mid-1700s, the increasing presence of English and Russians in the region prompted King Carlos III of Spain to order the establishment of missions and presidios along the Pacific Coast (U.S. Navy 1995a). The first of these to be founded was the 1769 colony at San Diego Bay. The Spanish ships anchored about one mile north of Ballast Point, and created an "embarcadero" on the beach known as La Playa, and a trail between La Playa and the presidio (Kelly and May 2001). Later, in 1795, recognizing the strategic defense importance of San Diego Bay and Point Loma, which protects it, the Spanish established defenses at Ballast Point with construction of Fort Guijarros (U.S. Navy 1995a). The Fort was used by the Spanish and Mexicans through the mid-1800s until California came under American control following the Mexican-American War (U.S. Navy 1995a, 1996). Other Spanish-Mexican development on the peninsula included a regional tallow and hide trading center at La Playa on the east side of Point Loma where SSC and FISC are now located.

From 1856 to 1869, the Point Loma area supported a thriving whaling industry. Shore stations operated on Ballast Point for processing the whales taken at sea and in San Diego Bay itself (U.S. Navy 1995a). As much as 55,000 gallons of oil were produced annually in San Diego, but the whaling industry and other civilian use of Point Loma came to a halt in 1874 when the U.S. Army took control of the peninsula (U.S. Navy 1995a, 1996).

Although Point Loma was declared as a U.S. Military Reservation in 1852, it was not until 1872 that serious work was begun to build a new fort on Ballast Point, but funding for the project was cut by Congress in 1874 (U.S. Navy 1995a, 1996). The military then abandoned San Diego for the next 22 years.

In 1885–1886 a new coastal defense system for the United States was developed. American military strategy centered on using Point Loma as a natural fortification in which military structures could be imbedded to obscure them (Kelly and May 2001). By 1897, efforts to fortify Point Loma had begun and over the next few years three coastal batteries were built (Batteries Wilkeson, McGrath, and Meed). In 1899 the military reservation was christened as Fort Rosecrans.

With the onset of World War I, development was centered on a plan to detect hostile naval invasion and triangulate artillery in a greater arc of trajectory than had been done before (Kelly and May 2001). The fortifications on Point Loma, previously focused on defending the harbor entrance itself, were expanded by adding two new mortar batteries to defend against ships approaching from the other side of Point Loma (U.S. Navy 1995a). After the war, Fort Rosecrans, although reduced to caretaker status with only a small garrison, saw the addition of two more batteries (Battery Point Loma and Battery Gillespie).

In the years leading up to World War II Fort Rosecrans was revitalized and modernized (U.S. Navy 1995a) and Batteries Strong and Ashburn were added to the defenses. The goal became to build a complex of artillery batteries capable of sinking entire naval fleets, while also protecting the area from overhead aerial bombing. The war's technological advances made the coastal defenses obsolete (U.S. Navy 1995a). Ownership of Fort Rosecrans was transferred from the Army to the Navy in 1957 and continues to be vital to the national defense system.

#### 2.3.2.2 Archeological Resources of Point Loma

Most archeological areas found to date appear to be aboriginal habitation sites with shellfish and related remains. Approximately 43 sites are known all across Point Loma, covering approximately 95 acres. See Appendix D for locations of archeological sites. Approximately 75% of CNM has been surveyed for archeological resources (prehistoric and historic) over the years (R. Kelly, pers. comm.). The remaining 25% is probably topography that is steep and/or thickly vegetated.

#### 2.3.2.3 Historical Resources on Point Loma

There are a number of significant historical resources located throughout Point Loma, including:

- Cabrillo National Monument Historic District which includes all structures of historic significance and archeological sites on the CNM property including the Old Point Loma Lighthouse;
- Museum storage at NPS;
- The pending Fort Rosecrans Historic District (boundaries not yet defined);
- Fort Rosecrans National Cemetery, California State Historic Landmark Number 55.

Cabrillo National Monument was established to commemorate the discovery of the west coast of the United States by Europeans and to remember Juan Rodriguez Cabrillo. The Monument's cultural resources are interpreted while celebrating an overriding theme of man's relationship to the sea. The Cabrillo statue is a cultural resource and important icon for the local Portuguese-American community and the Portuguese government.

The Old Point Loma Lighthouse (Photo 2-5), built in 1854, was one of the first of eight lighthouses built along the west coast and is the Point Loma landmark most familiar to San Diegans. The NPS has restored and refurnished the lighthouse to its 1880s appearance because photographic and narrative evidence for that period (1875–1891) is abundant.

*Photo 2-5. Old Point Loma Lighthouse.*

Located throughout Point Loma are the remaining elements of the Fort Rosecrans Coastal Defense System and the Point Loma Military Reservation representing the greatest concentration and broadest range of American military history on the Pacific Coast south of San Francisco (Kelly and May 2001). These elements include a wide variety of emplacements, such as artillery positions, bunkers, and support facilities that made up part of the San Diego harbor defense network during World Wars I and II (see map in Appendix D). The CNM Historic District contains 21 of these Coast Defense System structures. Two others were added after the recent transfer of land from the Navy to NPS.

As of yet, no comprehensive consolidation of the potentially eligible historic structures has been crafted for the entire Point Loma peninsula. However, several studies exist that contain overlapping recommendations for historic structure eligibility for certain areas of the point. Kelly and May (2001) list several potential Historic Districts that could be proposed among the historic resources on Point Loma that currently are not included under National Register guidelines. These include an expansion to the Fort Rosecrans District for structures added under the Grover Cleveland Administration, during the Great Depression, and in the 1940s; structures related to a Naval Coaling Yard and Supply Station; early Fuel Depot structures; a Navy Radio and Sound District; and a “Cold War” Naval Electronics Laboratory. The Keniston report (US Navy 1996), analyzed the coastal defense structures on the Point Loma Peninsula but excluded much of submarine base. The structures and proposed districts described within these reports will be reassessed upon crafting of the pending Fort Rosecrans Historic District (Yatsko, *pers. comm*. 2003).

### 2.3.2.4 Fire Management and Cultural Resources

Some archeological sites have fragile site surfaces that are currently protected by shrubs, which prevents erosion and trampling by people. Exposure of these sites by fire could degrade them. Certain of the historic resources are wooden structures or contain exposed burnable components. Many of these are also inhabited buildings, where survivable space management and suppression response is already at the highest priority level. The NPS museum storage facility is not inhabited but contains valuable artifacts. Guidelines for protecting NPS historic structures are provided in NPS Reference Manual 58.

Fire management activities, whether it be fire suppression, prescribed burning, hazard reduction, or creation of survivable space, must be sensitive to the possibility of detrimental effects on cultural resources. The direct effects of fire depend on the type of artifact or resource, its location, and the intensity of the fire. Prescribed fire or mechanical fuel reduction may be used around historical structures that might be damaged by wildfires or in the vicinity of archeological sites, and both vegetation clearing and ground-disturbing activity are concerns in these locations. Vegetation itself, whether planted or a certain condition or vegetation as part of a managed cultural landscape at a period of significance, can be an important element of historical resources.

There are three types of threats to cultural resources from fire management actions. First are direct effects, where fire itself is the agent of change (burning, cracking, smoke damage, etc.). For example, with regard to archeological sites, hot and long duration fires tend to be the most damaging, although heat rarely penetrates more than a few centimeters below the ground surface. In the case of chaparral, as noted previously, fire tends to burn in the canopies and the majority of heat is released into the atmosphere.

Buenger (2003) provides insight into direct effects on cultural resources. Not all materials comprising cultural resources are equally susceptible to the direct effects of fire. For example, wood is typically damaged at much lower temperatures than metal or stone. This holds true even within single material classes; for example, while a flaked stone artifact might not break unless exposed to very high temperatures, the same artifact will change color at a much lower temperature, impairing the ability of an archeologist to make a proper identification as to its source.

Second, cultural resources are also vulnerable to operational effects, those which result from fire management operations such as line construction, staging, etc. These could be an issue at CNM and NBPL given the fuel types and urban interface.

Finally, indirect effects are those that can occur when the context in which a resource is found has been altered by direct or operational forces, such as erosion, looting, or carbon contamination.

Appendix D shows the locations of cultural resources and also contains a copy of the CNRSW San Diego Metro Programmatic Agreement, executed February 23, 2003. For the Navy, compliance with section 106 of the National Historic Preservation Act (16 U.S.C. 470s) is governed by Stipulation 10D of this agreement. In the event of a wildland fire emergency, an excerpt from the relevant section of the Programmatic Agreement is reproduced below:

> "In the event that natural disasters, fires, spill events or other emergency events occur, CNRSW may take actions that may affect historic properties without consultation to protect life safety, stabilize any involved historic properties, and prevent further damage to property, consistent with 36 CFR 800.12. Emergency response work will be undertaken in a manner to avoid or minimize effects on historic properties to the extent possible. Should historic properties be discovered during emergency repair or response activity, work in the immediate area of the property will cease if CNRSW has determined that a

work stoppage at the site will not impede emergency response activities. As early as possible given the nature of the emergency, CNRSW will provide telephonic or email notification of the emergency to the SHPO and other appropriate parties to the PA. Notification will include the steps being taken to address the emergency, the discovered property and its apparent significance, and a description of the emergency work and potential effects on the discovered property. Within 30 calendar days following this notification, CNRSW will provide SHPO and other parties to the PA as appropriate a written report documenting the actions taken to minimize effects, present status and planned treatment of the property."

## 2.3.3 Natural Resource Values

### 2.3.3.1 Watersheds and Geology

The severe topography of the peninsula (Map 2-3) creates distinct drainages on the bay and ocean slopes, separated by the central spine of the peninsula, which rises to 460 feet above mean sea level. The deeply dissected terrain is cut by numerous natural drainages that channel runoff directly to the sea. Slopes of 40% to 75% are common. The rugged coastline is composed of eroding sandstone cliffs and characterized by wide rocky beaches, boulder fields, and small pockets of sandy beaches.

Point Loma is underlain by the Point Loma Formation that extends from northern Baja California to about Carlsbad, California. This formation is buried by recent sedimentary deposits, the lowest of which is the Pleistocene Cabrillo Formation composed of sandstone and conglomerates, visible at lower elevations. Above this is the more noticeable Bay Point formation of marine terraces and uplands formed from relictual beach dunes about 300 feet thick. The soils derived from this formation are loamy sands.

Point Loma used to be an island (Pourade 1964). Sedimentation from the San Diego River, which alternately drained into San Diego Bay and Mission Bay through geologic time, and a coinciding drop in sea level connected the Point to the Mainland about 10,000 years ago (Masters 1988).

### 2.3.3.2 Soils

A primary concern regarding soils is accelerated erosion and sedimentation that could occur due to fire or fire management activities. High fire temperatures can create hydrophobic conditions on certain soil types, in which impermeable subsurface layers can slough off in one mass after a fire. Many of the Point Loma soils have a naturally high erosion hazard (Table 2-6) due to poorly consolidated sandstone and shale sediments and steep slopes. Erosion hazard is a rating defined by the Natural Resources Conservation Service, and is based on soil characteristics (texture, percent coarse fragments, depth to impermeable layer), slope, vegetation cover and precipitation type and intensity. Soils are rated in five basic categories (slight, moderate, high, very high, and extreme). Considerable erosion is ongoing on the peninsula.

*Table 2-6. Soils on Point Loma, their texture, steepness, and erosion hazard.*

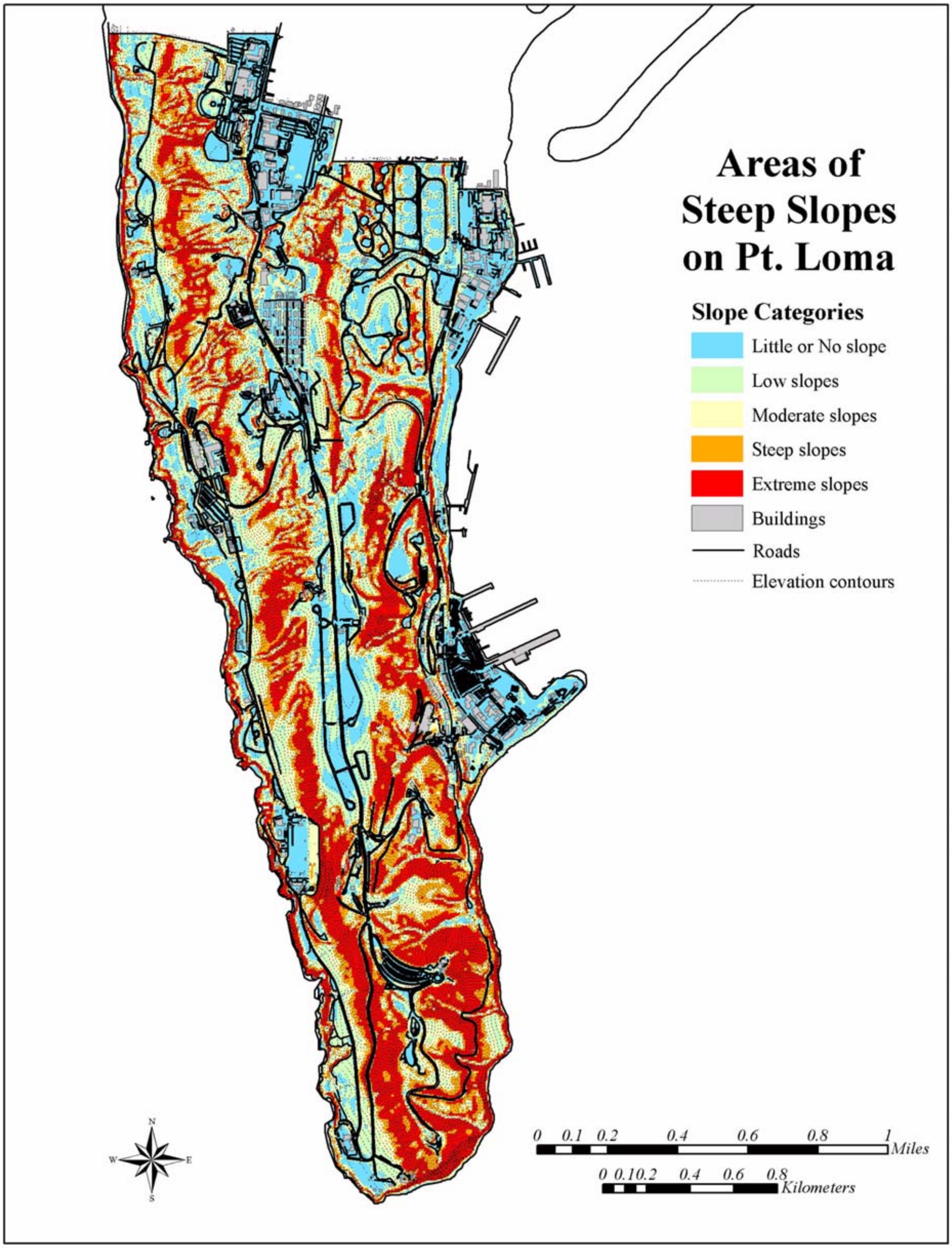
| **Soil** | **Texture** | **% Slope** | **Erosion Hazard** |
|---|---|---|---|
| Carlsbad | Gravelly loamy sand | 2-30 | Slight, Moderate to High |
| Gaviota | Fine sandy loam | 15-30 | Moderate to High |
| Hambright | Gravelly clay loam | 30-75 | High to Very High |
| Reiff | Fine sandy loam | 0-9 | Slight to Moderate |

The Carlsbad series soils, which are moderately well-drained, and well-drained gravelly loamy sands, are found on slopes of 2% to 30%. They are moderately deep, generally from 21 to 39 inches, over a hardpan layer. The vegetation cover is mainly chamise (*Adenostoma fasciculatum*), black sage (*Salvia mellifera*), laurel sumac (*Malosma laurina*), and grasses and forbs. On Point Loma, this soil type lies beneath the Fort Rosecrans National Cemetery, developed lands, and a small area of coastal sage scrub.

The Gaviota series consists of well-drained, shallow fine sandy loams. These soils are on uplands and have slopes of 15 to 30%. The elevation ranges from 300 to 500 feet. Vegetation on this soil type in San Diego County is mainly chamise, other chaparral scrub dominants, and grasses and forbs. It covers the mid-slopes of the southern half of the peninsula, supporting maritime succulent scrub, southern maritime chaparral, and coastal sage scrub.

The Hambright series consists of well-drained, shallow gravelly clay loams that formed in material derived from shaly breccia. These soils are located in mountainous areas and have slopes of 30% to 75%. The vegetation is primarily chamise, grasses, and forbs. This soil type occurs primarily along mid-elevations on the northwestern half of the peninsula.

The Reiff series soils are on alluvial fans and ocean terraces; they are well-drained, very deep (as thick as 90 inches on shoreline cliffs) fine sandy loams that formed in alluvium derived from granitic rock. These soils occur on slopes from 0 to 9%, and are commonly found at low elevations above the intertidal zone, under maritime succulent scrub.




*Map 2-3. Topography and steep slopes on Pt. Loma.*

#### 2.3.3.3 Air Quality

If experimental or prescribed fires are to be considered on Point Loma, then air quality concerns must be addressed. The same atmospheric processes that create a desirable climate of warm, sunny days can also lead to poor air quality. Specifically, a strong seasonal inversion layer (where a layer of warm air overlies a layer of cool air) prevents air at different altitudes from mixing and traps pollutants near the surface. Inversions effectively inhibit the dispersion of pollutants, resulting in a temporary (seasonal) degradation of air quality. Air quality in the San Diego Air Basin (SDAB) is impacted not only by local emissions but also by pollutants transported from other areas. In particular, ozone ($O_3$) and ozone precursor emissions transported from the South Coast Air Basin (located to the north) affect air quality within the SDAB. While the impact of pollutant transport is particularly important on days with high ozone concentrations, transported emissions are not solely responsible for the ozone problem in the San Diego area, as research has indicated that emissions from the SDAB are great enough on their own to cause violations of ozone standards (California Air Resources Board [CARB] 2003, County of San Diego Air Pollution Control District 2000).

Automobiles and other on-road vehicles (mobile sources) represent the greatest source of emissions in the SDAB. Major topographical features (e.g., the Cuyamaca Mountains) impact the transport and diffusion of pollutants by hindering their eastward movement. This, in conjunction with the shallow inversion layer and high pollution emissions results in generally poor air quality in the SDAB, which is similar to the air quality of most of coastal southern California. Other sources of emissions at Point Loma include civilian, military, and commercial vehicles; ships; tactical support equipment and vehicles; ground support equipment; small stationary sources; and ongoing construction activities. Table 2-7 summarizes representative air quality data from a monitoring station located at 12th Avenue in San Diego, the nearest monitoring station to Point Loma. Federal $O_3$ standards have not been exceeded over the past five years at this location, while the more stringent state $O_3$ standards have been exceeded three times within the last five years (CARB 2003). Over the past five years, the federal PM10 standard has not been exceeded and the state PM10 standard has been exceeded 22 times (CARB 2003).

Cabrillo National Monument is not in a Class I airshed for regional haze. The Clean Air Act defines certain federal areas as mandatory Class I airsheds, such as particular national parks (over 6000 acres), wilderness areas (over 5000 acres), national memorial parks (over 5000 acres), and international parks that were in existence as of August 1977. Because of evidence that fine particles are frequently transported hundreds of miles, all 50 states, including those that do not have Class I areas, participate in planning, analysis, and in many cases, emission control programs under the regional haze regulations. The same pollution that causes haze also poses serious health risks, especially for people with chronic respiratory diseases (http://www.epa.gov/ttn/ oarpg/t1/fact_ sheets/hazefs2.pdf).

*Table 2-7. Summary of representative air quality data from a monitoring station located at 12th Avenue in San Diego, the nearest monitoring station to Point Loma (Data Source: Calif. Air Resources Board, 2003).*

| Air Quality Indicator | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|
| ***Ozone ($O_3$)*** | | | | | |
| Peak 1-hour value (ppm) | 0.098 | 0.091 | 0.118 | 0.098 | 0.090 |
| Days above federal standard (0.12 ppm)[a] | 0 | 0 | 0 | 0 | 0 |
| Days above state standard (0.09 ppm)[c] | 1 | 0 | 1 | 1 | 0 |
| ***Particulate Matter less than 10 microns in diameter (PM10)*** | | | | | |
| Peak 24-hour value (mmg/m3) | 48 | 69 | 65 | 66 | 85 |
| Days above federal standard (150 mmg/m3) | 0 | 0 | 0 | 0 | 0 |
| Days above state standard (50 mmg/m3)c | 0 | 4 | 6 | 5 | 7 |
| ***Carbon Monoxide (CO)*** | | | | | |
| Peak 8-hour value (ppm) | 4.84 | 4.64 | 4.59 | 4.85 | 3.54 |
| Days above federal standard (9.0 ppm) | 0 | 0 | 0 | 0 | 0 |
| Days above state standard (9.0 ppm) | 0 | 0 | 0 | 0 | 0 |
| ***Sulfur Dioxide (SO2)*** | | | | | |
| Peak 24-hour value (ppm) | 0.011 | 0.008 | 0.010 | 0.012 | 0.007 |
| Days above federal standard (0.14 ppm) | 0 | 0 | 0 | 0 | 0 |
| Days above state standard (0.04 ppm) | 0 | 0 | 0 | 0 | 0 |
| ***Nitrogen Dioxide (NO2)*** | | | | | |
| Peak 1-hour value (ppm) | 0.094 | 0.122 | 0.117 | 0.098 | 0.102 |
| Days above state standard (0.25 ppm) | 0 | 0 | 0 | 0 | 0 |

[a]SDAB is in non-attainment ("serious") for the federal O3 standard.

[b]SDAB is in non-attainment for the state PM10 and ozone standards.

ppm = parts per million by volume; mg/m3 = micrograms per cubic meter.

The Environmental Protection Agency (EPA), the federal agency responsible for enforcing the Clean Air Act, recognizes that all types of fire (wildfire, prescribed fire, etc.) contribute to regional haze, and there is a complex relationship between what is considered a natural fire versus a human-caused fire. For example, the increased use of prescribed fire in some areas may lead to particulate emission levels lower than those that would be expected from a catastrophic wildfire. Given that in many instances the purpose of prescribed fires is to restore the natural fire cycles to ecosystems, the EPA works with state and federal land managers to develop enhanced smoke management plans that minimize effects of fire emissions on public health and welfare (http://www.epa.gov/ttn/oarpg/t1/fact_sheets/hazefs2.pdf).

CNM maintains a visibility monitoring camera in order to interpret changes in visibility conditions for the public.

### 2.3.3.4 Water Resources

No water sources were present on Point Loma until a dam was built in 1796 at the bottom of a ravine when Fort Guijarros was established on Ballast Point. There are no known ground water resources, natural seeps, or springs. The keepers at the Old Lighthouse depended on rain water stored in cisterns.

The City of San Diego is the major water supplier, and a City reservoir is located on Catalina Boulevard north of Fleet Combat Training Center, Pacific. Two additional large potable water reservoirs are located on the north side of Cabrillo Memorial Drive, one north of the Fort Rosecrans National Cemetery, and the other south of Ashburn Road where it joins Cabrillo Memorial Drive.

#### 2.3.3.5 Water Quality

Wildfires create conditions conducive to erosion and can increase sedimentation of water bodies. The waters surrounding Point Loma are sensitive to sedimentation. They are considered Essential Fish Habitat (EFH) under the Magnuson-Stevens Fishery Conservation Management Act (MSFCMA) (as amended on October 11, 1996), due to the presence of eelgrass and estuary conditions of San Diego Bay, and kelp beds on the Pacific Ocean side. This Act requires the delineation of EFH by regional fishery management councils with assistance from the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS). Essential fish habitat is “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The Pacific Fishery Management Council (PFMC) has delineated EFH for two southern California coast fishery types: coastal pelagic species and Pacific Coast groundfish. Coastal pelagic species are schooling fish not associated with the ocean bottom that migrate in coastal waters. Groundfish species typically live on or near the bottom of the ocean; thus, the terms *groundfish* or *bottomfish* are often used to describe them. The groundfish management unit consists of 83 species from groups including rockfish, flatfish, sharks and skates, roundfish, and others. The groundfish fishery EFH includes all waters from the mean higher high water line, and the upriver extent of saltwater intrusion in river mouths, along the coast of California seaward to the boundary of the U.S. Exclusive Economic Zone (EEZ) (PFMC 1998b). Estuarine habitats, defined as “those waters, substrates, and associated biological communities within bays and estuaries of the EEZ,” include the entire waters of San Diego Bay as EFH.

The MSFCMA requires federal action agencies to consult with the Secretary of Commerce and NMFS regarding any proposed action authorized, funded, or undertaken by the agency that may adversely affect EFH identified under the Act. In letters dated 29 March 2000 and 4 April 2000, NOAA, NMFS and the Navy reached agreement that the existing environmental review process under NEPA is functionally equivalent to the required consultation.

Waters off of the south and west shores of Point Loma also have two overlapping designations as Marine Protected Areas to 900 feet offshore. These designations prohibit swimming, surfing, and diving in waters within the area administered by CNM to protect the Tidepool Reserve and safety of visitors. The California Fish and Game Commission also prohibits commercial take of any plant or invertebrate except lobster, abalone, and crab (14 Calif. Code of Reg. 27.50, 123 [f][2][B] and 123 [d]). While these designations regulate the take of plants and animals and not water quality, sedimentation from wildfire could be especially detrimental to the sensitive intertidal areas.

### 2.3.3.6 Plant Communities of Point Loma

Point Loma not only evolved as an island but also functions to some extent today as an insular setting. It is fairly isolated from other significant stands of natural vegetation by both geography and development, and its maritime climatic influence allows for unique vegetation assemblages. Several plant communities are rare or restricted in distribution outside Point Loma. In addition, much of the vegetation is distinctive in that it contains a large succulent component (cacti and other plants with succulent stems).

The plant communities identified in Table 2-8 and Map 2-4 are based on Holland (1986). Nomenclature for plant species follows Hickman (1993). Their acreage, location, dominant structure and function for species support are described in Table 2-9. Detailed plant community descriptions may be found in the Navy's INRMP (U.S. Navy 2002) and NPS' Resource Management Plan and Vegetation Management Plan (CNM 1998 and 1995 with updates).

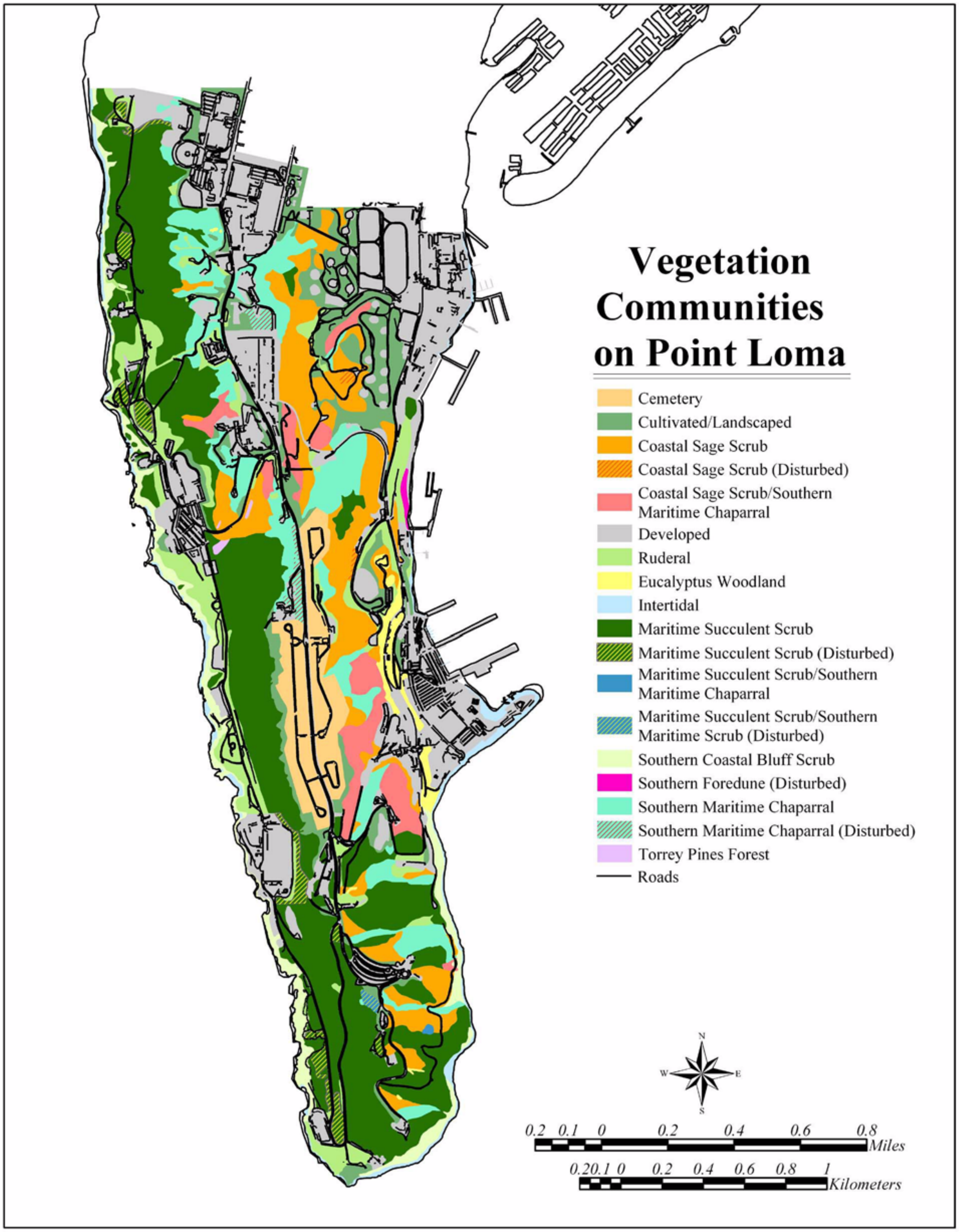
*Table 2-8. Plant communities fuel types of Point Loma (acres) based on vegetation surveys in 1993. Nomenclature for communities is based on Holland (1986) with revisions suggested by Oberbauer (1996). Land cover types for Anti-submarine Warfare Base (ASW) and Fleet Industrial Training Center Pacific (FITCPAC) were digitized by RECON from a January 2001 aerial photograph. Nomenclature for plant species follows Hickman (1993).*

| **Fuel Type / Plant Community** | **Naval Base Point Loma** (acres) | **Cabrillo National Monument** (acres) | **Other Ownership** (acres) | **Total** (acres) |
|---|---|---|---|---|
| ***Low shrublands*** | ***602.5*** | ***132.1*** | ***15.7*** | ***750.3*** |
| Southern coastal bluff scrub | 36.1 | 14.5 | 3.1 | 53.7 |
| Maritime succulent scrub | 275.6 | 86.3 | 12.4 | 374.3 |
| Diegan coastal sage scrub | 118.3 | 23.0 | 0.2 | 141.5 |
| Diegan coastal sage scrub/southern maritime chaparral | 55.3 | 0.6 | <0.1 | 55.9 |
| Southern maritime chaparral | 116.2 | 5.7 | <0.1 | 121.9 |
| Maritime succulent scrub/southern maritime chaparral | 1.0 | 2.0 | 0 | 3.0 |
| ***Woodlands and Forests*** | ***18.3*** | ***0.2*** | ***0*** | ***18.5*** |
| Torrey pine forest | 1.2 | 0 | 0 | 1.2 |
| Eucalyptus woodland | 17.1 | 0.2* | 0 | 17.3 |
| ***Others*** | ***610.2*** | ***25.5*** | ***109.2*** | ***744.9*** |
| Southern Foredunes | 1.6 | 0 | 0 | 1.6 |
| Ruderal | 91.0 | 2.8 | 7.0 | 100.8 |
| Cultivated/landscape | 109.6 | 3.8 | 7.2 | 120.6 |
| Cemetery | 0 | 0 | 65.2 | 65.2 |
| Developed | 382.6 | 15.5 | 27.2 | 425.3 |
| Intertidal | 25.4 | 3.4 | 2.6 | 31.4 |
| **TOTAL** | 1231.0 | 157.8 | 124.9 | 1513.7 |

* Eucalyptus trees have since been removed from CNM.

*Table 2-9. Plant communities of Point Loma, acreage, location, dominant structure and function for species support. Plant community descriptions are adapted from U.S. Navy (2002).*

| Description | Dominant Species | Sensitive Species Dependent on Plant Community |
|---|---|---|
| ***Diegan coastal sage scrub*** ***(142 acres most extensively on the Bay side on slopes above SUBASE and FISC, and several locations on west shore.)*** | | |
| Low, soft-woody subshrubs to about 3 feet high, many facultatively drought-deciduous. Found on drier sites, such as steep, south-facing slopes or clay-rich soils. The shrub canopy ranges from sparse to dense, with native forbs in the interspaces and understory. San Diego to San Luis Obispo, on weathered soils in the coastal fog belt. | California sagebrush *(Artemisia californica)*, California buckwheat *(Eriogonum fasciculatum)*, laurel sumac *(Malosma laurina)*, black sage (*Salvia mellifera*), and lemonadeberry *(Rhus integrifolia)*. Native understory includes foothill needlegrass *(Nassella lepida),* golden tarweed *(Hemizonia fasciculata),* wishbone bush *(Mirabilis californica),* chalk lettuce *(Dudleya pulverulenta),* and coast barrel cactus *(Ferocactus viridescens)*. | Coastal California gnatcatcher *(Polioptila californica californica)*, San Diego cactus wren *(Campylorhynchus brunneicapillus couesi)*, southern California rufous-crowned sparrow *(Aimophila ruficeps canescens)*, San Diego horned lizard *(Phrynosoma coronatum blainvillii)*, and many rare plants. |
| ***Southern coastal bluff scrub*** ***(54 acres in narrow band on the seaside bluffs.)*** | | |
| Low or prostrate scrub. Dominant plants are mostly woody and/or succulent that are often dwarfed due to almost constant exposure to coastal, moisture-laden winds with a high salt content (Holland 1986). Found in localized stands south of Point Conception. | California desert thorn *(Lycium californicum),* seablite *(Suaeda calceoliformis),* lemonadeberry *(Rhus integrifolia),* coast barrel cactus *(Ferocactus viridescens),* and snake cholla *(Opuntia parryi).* | Shaw's agave *(Agave shawii)* and seaside calandrinia *(Calandrinia maritima)*. Velvet cactus *(Bergerocactus emoryi)* and Shaw's agave *(Agave shawii)* are more common in Baja California, and this is their most northerly location. |
| ***Southern maritime chaparral*** ***(122 acres plus 54 acres that intergrade with Diegan coastal sage scrub.)*** | | |
| Occurs on weathered sands within the coastal fog belt. On ridge tops this community is somewhat lower growing (3-4 feet), more open. In drainages, it is denser and grows to 6-7 feet. Highly restricted to several scattered locations from San Luis Obispo to San Diego. | Chamise *(Adenostoma fasciculatum)*, wart-stemmed ceanothus *(Ceanothus verrucosus)*, scrub oak *(Quercus dumosa),* toyon *(Heteromeles arbutifolia),* lemonadeberry *(Rhus integrifolia)*, bush rue *(Cneoridium dumosum),* and red berry *(Rhamnus crocea).* | Rare plant species characteristic of this community and present on Point Loma include wart-stemmed ceanothus *(Ceanothus verrucosus)* and sea dahlia (*Coreopsis maritima)*. |
| ***Maritime succulent scrub*** ***(374 acres plus 2 acres that intergrade with southern maritime chaparral.)*** | | |
| Restricted to steep slopes of coastal headlands and bluffs from Torrey Pines State Reserve to Baja California. Low, open scrub dominated by drought deciduous, soft-woody shrubs, many of which are stem and/or leaf succulents. Intershrub area is unvegetated or sparsely vegetated with native grasses, forbs, and low-growing succulents. | Dominant species include California sagebrush *(Artemisia californica)*, California encelia *(Encelia californica),* lemonadeberry *(Rhus integrifolia)*, cliff spurge *(Euphorbia misera),* dudleya species *(Dudleya* spp.*),* and snake cholla *(Opuntia parryi)*. | Several rare plant species, including cliff spurge (*Euphorbia misera*), coast barrel cactus (*Ferocactus viridescens)*, and snake cholla *(Opuntia parryi)*. |
| ***Southern foredune, disturbed*** ***(1.6 acres in one location north of the MSF deperming pier.)*** | | |
| Found on sandy sites adjacent to the high-tide line. Occurs from Point Conception to Mexico. | Saltgrass *(Distichlis spicata),* beach evening primrose *(Camissonia cheiranthifolia* ssp. *suffruticosa),* and red sand verbena *(Abronia maritima)*. | No sensitive species known from this location, but can support California least tern *(Sterna antillarum browni),* western snowy plover (*Charadrius alexandrinus nivosus)*, and silvery legless lizard *(Anniella pulchra pulchra)*. |
| ***Intertidal*** ***(31 acres along most of the undeveloped coastline.)*** | | |
| Rocky sites or isolated sandy and cobble beaches exposed to alternating air and wave forces. | Supports marine plants, shellfish, fish, over 300 species of algae and invertebrates (Zedler 1976, 1978). | High-quality tidepool ecosystem. Foraging shorebirds, seabirds. |
| ***Torrey pine forest*** ***(1.2 acres of cultivated trees along Woodward Rd. near the SSC.)*** | | |
| Trees less than 15 m tall with open canopy. Sparse understory comprised of shrubs, grasses, and forbs. | Torrey pine (*Pinus torreyana*). | Is treated as a native plant community at least on Navy land due to rarity. |
| ***Eucalyptus woodland*** ***(17 acres, mostly at SUBASE.)*** | | |
| Dense to open stands with little understory. | Gum tree (*Eucalyptus* spp.) | Habitat for a number of native bird species. |
| ***Ruderal*** ***(101 acres near developed sites, vacant lots, road sides, and construction staging areas.)*** | | |
| Ruderal lands are dominated by non-natives, and the species composition and site conditions are not characteristic of the disturbed phase of any native plant association. | Typically dominated by non-native grasses, and forbs such as Russian thistle *(Salsola tragus)* and Australian saltbush *(Atriplex semibaccata)*. | Little value assigned for natural functions. |
| ***Cultivated/Landscaped*** ***(186 acres, including Fort Rosecrans National Cemetery.)*** | | |
| Horticultural species have been planted for aesthetic, recreational, or erosion control purposes. Golden wattle *(Acacia longifolia)* and hottentot-fig (*Carpobrotus edulis)* occur on FISC, and along the Cemetery border. Other species include Monterey cypress *(Cupressus macrocarpa),* and Peruvian pepper tree *(Schinus molle).* | | Used by many migratory and resident bird species. |
| ***Urban/Developed*** ***(433 acres.)*** | | |
| Developed areas support no native vegetation and typically contain man-made structures such as buildings, roads, storage structures, radar installations, and ship piers and docks. | | Little value assigned for natural functions. |




*Map 2-4. Plant communities on Point Loma.*

### 2.3.3.7 Plant Communities and Fire Effects

While the historical fire regime is not known specifically, it can be assumed that fire was present and regulating the composition and structure of plants and wildlife to some degree. The fire regime can have significant effects on biota either through the lack of significant fire over an extended period or from fires that occur at an intensity, pattern, or interval to which the biological communities or individual species have not adapted. Actual effect on the community not only depends on the nature of the fire regime, but on how it interacts with other natural processes at the landscape, community, and species scales. Because the modern environment has been altered by many irreversible changes, the resilience of Point Loma's plant communities and species to today's fire regime may be different than they were under the fire regime of a few hundred years ago.

Table 2-10 summarizes fire and other management concerns related to the various plant communities. For reasons described previously in this chapter, the most significant risk to the plant communities on a regional basis, that of a prematurely short fire return interval, is not addressed in this table because it is unlikely at this time.

*Table 2-10. Summary of fire concerns related to plant communities of Point Loma. The peninsula does not suffer from the problems associated with high fire frequencies and short fire return intervals that have been reported for much of southern California. For this reason, the most significant regional risk to these communities, that of a prematurely short fire return interval, is not addressed here.*

| Plant Community | Fire and Other Management Concerns |
|---|---|
| **Diegan coastal sage scrub** | *Fire:* The lack of fire in Point Loma sage scrub stands is expected to have resulted in a structural simplification of the community as shrubs age and canopy cover diminishes recruitment, an overall reduction in above-ground stand diversity (Westman 1981, Westman 1982, O'Leary 1989, Malanson and O'Leary 1982, De Simone and Zedler 1999), low numbers of above ground annuals (though they may still be present in the seed bank), and a general absence of nitrogen-fixing organisms (Westman 1982, DeBano and Dunn 1982). Lemonade berry is expected to continue to expand, while California sagebrush may decline in cover due to plant aging. Concentration of dominance by a small number of shrub species is at its maximum (Westman 1981). Low-intensity fires stimulate sprouting of dominants, but hot fires suppress crown-sprouting, and consequently promote the herbaceous flora (Westman 1981). Coastal sage scrub has lower shrub cover, higher volatile oil content, greater cover by herbaceous (or understory) species, shorter duration of nitrogen-fixing species, and more marked variation in post-fire sprouting patterns than chaparral (Westman 1981). Typically, coastal sage scrub has much less standing biomass and litter accumulation. Constituent shrub species are capable of continual reproduction by seed, unlike chaparral species. Resprouting shrubs recruit seedlings immediately after fire but also recruit in gaps of unburned stands. Gap-creating agents vary (including shallow soils, steep slopes), but animals, especially small mammals, can be important in creating and maintaining gaps (DeSimone and Zedler 1999). In coastal areas, most sage scrub species resprout from below ground root crowns, although there can be substantial seedling germination (White 1995). This is not the case in inland areas where there is little or no regeneration from sprouting and virtually all recovery is dependent upon seed germination. Animals with sedentary life cycles that are dependent on herbaceous or suffrutescent shrubs of a more open habitat condition could be at risk from prolonged absence of fire as the shrub canopy fills in.<br>*Other:* Nesting coastal California gnatcatchers have not been reported from Point Loma since 1915 (Quon and Haas 2001). However, there are sightings of individuals, presumably dispersing young, on a fairly regular basis. Coastal sage scrub is very fragmented, but animals likely co-use maritime succulent scrub. Exotics are a localized problem on habitat edges. |
| **Southern coastal bluff scrub** | *Fire:* It is unlikely that fire will affect this community due to its very open condition and low fuels. Succulent species resist burning but recover slowly once burned. They are generally not present in the seed bank. They are resilient to low-intensity fires, or long intervals without fire. Sensitive and rare cacti and succulents should be protected from high-intensity fires if number and area of the population is small.<br>*Other:* Disturbed by exotic species such as hottentot fig *(Carpobrotus edulis)* and crystalline ice plant *(Mesembryanthemum crystallinum)* and erosion. |

*Table 2-10. (Continued) Summary of fire concerns related to plant communities of Point Loma. The peninsula does not suffer from the problems associated with high fire frequencies and short fire return intervals that have been reported for much of southern California. For this reason, the most significant regional risk to these communities, that of a prematurely short fire return interval, is not addressed here.*

| Plant Community | Fire and Other Management Concerns |
|---|---|
| **Southern maritime chaparral** | *Fire:* There is a risk in the long-term of eventually losing fire-dependent, obligate seeding species such as wart-stemmed ceanothus that can be present for many years in the seed bank until stimulated to germinate by fire. This risk is not believed to be imminent for wart-stemmed Ceanothus. However, with some fire-free periods of 150 years or more, the limits of this species' and other organisms' resilience is unknown. The length of time that seeds remain viable is unknown for most maritime chaparral species (Tyler and Odion 1996). Further study of seed bank longevity is needed to understand the risk to species of concern. Under continued absence of fire, this community will shift towards taller canopy dominants which are in the vigorous crown sprouter group (such as oak and toyon), and loss of ceanothus and other obligate seeders. Van Dyke et al (2001) found that more than half of the herbs growing above ground were absent in samplings 25 years apart in maritime chaparral of Monterey County. The remaining herbs were restricted to the few remaining canopy gaps, and the understory was bare except for litter and seedlings of trees, which need shade to germinate, then a canopy opening to establish new individuals. In general, herbs are expected to be low in number and restricted to canopy openings where dominant species die from aging, or on shallower or finer-textured soil types that restrict shrub growth. If fire parameters do not favor regeneration of obligate seeders, or if seedlings emerge under adverse environmental conditions after fire and die from drought or competition, stand dominance may shift to chamise. Animals with sedentary life cycles that are dependent on herbaceous or suffrutescent shrubs of a more open habitat condition may be at risk.<br>*Other:* Open ridges on sandstone is the habitat for the federally endangered Orcutt's spineflower. Exotics threaten this plant species (Bauder 2000), but the Navy has been funding weed removal and habitat restoration projects adjacent to areas it occupies (K. O'Connor, *pers. comm.*). Non-native species are not common in intact chaparral stands, but shallow soils, erosion or other disturbance can provide them with a foothold. Fire is not expected to harm the annual spineflower and other canopy gap species by controlling competing invasive grasses, but only if spineflower seeds are fire-tolerant and the risk of creating new openings for invasives is managed. Low acreage and erosion are problems for this community. |
| **Maritime succulent scrub** | *Fire:* Stem succulents are concentrated in this community, along with species common in coastal sage scrub. Cacti and other succulents resist burning but recover slowly (vegetatively) once burned. They are more resilient to low-intensity fires, or long intervals without fire. Sensitive and rare cacti and succulents should be protected from high-intensity fires. Lack of fire may benefit survivability, but canopy closure (see photo 2-4) and shade are also detrimental to adults. Shade may benefit succulent seed germination. California sagebrush has declined in total cover during long fire-free periods, and this appears to be occurring on Point Loma (R. Taylor, *pers. comm.*, based on comparing two 1931 and 2000 vegetation plots). There is lower mortality in low-intensity fires due to re-sprouting of dominants, but hot fires increase shrub mortality and may kill succulents, while promoting the herbaceous flora. Animals with sedentary life cycles and dependent on herbaceous or suffrutescent shrubs of a more open habitat condition may be at risk.<br>*Other:* Erosion, exotic species. |
| **Southern foredune** | *Fire:* Introduction of invasives may eventually allow a fire to carry when it normally would not, but coastal position and low fuels make fire very unlikely to occur here.<br>*Other:* Disturbed by non-natives such as ripgut grass *(Bromus diandrus),* soft chess *(B. hordeaceus),* hottentot fig, and acacia. |
| **Torrey pine forest** | *Fire:* Torrey pine stands have a high fuel load that burns in stand-replacing crown fires. They establish seedlings after fire. They have no adventitious-bud root crown and the cones have reduced serotiny compared to inland species, apparently adapted to long intervals without fire or to low-intensity fires.<br>*Other:* None. |
| **Eucalyptus groves** | *Fire:* Eucalyptus groves are very flammable and should not be near structures. Specific problems are addressed in Chapter 3.<br>*Other:* Some species of eucalyptus are invasive and should be controlled. On Point Loma, these groves are nesting habitat for herons of several types. Herons and their nests are protected under the Migratory Bird Treaty Act. Replacing these groves with other trees more suitable for fire safety but that could also provide nesting would require a dense-crowned species to provide adequate hiding cover. |
| **Intertidal** | *Fire:* Any fire impacts would be indirect due to potential sedimentation.<br>*Other:* In general, regional threat is related to human harvesting and trampling of area. |

*Table 2-10. (Continued) Summary of fire concerns related to plant communities of Point Loma. The peninsula does not suffer from the problems associated with high fire frequencies and short fire return intervals that have been reported for much of southern California. For this reason, the most significant regional risk to these communities, that of a prematurely short fire return interval, is not addressed here.*

| Plant Community | Fire and Other Management Concerns |
|---|---|
| **Developed/Landscaped** | *Fire:* Specific problems with survivable space are addressed in Chapter 3. Washington palm can burn explosively and is often ignited by ember laden winds.<br>*Other:* Some horticultural species can be invasive and dominate certain native habitats on Point Loma. |
| **Non-native Grassland and Ruderal** | *Fire:* The margins of shrublands and developed areas contain a mix of nonnative species that grade from grasslands to weedy forbs. Fire can either enhance or impair their ability to invade native communities.<br>*Other:* The mild climate fosters weedy associations dominated by escaped horticultural trees (acacia). |

### *Long-term Vegetation Plot Records*

As part of a larger study assessing vegetation trend across coastal San Diego County that looked at 78 plots originally sampled in 1931, Taylor (*pers. comm.* 2003) compared the historical vegetation records of two plots from 1931 on the Point Loma Peninsula with plots established and sampled in 2000. He established the new plots as close as possible to each of the historical plots, matching slope, aspect, and elevation. One of the original plots at CNM is now beneath the visitor center parking lot, so the two new plots were placed in nearby extant vegetation. This site is described as a gentle south-facing slope. The other historical plot was located upslope from the Magnetic Silencing Facility on the eastern slope of the peninsula on NBPL. The new plots associated with the Navy site are believed to be within 10 meters of the original location. The results of this study are presented in Table 2-11.

Both sites sampled in 2000 had lower percent cover of California sagebrush *(Artemisia californica)* than had been recorded on the 1931 plots. While cover of lemonade berry (*Rhus integrifolia)* was similar in both sampling periods at the Cabrillo site, it was notably higher in 2000 at the Navy site, and it has been increasing at other sites on Cabrillo National Monument (Zedler *et al*. 1995). Data for wart-stemmed ceanothus (*Ceanothus verrucosus)* are less clear. At the Cabrillo site, *Ceanothus verrucosus* cover was lower in the 2000 plots than in the 1931 plots, but slightly higher at the Navy site. California buckwheat (*Eriogonum fasciculatum)* was much higher in 2000 at the Cabrillo site, but not at the Navy site. Deerweed (*Lotus scoparius),* a disturbance dependent species, while absent at the Cabrillo site in 1931, had lower cover values at the Navy site in 2000 than in 1931. Sawtoothed goldenbush (*Hazardia squarrosa),* while present in 1931 on the Cabrillo site, was not observed in 2000. Grasses, which covered 38% of the Navy site in 1931, were apparently absent in 2000.

A number of species found in the plots sampled in 2000 were new to the plots. For the Cabrillo site these included bushrue (*Cneoridium dumosum),* lady fingers *(Dudleya edulis),* common encelia (*Encelia californica),* black sage *(Salvia mellifera),* golden yarrow *(Eriophyllum confertiflorum),* spiny redberry *(Rhamnus crocea),* and cliff spurge *(Euphorbia misera).* Of these, *Euphorbia misera* experienced the greatest increase. The Navy site also showed an increase in recorded species, including *Ceanothus verrucosus, Cneoridium dumosum, Encelia californica, Salvia mellifera,* California broom *(Baccharis sarothroides),* and hottentot fig *(Carpobrotus edulis).*

When comparing these data with changes across the county, it is interesting that Taylor (*pers. comm.* 2003) found similar declines in *Artemisia californica* across the region. In contrast, *Rhus integrifolia* has shown an increase on unburned east facing slopes in coastal San Diego County. Taylor has observed similar patterns in Ventura County and in the Santa Monica Mountains (Taylor, *pers comm*. 2003). The biggest differences observed in Table 2-11 are the most likely to reflect a historical change, since problems with replicating the original plot placement could easily account for more subtle differences.

*Table 2-11. Percent absolute cover for both US Navy and Cabrillo sites. There were two plots set up in 2000 for each historical 1931 plot, hence 2000(a) and 2000(b). Data courtesy of Robert Taylor, NPS.*

| Plant Species | 1931 | 2000(a) | 2000(b) | RelativeChange 1931-2000 |
|---|---|---|---|---|
| ***Cabrillo National Monument Site*** | | | | |
| *Artemisia californica* | 47 | 18 | 0 | Decrease |
| *Ceanothus verrucosus* | 20 | 2 | 5 | Decrease |
| *Cneoridium dumosum* | 0 | 5 | 0 | New* |
| *Dudleya edulis* | 0 | 1 | 0 | New* |
| *Encelia californica* | 0 | 2 | 7 | New* |
| *Eriogonum fasciculatum* | 5 | 29 | 37 | Increase |
| *Eriophyllum confertiflorum* | 0 | 0 | 3 | New* |
| *Euphorbia misera* | 0 | 20 | 6 | New* |
| *Hazardia squarrosa* | 10 | 0 | 0 | Loss** |
| *Rhamnus crocea* | 0 | 0 | 4 | New* |
| *Rhus integrifolia* | 18 | 13 | 25 | No change |
| ***NBPL Site*** | | | | |
| *Artemisia californica* | 81 | 6 | 5 | Decrease |
| *Baccharis sarothroides* | 0 | 0 | 1 | New* |
| *Carpobrotus edulis* | 0 | 14 | 6 | New weed* |
| *Ceanothus verrucosus* | 0 | 10 | 0 | New* |
| *Cneoridium dumosum* | 0 | 5 | 8 | New* |
| *Encelia californica* | 0 | 6 | 2 | New* |
| *Eriogonum fasciculatum* | 8 | 4 | 4 | Decrease |
| Grass | 38 | 0 | 0 | Decrease |
| *Lotus scoparius* | 38 | 0 | 2 | Decrease |
| *Rhus integrifolia* | 10 | 50 | 69 | Increase |
| *Salvia mellifera* | 0 | 3 | 0 | New* |

*Species not recorded in 1931 samplings.
**Species recorded in 1931 but absent in 2000 samplings.

## *Fire Effects in Chaparral*

Ecologically, maritime chaparral is differentiated from interior chaparral by having greater exposure to summer fog, higher humidities, and milder temperatures, all of which help to alleviate the drought stresses experienced by inland communities. This may potentially lead to adaptations to different disturbance regimes such as fire (Van Dyke *et al.* 2001). Maritime chaparral on Point Loma differs from that of more northerly locations on the central California coast in that it is not dominated by species of the manzanita genus *(Arctostaphylos* spp.*)*, many of which are narrowly endemic (Van Dyke *et al.* 2001).

Throughout its range, maritime chaparral occurs in a matrix of coastal sage scrub and oak woodland. Herbaceous species are restricted to canopy openings and as a result are uncommon in mature chaparral but can dominate after a fire. Post-fire emergence of these species is largely from dormant seeds in the soil, as well as from bulbs, rhizomes, and tubers. A second pulse of annual herbs often occurs within five years of a fire (S. Keeley 1977), probably corresponding to the first above-average annual rainfall. As the community ages, it becomes increasingly dominated by a few species of tall, vigorous crown sprouters (Lloret and Zedler 1991, Van Dyke *et al.* 2001). In areas where oaks or other tree species are located in proximity to mature chaparral, the chaparral shrubs can act as "nurse plants" for tree seedlings which may eventually overtop and kill their hosts (Callaway and D'Antonio 1991). Chaparral is generally believed to be resilient to fire return intervals ranging from between 20 to 150 years, with average historic return intervals of 50 to 70 years at least in inland situations (Minnich 1983, Davis and Michaelson 1995, Conard and Weise 1998, Mensing *et al*. 1999).

Point Loma does not experience the problems associated with high fire frequencies and short fire return intervals that have been reported for much of southern California. Regionally, a single premature fire can dramatically transform vegetation composition or even type-convert shrublands. O'Leary (1995) estimated that fire return intervals of five to ten years can result in chaparral replacement by coastal sage scrub, while others have found that this same interval will cause the replacement of coastal sage scrub with exotic grasslands (Timbrook *et al*. 1982, Minnich and Dezzani 1998). However, even fire intervals of 20 years or longer may result in significant changes in stand structure (Parker 1989). Despite the apparently greater resilience of coastal sage scrub to short fire return intervals, conversion to annual grasses has been widely reported, particularly at drier inland locations (Callaway and Davis 1993, Riggan *et al*. 1994, Minnich and Dezzani 1998, O'Leary 1995). This may be due to interaction with other disturbance types such as grazing or drought or the ready establishment of exotic annual herbs which can often support high fire frequencies (Minnich and Dezzani 1998).

Evidence of ecological changes due to the long fire-free period on Point Loma include both historical observations of species assemblages that differ from the present, and modern observations of community dynamics. Historically, for example, William Emory made observations that suggest a different composition of the plant community than exists today, which may be related to fire regime. He noted the dominance of yerba santa (*Eriodictyon* sp.), which today grows mainly along roadsides or in disturbed areas. He also observed other shrubs which formed dense thickets such as chamise (*Adenostoma fasciculatum*), bushrue (*Pitavia dumosa*, now called *Cneoridium dumosum*), a species of scrub oak (Quercus sp.), and buck brush (*Ceanothus rigidus*, now called *C. cuneatus*), which is no longer present on Point Loma (Zedler *et al.* 1995).

Modern observations show that the population of wart-stemmed ceanothus, a major component of the chaparral community, is decreasing on Point Loma, while the lemonade berry population is increasing (Zedler *et al.* 1995). Wart-stemmed ceanothus is the only fire-dependent chaparral species occurring prominently on Point Loma, although not all species in the chaparral have been evaluated for fire dependencies. It is an obligate seeder that requires a hot fire to germinate its long-lived seeds residing in the soil in order to perpetuate itself since the mature plant is killed in fires. Zedler and his collaborators found that wart-stemmed ceanothus shrubs also propagated by layering and sprouting on Point Loma, but not at a rate that will affect population dynamics. Fire is the only mechanism that will increase the above ground population of this rare shrub. However, there is no imminent danger of losing the species since the rate of above ground population loss is slow and there is an abundant seed bank.

Evidence of the ecological consequences and fire management implications of the long fire free interval on Point Loma's aging chaparral stands comes from a recent seed bank study (Cummins 2003). Eight native plant species not previously known to occur on CNM were discovered, four of which have fire following characteristics. The last four on the following list also were not documented from anywhere on Point Loma before the recent seed bank study.

- Fire poppy (*Papaver californicum*), endemic to southern and central California and the Channel Islands where it appears following fire;
- Coastal lotus (*Lotus salsuginosus*), seeds respond to heat stimulation;
- Everlasting nest-straw (*Stylocline gnaphaloides*);
- San Diego bird's-foot-trefoil (*Lotus hamatus*);
- Purple everlasting (*Gnaphalium purpureum*), may be a fire-follower;
- Venus looking-glass *(Triodanis perfoliata*), found on burns and disturbed slopes;
- Polycarp (*Polycarpon depressum*);
- Arctic pearlwort (*Sagina procumbens*).

Some sites did not contain any species that are particularly restricted to the post-burn flora. The first two species, fire poppy and coastal lotus, are obligate fire-followers and are unlikely to occur during the interfire period. Cummins expects to find more undocumented species after a fire of any substantial size because only a small portion of CNM soils were surveyed. Some of the fire management implications of the results of the seed bank study are:

- A portion of the flora is stored in the soil seed bank and is unexpressed in the standing vegetation; the flora has additional unknown species that are present in the seed bank and would be expressed following any large fire (given that their seeds survive);
- The dominant shrubs and trees of the historic southern maritime chaparral are present in the existing flora or the seed bank;
- Prescribed fire is unnecessary to prevent extirpation of wart-stemmed ceanothus which will persist in the seed bank for many years after the death of the parent plants, but fire would increase the above-ground population;
- Populations of wart-stemmed ceanothus are present in the seed bank in areas where no adult plants occur; and
- Some non-native invasive species are abundant in the seed bank even when adult plants have been removed and therefore have the potential to re-establish following fire, given that their seeds survive.

A recent fire on Santa Catalina Island illustrates the potential for fire to affect species diversity in an area that has strong floristic ties to Point Loma, as well as similar maritime climate controls. In this case, after an extended fire-free interval, a human caused fire (1999 Goat Harbor Fire) resulted in the appearance of fire poppies, representing the first record of that species for that island. In addition, many other native plants seen rarely or not for years emerged from the seed bank (Knapp 2003). However, an alternative hypothesis may explain the appearance of native plants after the fire. Except for strict fire-followers, many native species on the islands may be absent due to intense herbivory. If herbivory is less of a controlling factor on Point Loma, the influence of fire may have alternative consequences.

### *Fire Effects in Coastal Sage Scrub*

Coastal sage scrub is dominated by low-growing shrub species, many of which are highly combustible because of the high proportion of fine fuels and volatile secondary plant chemicals, and are often highly tolerant of fire (see Table 2-9). Herbaceous species (plus seedlings) tend to occupy gaps in the shrub canopy where they can sometimes occur at high densities ( Davis *et al*. 1989, Rice 1993, Tyler 1995 in Keeley 2000). However, the highest densities of herbaceous annuals appear in the first growing season following a fire, with a secondary immigration of less abundant or less readily dispersed herb species to the site over time.

Within 20 years post-fire the cover of legumes and vines has all but disappeared. Symbiotic nitrogen-fixing organisms are virtually absent from stands which have not burned in 20 years or more (Westman 1981). Mature stands are typically highly dominated by one or very few species, due at least in part to the shade intolerance of the herbaceous understory and to reduced levels of soil nitrogen (Westman 1981). With the exception of a few scattered herbaceous individuals, the understory is barren. It is not uncommon to find areas of one hectare or more dominated by one or two shrub species. The dominant shrubs often die within 25–35 years on sites which have not burned in 60 years or more. At 40 years, the stand diversity is much reduced, and annuals have completely disappeared, though they may remain viable within the seed bank.

Fuelbed characteristics of coastal sage-scrub differ from mixed evergreen chaparral both in terms of fuel loading and fuel arrangement. The volatile oil concentrations of coastal sage-scrub species are considerably higher than mixed chaparral, which creates a higher reaction intensity per unit of fuel during pyrolysis.

Life form largely dictates the mode of post-fire regeneration. Herbaceous perennials are all obligate resprouters. Suffrutescents, with slightly woody bases above ground are killed by fire and regenerate from an abundant seed bank e.g. deerweed and peak rush-rose (*Helianthemum scoparium).* Among the subshrubs, most are obligate resprouters.Two species, white sage *(Salvia apiana)* and ashyleaf buckwheat (*Eriogonum cinereum),* form distinct basal burls (Keeley 1998). Sprouting may be a necessary form of regeneration because it appears that the seeds of most coastal sage-scrub species are killed by the intense heat of a fire. However, three species of subshrubs are facultative seeders: California sagebrush, California buckwheat, and black sage. In these species first-year seedlings are common but resprouting is variable and there may be complete mortality at some sites. Post-fire resprouting in coastal sage scrub subshrubs tends to be more successful in younger, rather than in older shrubs, and at coastal, rather than inland sites (Keeley 1998).

### 2.3.3.8 Wildlife Habitat Valuation in the PLECA

Federal Fire Policy guidelines are that natural resources priorities for fire suppression and investment in pre-suppression work is done based on relative values to be protected. Therefore, natural resources need to be assessed for relative value. The Navy had previoudly undertaken a habitat evaluation process on Point Loma. In order to support a long-term, conservation-based and interagency approach to managing Point Loma's natural resources, NAVFAC Southwest used a Habitat Evaluation Model (HEM) to assess and rank natural resource values. Such a valuation was necessary in order for the PLECA to function as a conservation bank with mitigation standards.

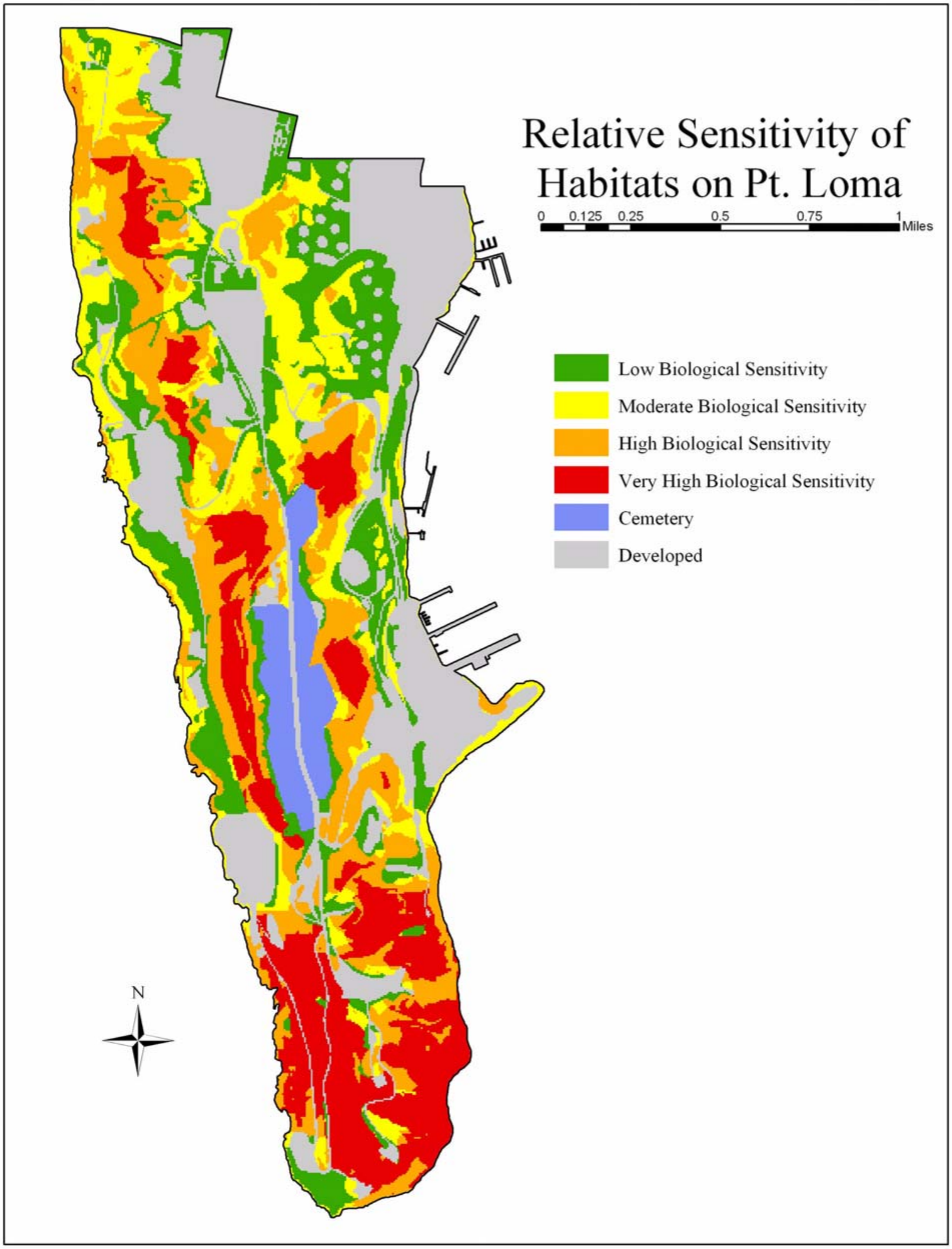
The HEM was developed based on factors that influence biological community viability. Eleven components of the HEM were compiled as separate data layers using geographical information systems (GIS). The following components were then combined to produce an overall habitat evaluation map to serve as the biological basis for prioritizing lands for preservation and inclusion in the ecological reserve:

- Habitat diversity;
- Patch size;
- Rarity of native habitats;
- Habitat disturbance;
- Edge effect;
- Proximity to protected open space;
- Concentration of sensitive species;
- Sensitive plant species population size;
- Sensitive wildlife habitat value;
- Sensitive habitat status; and
- Sensitive species status.

The HEM ranked undeveloped land on Point Loma into four categories based on relative biological value: very high, high, moderate, and low (Map 2-5). Inclusion of only the very high and high biological value areas into the reserve was assessed and found to be insufficient for preservation of viable ecosystems since it would only encompass half of the existing undeveloped lands on Point Loma and some key resources would be inadequately protected. The HEM served as the basis for a "biologically optimal" reserve design. However, additional criteria for inclusion in the reserve were used and included:

- All very high and most high value areas from the HEM;
- Moderate value areas that support habitats or sensitive species not adequately captured in very high and high areas alone;
- Significant occurrences of sensitive wildlife species or sensitive wildlife habitat.

Not all habitat in the biologically optimal reserve design was included in the final design of the PLECA. Landowners evaluated the proposal and certain areas were removed based on proposed future construction projects.




*Map 2-5. Habitat Values on Point Loma (Data from Ogden 1994).*

### 2.3.3.9 Wildlife Populations and Fire Effects

Point Loma is considered to be a major wildlife resource of regional significance due to the quality, abundance, and diversity of habitats and its coastal location. A comprehensive species list is provided in Appendix C, and profiles of the known sensitive species are available in the NBPL INRMP (U.S. Navy 2002).

Continuing to identify which species are at risk from an altered fire regime as in the previous sections, we attempt to group wildlife as to expected fire effects. These effects can be direct, but many are quite indirect and less predictable compared to plants. Direct effects include injury and mortality due to direct exposure to the fire. Indirect effects are caused by the alteration or destruction of habitat utilized by wildlife within the perimeter of the fire (Walters and Hillborn 1978). Most animals are able to escape the lethal effects of fire by selecting an insulated micro environment (burrows, riparian areas) or by rapidly emigrating from the area of the fire. Therefore the majority of the effects upon wildlife species are indirect, a result of alterations in the vegetation structure and temporary loss of habitat. These alterations include the removal of favorable nesting sites, the disappearance of host and forage plants, and loss of protective vegetation cover. Additionally, the loss of vegetation also results in changes in the biophysical milieu, altering temperature, wind, incident radiation, and soil moisture among other parameters that make up a microhabitat. The following passages discuss the effects of fire upon key species and species groups of interest.

#### Terrestrial Mammals

Thirty terrestrial mammal species have been recorded on Point Loma. Nomenclature for mammals follows Jones *et al*. 1992. Commonly detected species include the desert cottontail rabbit (*Sylvilagus audubonii),* California ground squirrel (*Spermophilus beecheyi*), northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*), deer mouse (*Peromyscus maniculatus*), California vole (*Microtus californicus*), and western harvest mouse (*Reithrodontomys megalotis*). Gray foxes (*Urocyon cinereoargenteus*) were recently observed during studies on Point Loma conducted by Fisher and Brown (2001). Gray foxes and coyotes were documented in a carnivore scat and tracking project (Soule' and Crooks 1996).

In 1997, a survey of bat species of NBPL identified western mastiff bats (*Eumops perotis californicus*), Mexican free-tailed bats (*Tadarida brasiliensis*), and myotis (*Myotis* spp.) foraging over the area (Brown and Berry 1997). Some species have been received by rehabilitators apparently from Point Loma that were not detected in these surveys. They are the Mexican long-tongued bat (*Choeronycteris mexicana*) and pocketed free-tailed bat (*Nyctinomops femorosaccus*).

The U.S. Geological Survey conducted a bat survey under contract with the National Park Service (Stokes *et al.* 2003). The report mentions that three species were found historically on the peninsula; the hoary bat (*Lasiurus cinereus*), the western red bat (*Lasiurus blossevillii*), and the California myotis (*Myotis californicus*). During the 2002 survey, four species were detected: the western red bat, the big brown bat (*Eptesicus fuscus*), the Mexican free-tailed bat, and the big free-tailed bat (*Nyctinomops macrotis*).

The degree to which mammals are successful at surviving wildfire depends both on their mobility and the uniformity, severity, size, and duration of the fire (Wright and Baley 1982). Small mammals usually attempt to escape wildfire by using subterranean shelters. Small rodents that construct surface dwellings, such as woodrats, are particularly vulnerable. More mobile, large mammals such as carnivores and ungulates must find sanctuary in unburned patches or along the periphery of the fire. Large mammal death is generally rare, but possible when fronts are fast moving, wide, and actively crowning with thick ground smoke (Smith 2000).

Depending on the uniformity and severity of a wildland fire, mammals can experience different indirect effects. Given a patchy burn, small rodents, such as woodrats, can recover quickly and exceed pre-burn levels (Schwilk and Keeley 1998 as referenced in Smith 2000). Mule deer *(Odocoileus hemionus)* generally prefer to forage in recovering burned vegetation as opposed to unburned areas (USFS 2003). This is most likely due to an increase in the soil nutrient availability, and thus an increase in the nutritional value of forage within burned sites. In one study, mule deer were estimated to have densities of 25 per square mile in unburned chaparral, while burned areas that had experienced a stand replacing fire had densities of 56 per square mile (Smith 2000). Coyotes *(Canis latrans)* can benefit from increased levels of prey during the recovery phase.

### Birds

Point Loma is located at a convergence point along the Pacific migratory bird flyway and more than 350 bird species have been recorded in the area. Nine bird species known to be resident or migrants are listed by either federal or state agencies as threatened or endangered. Almost all native bird species are also covered by the Migratory Bird Treaty Act (MBTA).

Shrubland bird populations are generally known to decline as an immediate response to shrubland wildfires (Smith 2000). This can result from emigration to unburned patches and direct fatalities as result of overexposure to the fire. If the fire disrupts nesting this can also directly affect population levels.

If burns are patchy the initial losses related to the fire itself are often counter-balanced by population increases during the vegetation recovery in subsequent years. Research in chaparral after the first year of a stand-replacing fire suggests that avian species richness in the burn was 70% to 90% of that in the unburned adjacent sites (Moriarty *et al.* 1985).

Sage sparrows, wrentits, black-throated sparrows, bushtits, mountain chickadee, acorn woodpeckers, white-headed woodpeckers, other sapsuckers, screech owl, sawwhet owl are canopy-dependent species which would decline post-fire. Canopy species may have severe short-term and long-term effects because of possible type conversion in some habitats. Wrentits and California thrashers are very sedentary and are probably killed by fires. California gnatcatchers *(Polioptila californica)* prefer the cover and structure provided by mature unburned coastal sage scrub. Likewise the California thrasher *(Toxostoma redivivum)* will recolonize burned sites four to five years after a burn, and do not reach maximum densities until twenty years post-fire (Cody 1998).

In contrast, the lazuli bunting feeds on the first annuals after fire, and is considered a fire follower species. It was never detected at locations during the five-year San Diego Natural History Museum (SDNHM 2004) Atlas period, but was observed in the first post-fire year. Also, Lawrence's goldfinch, mountain quail, wild turkey increased. A 2000% increase in black-chinned sparrows was observed, and swallows, swifts, sparrows, and flycatchers were more abundant in burned chaparral in the first post-fire year. Finally, the SDNHM notes that this rebound effect was especially dramatic on Costa's hummingbird *(Calypte costae).* This results from heightened levels of poodle-dog bush *(Turricula parryi),* beardtongue *(Penstemon spectabilis),* and woolly blue-curls *(Trichostema lanatum)* that promote feeding and nesting.

It is unusual for raptors to suffer mortality due to a direct impact of fire (USFS 2003). Adults individuals can escape fire, however fire could directly reduce raptor populations if it impacts nesting trees. Low-intensity fires probably have little effect. Most raptor species are unaffected or benefitted when occupying burned habitat. Burned areas provide little cover for prey species and raptors can take advantage of this vulnerability. Additionally, because prey species often increase after fire, raptors can also benefit. Coopers hawk (*Accipiter cooperii*) populations have been documented to benefit from fire (Dodd 1988 as referenced in Smith 2000). Nonetheless, fires that destroy potential nesting trees could impede reproduction of raptors when alternative nesting sites are scarce (USFS 2003)

While not considered sensitive, a species group that may require special management consideration on Point Loma is herons. This is because they nest in trees that pose a fire hazard to nearby, occupied wooden structures. Few great blue heron (*Ardea herodias wardi*) breeding colonies occur in San Diego County. In the 1970s, great blue herons established a nesting colony on SUBASE in two separate eucalyptus groves. Since 1980, these herons have dispersed and colonies now occur at several locations on SUBASE and MSF. In 1990, they started nesting at MSF, at SSC in 1994, and at FISC in 1995. In 1991, 49 active nests were documented on Point Loma (Platter-Rieger 1991). Black-crowned night herons *(Nycticorax nycticorax)* also began nesting at SUBASE in the 1970s, and in 1980 Platter-Rieger (1991) estimated 100 active nests on Point Loma. As many as 166 nests (in 1990) have been documented on Point Loma. Presently, this species is not nesting at SUBASE (U.S. Navy 2002), but has been observed nesting on NBPL in the fig trees (*Ficus* sp.) near Building 1 on SSC Bayside. Black-crowned night herons are also known to roost and nest near MSF.

### Reptiles and Amphibians

Nomenclature follows Collins 1997. Fisher and Brown (2001) searched throughout Point Loma and compiled an inventory of all the reptile and amphibian species they encountered. Species commonly captured included southern alligator lizards (*Elgaria multicarinatus*), western fence lizard (*Sceloporus occidentalis*), and side-blotched lizards (*Uta stansburiana*). The NPS continued the inventory initiated by the U.S. Geological Survey and continues to monitor the reptile and amphibian species populations at 17 sampling arrays located throughout the peninsula. Twelve of the nineteen species of reptiles and amphibians recorded historically on Point Loma have been detected. Seven snake species are also present on the peninsula (Appendix C). The Pacific slender salamander is the only amphibian that has been documented recently on Point Loma.

The direct impact of fire depends heavily on the severity and extent of the fire, and mobility of the species in question. Reptiles and amphibians must find respite in subterranean burrows, ponds, insulated rocks, etc. (Smith 2000). Due to their limited mobility they cannot escape a fast moving fire front. Significant mortality was observed as a result of the 2003 Cedar Fire (Tierra Data, *pers.observation* 2003).

Undoubtedly, changes in the vegetation due to fire can indirectly impact reptile and amphibian species. A study by Simovich (1979, as referenced in Smith 2000) found that lizards were more abundant in chaparral after a wildland fire when compared to mature stands of chaparral.

### Terrestrial Invertebrates

Almost 300 terrestrial insect species were identified on NBPL in 1993 and 1994 surveys by Bruyea Biological Consulting and Barnes Enterprises personnel. One rare species, the wandering skipper butterfly (*Panoquina errans*), is known to occur on the beach area north of MSF (Platter-Rieger 1996), and is tied to salt marsh vegetation.

The direct mortality of insects caused by wildland fires is significant. However, many species are able to escape fire by taking flight, or finding sanctuary in protected micro-sites such as soil burrows, unaffected trees, or rock outcroppings. In contrast, some species are attracted to fires, in search of suitable dead wood in which to lay eggs (Smith 2000).

Given that generally insect populations suffer heavily from wildland fires, recolonization and insect diversity of the burned site increases as vegetation is released from dormancy and regenerates. Insect diversity can shift as fire-following plants that were absent prior to the fire can provide new niches. Additionally, relative abundance of species can change as insects that take advantage of decaying wood become more abundant.

### Sensitive Wildlife

Map 2-6 shows the known locations of sensitive wildlife and plant species on Point Loma. Table 2-12 lists wildlife species known or with potential to occur on Point Loma that have a recognized sensitivity status (derived from NPBL INRMP, U.S. Navy 2002). Profiles of many of these may be found in the NBPL INRMP.

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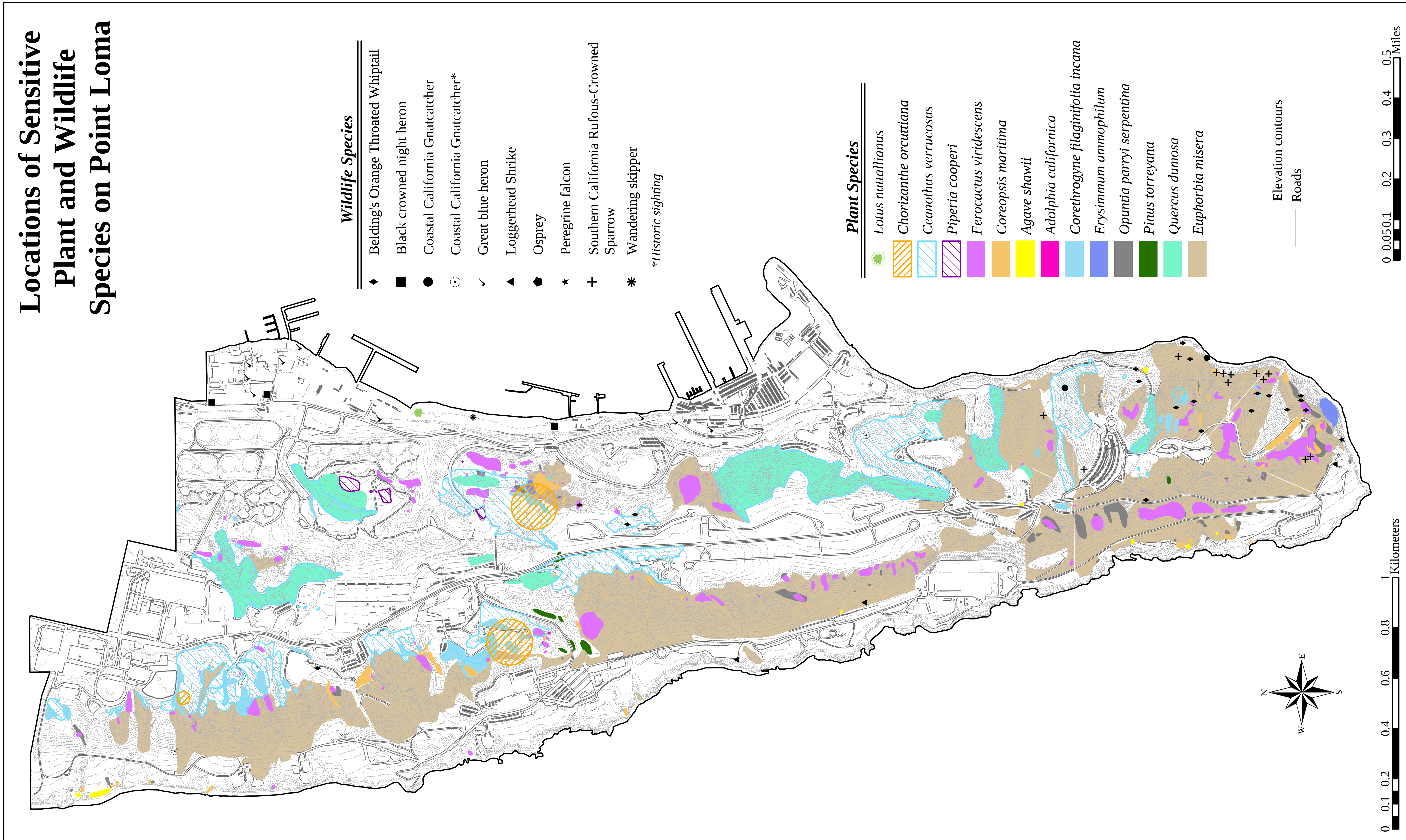


*Map 2-6. Location of sensitive plant and wildlife species on Point Loma.*

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*Table 2-12. Sensitive wildlife of Point Loma. (This list does not include records from Appendix F, Table 3 of the 2002 INRMP due to difficulty in differentiating between present and historical observations on that list.)*

| Scientific name | Common name | Foraging/ Resident/ Migratory/ Breeding | Sensitivity status | Comment |
|---|---|---|---|---|
| **REPTILES & AMPHIBIANS** | | | | |
| *Anniella pulchra* | Silvery legless lizard | R | FSC, CSC, NPS sensitive | Expected in sandy habitats. Known from Point Loma Nazarene College, La Playa. |
| *Cnemidophorus tigris multiscutatus* | Coastal western whiptail | n/a | | extirpated from Cabrillo |
| *Cnemidophorus hyperythrus beldingi* | Belding's orange-throated whiptail | R | CSC, NPS sensitive | Brown and Fisher (2001) on NBPL |
| *Crotalus ruber ruber* | Northern red diamond rattlesnake | n/a | | extirpated from Cabrillo |
| *Diadophis punctatus similis* | San Diego ring-neck snake | R | NPS sensitive | |
| *Eumeces skiltonianus interparietalis* | Coronado skink | n/a | CSC | extirpated from Cabrillo |
| *Lichanura trivirgata rosafusca* | Coastal rosy boa | n/a | FSC | extirpated from Cabrillo |
| *Phrynosoma blainvillei* | San Diego horned lizard | n/a | CSC | extirpated from Cabrillo |
| *Salvadora hexalepis virgultea* | Coast patch-nosed snake | R | CSC | |
| *Scaphiopus hammondii* | Western spadefoot toad | R | FSC, CSC | |
| **BIRDS** | | | | |
| *Accipiter cooperi* | Cooper's hawk | F | CSC | Some potential to breed on Point Loma |
| *Accipiter striatus* | Sharp-shinned hawk | F | CSC | Low potential to breed on Point Loma |
| *Agelaius tricolor* | Tricolored blackbird | R | FSC, CSC | |
| *Aimophila ruficeps canescens* | Southern California rufous-crowned sparrow | R,B | CSC | |
| *Ammodramus savannarum* | Grasshopper sparrow | R | | |
| *Amphispiza belli belli* | Bell's sage sparrow | R,B | FSC, CSC | |
| *Aquila chrysaetos* | Golden eagle | F | CSC | Some potential to breed on Point Loma |
| *Ardea herodias* | Great blue heron | B | CDF Sensitive | Several nesting colonies known |
| *Buteo regalis* | Ferruginous hawk | M | FSC, CSC | |
| *Buteo swainsoni* | Swainson's hawk | M | FSC | Former nesting colony now extirpated |
| *Campylorhynchus brunneicapillus couesi* | Coastal cactus wren | R | CSC | |
| *Cerorhinca monocerata* | Rhinoceros auklet | R | CSC | |
| *Charadrius alexandrinus nivosus* | Western snowy plover | | FT, CSC | |
| *Chilidonias niger surinamensis* | Black tern | R | FSC, CSC | Breeding status unknown |
| *Circus cyaneus* | Northern harrier | F | CSC | Not expected to breed on Point Loma |
| *Egretta thula thula* | Snowy egret | | FSC | |
| *Elanus leucurus* | White-tailed kite | B | FSC | |
| *Empidonax traillii extimus* | Southwestern willow flycatcher | M | FE | Not expected to breed on Point Loma |
| *Eremophila alpestris actia* | California horned lark | B | CSC | Known to breed on south Point Loma |
| *Falco mexicanus* | Prairie falcon | M | CSC | Not expected to breed on Point Loma |
| *Falco peregrinus anatum* | Peregrine falcon | B | CSC | Known to breed on southern tip of point |
| *Gavia immer* | Common loon | M | FSC, CSC | Observed, but breeding status unknown |
| *Haliaeetus leucocephalus* | Bald eagle | F | FT, SE | Not expected to breed on Point Loma |
| *Icteria virens* | Yellow-breasted chat | R | | Breeding status unknown |
| *Lanius ludovicianus* | Loggerhead shrike | R | FSC, CSC | Known to occur in several habitats |
| *Larus atriculla* | Laughing gull | unk | CSC | Known to occur, breeding status unknown |
| *Larus californicus* | California gull | M | CSC | Known to occur, breeding status unknown |
| *Laterallis jamaicensis coturniculus* | California black rail | n/a | FSC, ST | Extirpated from Point Loma |
| *Numenius americanus* | Long-billed curlew | M,R | FSC, CSC | Known to occur, breeding status unknown |
| *Nycticorax nycitocorax* | Black-crowned night heron | B | | |
| *Oceanodroma melania* | Ashy storm petrel | unk | FSC, CSC | Observed, but breeding status unknown |
| *Oceanodroma microsoma* | Black storm-petrel | unk | CSC | Observed, but breeding status unknown |
| *Pandion haliaetus* | Osprey | R | CSC | Breeding status on Point Loma unknown |
| *Passerculus sandwichensis beldingi* | Belding's savannah sparrow | | SE | |
| *Pelecanus erythrorhychos* | American white pelican | M | CSC | No nesting colonies on Point Loma |

*Table 2-12. Sensitive wildlife of Point Loma. (Continued) (This list does not include records from Appendix F, Table 3 of the 2002 INRMP due to difficulty in differentiating between present and historical observations on that list.) (Continued)*

| Scientific name | Common name | Foraging/ Resident/ Migratory/ Breeding | Sensitivity status | Comment |
|---|---|---|---|---|
| *Pelicanus occidentalis californicus* | California brown pelican | M | FE, SE | No nesting colonies on Point Loma |
| *Phalacrocorax auritus albociliatus* | Double-crested comorant | M | CSC | No nesting colonies on Point Loma |
| *Piranga flava* | Hepatic tanager | M | CSC | Breeding status unknown |
| *Piranga rubra* | Summer tanager | M | CSC | Breeding status unknown |
| *Polioptila californica californica* | Coastal California gnatcatcher | R | FT, CSC | |
| *Rhynchops niger* | Black skimmer | R | CSC | Known to occur, breeding status unknown |
| *Riparia riparia* | Bank swallow | R | FSC, ST | |
| *Sterna elegans* | Elegant tern | R | FSC, CSC | No known breeding sites on point |
| *Sterna nilotica vanrossemi* | Gull-billed tern | R | CSC | Breeding status unknown |
| *Toxostoma bendirei* | Bendire's thrasher | M | CSC | |
| *Vermivora virginiae* | Virginia's warbler | R | CSC | |
| *Vireo bellii pusillus* | Least Bell's vireo (nesting) | R | FE, SE | |
| **MAMMALS** | | | | |
| *Chaetodipus longimembris pacificus* | Pacific pocket mouse | unk | FE, CSC | Not detected in 1981 surveys |
| *Eumops perotis californicus* | Western mastiff bat | F? | FSC, CSC | Detected in 1997 |
| *Macrotus californicus* | California leaf-nosed bat | unk | CSC | Low potential to occur on Point Loma |
| *Neotoma lepida intermedia* | San Diego woodrat | unk | CSC | Some potential to occur on Point Loma |
| **INVERTEBRTATES** | | | | |
| *Panoquina errans* | Wandering skipper | | FSC | Known to occur at beach north of MSF |

***Status Codes***: FE = Federal Endangered FT= Federal Threatened FSC= Federal Species of Concern FPT= Federally Proposed for listing as Threatened SE = California Endangered ST = California Threatened CSC = California Species of Concern CDF Sensitive= California Department of Forestry and Fire Protection classify these as species that warrant special protection during timber operations.

CNPS 1B = Rare or Endangered in California and elsewhere CNPS 2 = Rare or Endangered in California, more common elsewhere CNPS 3= Plants about which we need more information CNPS 4= Plants of limited distribution, a watch list

## 2.3.3.10 Plant Populations and Fire Effects

A comprehensive list of plant species known to occur on Point Loma is provided in Appendix C. Plants may be divided into functional groups with respect to their response to fire, and these are addressed in the following section.

### Sensitive Plants

Table 2-13 lists the plant species considered sensitive by the California Native Plant Society (CNPS) that have been identified on Point Loma (Map 2-6). The distribution data were originally collected by Ogden (now AMEC Earth and Environmental) in 1993. Mike Simpson of the San Diego State University updated the rare plant distribution maps for CNM in 1999.

CNPS List 1B includes plants that are rare throughout their range and meet the requirements for state listing. Examples of plant species observed on NBPL that are CNPS List 1B species include aphanisma (*Aphanisma blitoides*), Nuttall's lotus (*Lotus nuttallianus*), and snake cholla (*Opuntia parryi*). Cliff spurge (*Euphorbia misera*), a species widely dispersed in maritime succulent scrub on Point Loma, is a CNPS List 2 plant, meaning it is rare in California. Shaw's agave (*Agave shawii*) is also a CNPS List 2 species, and Point Loma is one of its two locations in the continental U.S., although it is more common in Baja California, Mexico. Lewis's evening primrose (*Camissonia lewisii*) is a CNPS List 3 species, which includes plants for which insufficient information exists to assign them to another list or are taxonomically problematic. Seaside calandrinia (*Calandrinia maritima*), ashy spike-moss (*Selaginella cinerascens*), and San Diego County viguiera (*Viguiera laciniata*) are CNPS List 4 species, which is a watch list for plants of limited distribution. They are not rare from a statewide perspective, but their status should be regularly monitored to determine if changes are taking place.

Snake cholla and coast barrel cactus (*Ferocactus viridescens*) are also CNPS sensitive species. The population of velvet cactus (*Bergerocactus emoryi*) is one of three known populations in the continental United States. Dudleya (*Dudleya caespitosa*) was recently discovered on Point Loma, well south of the formerly known range of the plant. Additionally, the rare lichen, false orchil *(Dendrographa leucophaea),* is found within CNM.

### Federally Endangered Orcutt's spineflower

Orcutt's spineflower (*Chorizanthe orcuttiana),* listed as endangered by the USFWS and CDFG, was discovered in 1997 on NBPL. Orcutt's spineflower is currently listed as endangered by both USFWS (November 6, 1996) and CDFG (listed in 1979 pursuant to the Native Plant Protection Act (chapter 10 section 1900 et seq. of the California Fish and Game Code) and California Endangered Species Act (chapter 1.5 section 2050 et seq. of the Fish and Game Code). CNPS also considers it to be rare and endangered (CNPS 2000). It was first described by Charles Parry in 1884 based on a specimen collected by Charles Orcutt at Point Loma, San Diego County, in the same year (Parry 1884).

*Table 2-13. Sensitive plants of Point Loma. (This list does not include records from Appendix F, Table 3 of the 2002 INRMP due to difficulty in differentiating between present and historical observations on that list.)*

| Scientific name | Common name | Sensitivity status | Comment |
|---|---|---|---|
| **PLANTS** | | | |
| *Adolphia californica* | California adolphia | CNPS 2 | Clay soils in shrublands |
| *Agave shawii* | Shaw's agave | CNPS 2 | Coastal bluff scrub, coastal sage scrub |
| *Aphanisma blitoides* | Aphanisma | CNPS 1B | Coastal bluffs near the ocean and beach dunes. In extremely favorable rain years it may be found in maritime succulent scrub and desert thorn communities (E. Kellogg, *pers. obs*.). |
| *Bergerocactus emoryi* | Velvet cactus | CNPS 2 | Sandy soils, dry bluffs, cliffs along coast |
| *Calandrinia maritima* | Seaside calandrinia | CNPS 4 | Coastal bluff scrub, sandy soils |
| *Camissonia lewisii* | Lewis' evening primrose | CNPS 3 | Coastal scrub, coastal dunes, grasslands. Reported on Point Loma by Beauchamp (1986) |
| *Ceanothus verrucosus* | Wart-stemmed ceanothus | CNPS 3 | Coastal sage scrub, southern maritime chaparral. Common on Point Loma. |
| *Chorizanthe orcuttiana* | Orcutt's spineflower | FE, SE, CNPS 1B | Coastal sage scrub and southern maritime chaparral; sandy places |
| *Chorizanthe procumbens* var. *albiflora* | Fallbrook spineflower | CNPS 2 | Chaparral, coastal sage scrub |
| *Coreopsis maritima* | Sea dahlia | CNPS 2 | Coastal bluff scrub, sea bluffs, maritime succulent scrub |
| *Dendrographa leucophaea* | Lichen--false orchil | | |
| *Dichondra occidentalis* | Western dichondra | CNPS 4 | Chaparral, coastal sage scrub, fire follower |
| *Euphorbia misera* | Cliff spurge | NPS sensitive, CNPS 2 | Coastal sage scrub, maritime succulent scrub, rocky slopes, coastal bluffs |
| *Ferocactus viridescens* | Coast barrel cactus | NPS sensitive, CNPS 2 | Dry hills, sandy to rocky areas, chaparral, coastal sage scrub, maritime succulent scrub |
| *Lepidium virginicum* var. *robinsonii* | Robinson's pepper grass | CNPS 1B | Coastal scrub, chaparral, dry soils. Reported in 1912 from Point Loma. Believed extirpated. |

*Table 2-13. Sensitive plants of Point Loma. (Continued)(This list does not include records from Appendix F, Table 3 of the 2002 INRMP due to difficulty in differentiating between present and historical observations on that list.) (Continued)*

| Scientific name | Common name | Sensitivity status | Comment |
|---|---|---|---|
| *Lessingia filaginifolia var. filaginifolia* | San Diego sand aster | CNPS List 1B | Coastal chaparral in sandy openings with chamise. Reported as substantially declining on Point Loma (Reiser 1994) due to expansion of facilities. |
| *Lotus nuttallianus* | Nuttall's lotus | CNPS 1B | Coastal dunes, coastal sage scrub, beaches, urban weedy areas |
| *Microseris douglasii* var. *platycarpa* | Small-flowered microseris | CNPS 4 | Coastal sage scrub, inland clay soils |
| *Nemacaulis denudata* var. *denudata* | Coast woolly-heads | CNPS 1B | Coastal dunes, beaches, coastal strand |
| *Opuntia parryi serpentina* | Snake cholla | NPS sensitive | Chaparral, coastal sage scrub, sandy places and dry slopes, canyons |
| *Orobanche parishii* ssp. *brachyloba* | Short-lobed broomrape | FSC, CNPS 1B | Coastal bluff scrub, coastal dunes; parasitic on Isocoma |
| *Pinus torreyana* ssp. *torreyana* | Torrey pine | CNPS 1B | Chaparral; sandstone |
| *Piperia cooperi* | Chaparral rein orchid | CNPS 4 | Coastal sage scrub, southern maritime chaparral, maritime succulent scrub |
| *Quercus dumosa* | Nuttal's scrub oak | CNPS 1B | Coastal chaparral, coastal sage scrub; sandy/clay loam |
| *Viguiera laciniata* | San Diego County viguiera | CNPS 4 | Chaparral, coastal sage scrub, dry slopes below 2500 ft |

***Status Codes***: FE = Federal Endangered. FT= Federal Threatened. FSC= Federal Species of Concern. FPT= Federally Proposed for listing as Threatened. SE = California Endangered.
CSC = California Species of Concern. CDF Sensitive = California Department of Forestry and Fire Protection classify these as species that warrant special protection during timber operations.

CNPS 1B = Rare or Endangered in California and elsewhere. CNPS 2 = Rare or Endangered in California, more common elsewhere. CNPS 3= Plants about which we need more information. CNPS 4= Plants of limited distribution, a watch list.

*Chorizanthe orcuttiana* is a low, yellow-flowered annual of the buckwheat family (Polygonaceae). It is distinguished from other members of the genus by its prostrate form, campanulate three-toothed involucre and involucral awns that are hooked near the tip (Reveal 1989). This species is found on sandy soils derived from eroded coastal bluffs, within openings in chaparral and coastal sage scrub communities (Bauder 2000, CNPS 2000). Soil samples taken in the vicinity of existing populations indicate a sand fraction of about 90%, low organic matter and nitrate, and moderate acidity.

The Federal Register Listing (Vol. 61, No. 195 October 7, 1996) for Orcutt's spineflower considered disruption in historic fire cycles as potentially threatening this species. "Fragmentation has rendered individual populations more susceptible to fire events that may either occur too frequently or be suppressed too long to maintain a healthy southern maritime chaparral habitat." It was reportedly threatened by trampling because of its small size and its preference for open areas, which tend to attract foot traffic through otherwise dense chaparral vegetation, and by exotic grasses and weeds.

Only a few populations of Orcutt's spineflower exist, three of which are on Point Loma (Bauder 2000, O'Connor, *pers.comm.* 2004). The populations on NBPL include one on SUBASE, detected in 1997, one on SSC, which was observed in 1999, and one at SSC, discovered in 2003. The Point Loma populations have been monitored since 1998 in accordance with a USFWS permit (Bauder 2000). Another population is at Oakcrest Park in Encinitas (down to one individual plant in 2000), but one at Torrey Pines State Park has not been seen since 1987 (Bauder 2000). The Navy has funded an effort to expand and enhance the habitat of the population on its land by eradicating iceplant (*Carpobrotus edulis)* and other invasives from the known sites, and providing erosion control to prevent loss of topsoil (Soil Ecology and Restoration Group 2001). The project also involves collecting seed for greenhouse germination and eventual outplanting.

Orcutt's spineflower is adapted to natural openings in chaparral. Its herbaceous annual life history will avoid most fire effects as long as the fire occurs after seed dispersal. The seeds germinate late in the fall after seasonal winter rains begin, and the single-seeded fruits (achenes) are produced late in the spring.

It would benefit management of this species to know if germination may be stimulated or affected detrimentally by fire. There have been no studies that looked at this directly. However, what we do know about the seeds was summarized by Bauder (2000). She had extremely low success in inducing germination; of 500 seeds in the trial, 28 germinated. X-rays of an unselected sample of the seed set showed that 57-59% of the involucres were filled with seeds. However, this does not necessarily indicate the percent of viable seeds. One possibility for such a low success rate is that the seeds needed to mature longer on the plant before their removal in June after the plant had dried.

Several methods to induce germination were tried, including imbibing, involucre removal, and cold stratification. Cold stratification has been shown to work in past germination experiments of other species, and was tried with some success in experiments run by Rancho Santa Ana Botanical Gardens. An unknown dormancy mechanism, such as a particular temperature sequence or chemical cue could also be necessary for germination. A study with a limited sample size suggested that the removal of the involucre facilitates germination. Seeds are contained tightly within the involucres, and are very difficult to remove by hand with dissecting needles. Seeds can retain viability for several years, and these results may indicate that it takes several years for the involucre to deteriorate enough for germination. It also could be that there is an unknown mechanism to remove the involucre. Metzger (1992) investigated this theory with a related plant black bindweed *(Polygonum convolvulus)*. He studied the effects of both sand abrasion and microorganisms in involucre removal, with no significant results. Neither Bauder, Metzger, nor Rancho Santa Ana Botanic Gardens investigated the role of fire in removing the involucre.

### Plant Functional Groups and Fire Effects

In order to consider effects of fire on plants, they may be grouped by similar life history characteristics. Response to variation in the fire regime varies with regeneration strategies. Table 2-14 and Table 2-15 include a representative cross-section of species representing a variety of plant life histories on Point Loma including both dominants and sensitive species. These tables were conceived to function as a resource for future fire management decision-making. Information for dominant shrubs was derived from the USFS Fire Effects Information System (USFS FEIS at http://www.fs.fed.us/database/feis/plants/). Some sensitive species that occur on Point Loma (e.g. *Lotus nuttallianus,* horned sea-blite (*Suaeda calceoliformis),* red sand verbena *(Abronia maritima),* coast woolly-head *[Nemacaulis denudata* var. *denudata]*) are not considered in these tables because they are not considered at risk from fire since they primarily reside in coastal bluffs or dunes which do not have sufficient flammable fuels to burn. The breakdown of life histories used for shrubs and trees is based on Zedler (1977, 1995). Classification of herbaceous species is based on Zedler (1995), Keeley and Keeley (1984), and Keeley *et al*. (1985). Lichens are also considered in the herbaceous species table. The life history breakdown is as follows:

- Shrubs and trees
  - -Obligate seeders (reproduce almost exclusively by seed)
  - -Obligate sprouters (reproduce almost exclusively by sprouting)
  - -Facultative seeders/sprouters (commonly reproduce by both seed and sprouts)
  - -Suffrutescents (plants which are woody at the base only, do not die each year)
  - -Intermediate- to long-lived canopy dominants of coastal sage scrub
  - -Insufficient information to classify with confidence
- Stem succulents and cacti
- Herbaceous Species
  - -Herbaceous perennials with underground storage structures
  - -Herbaceous perennials dependent on seed for propagation (one known for Point Loma in seed bank only)
  - -Opportunistic native annuals (plants that die each year and do not need fire for germination, but instead germinate under many conditions)
  - -Pyrophyte annuals (plants that die each year and only appear after fire because seeds are stimulated to germinate by heat, smoke, or charate)
  - -Lichens

*Table 2-14. Fire adaptations and potential management approaches for selected species of shrubs and trees on Point Loma. Shrub classification from Zedler (1977, 1995).*

| Species | Wildland Fire Adaptation | Potential Fire Management Approaches |
|---|---|---|
| ***Obligate Seeders.*** **Primary period of population expansion is post fire. Mature plants killed by fire, recruitment mostly from soil seed bank. Fire-dependent, shallower roots, higher tolerance of water stress, and greater post-fire seedling survivorship than obligate sprouters. Obligate seeders can be lost with a single premature burn. For non-sprouting species 7-15 years are needed for seedlings to mature enough to replenish the population, depending on weather and other factors. These shrubs have only limited dispersal ability and once lost from an area, recolonization from other established populations can be extremely slow (Zedler and Zammit 1989). Obligate seeders can disappear after a long fire-free period, but still remain in the soil seed bank.** | | |
| *Ceanothus verrucosus* wart-stemmed ceanothus | Thomas Nuttall, a botanist who visited Point Loma in the mid-1800s, noted this fire-dependent shrub on Point Loma, which occurs from coastal San Diego County south to Ensenada in Baja. Zedler and his collaborators observed that the population was declining on Point Loma (Zedler *et al*. 1995), and it is believed that a medium to hot fire is needed to break open seed coats for germination sufficient to reoccupy the site. Fire is the only natural mechanism to maintain or expand the population of this rare shrub. If fire does not occur for many more decades, shifts in plant community structure can be expected. There is evidence that seed banks will remain large enough to replace their stands once a fire occurs, even if seed production ceases for numerous years (Cummins 2003). Also, fire under conditions insufficient to germinate seed may shift competitive balance to other dominants such as chamise. | Develop a plan to see if prescribed burning is necessary to maintain this shrub, and to determine the best strategy to reverse the declines due to the aging of vegetation in the absence of fire. Ensure that the local population is not extirpated in a single wildland fire that does not provide conditions sufficient for germination, or that is followed by drought, competition from exotics, or herbivory by small mammals, with high die-off of seedlings. |
| *Ceanothus cuneatus* wedgeleaf ceanothus | Now missing from flora on Point Loma. Frequent fires can eliminate this species, although single fires appear to favor it. Species is not rare regionally. | May benefit from similar management to wart-stemmed ceanothus. Viable seed may still be present in the seed bank, but not observed in seed bank study. May want to test further to see if present in the seed bank. |
| *Pinus torreyana* ssp. *torreyana* torrey pine | See Tables 2-13 and 2-16 on habitats. | Treat as horticultural species and avoid burning. Monitor naturalized populations for insect pests and disease, recruitment. |
| ***Obligate Sprouters.*** **Seeds killed by fire, regeneration by vegetative resprouting. Sprouts between fires but may need fire to create gaps for saplings to recruit to the canopy and for population expansion; more resilient to short return intervals for fires (Zedler *et al*. 1993, Fabritius and Davis 2000), but nevertheless may be severely impacted by sustained high-frequency fire regimes. Successful germination and recruitment of new individuals is correlated with the cooler, moister, low light conditions and increased litter depth associated with mature closed-canopy chaparral that develops over fire-free intervals of 40 years or more (Lloret and Zedler 1991, Keeley 1992a and b, DeSimone 1995). S. Keeley *et al.* (1981) investigated seedlings of obligate sprouters: Seedlings are established primarily in mature chaparral in gaps resulting from the death of senescing, shorter-lived species. Seedling establishment is often episodic and coincides with periods of above-normal rainfall. Although initial establishment may occur in burned or unburned stands during very wet years, continued survival is favored beneath mature stands on sites that are relatively mesic (north slopes) and which possess a well-developed litter layer. Long-term survival beneath mature chaparral is rare; seedlings are subjected to herbivory by small mammals. Seedlings are most common in very old stands (60 to 100+ years) where long fire free intervals allow for the build-up of seedling populations.** | | |
| *Quercus dumosa* Nuttall's scrub oak | Nuttall's scrub oak's prolific sprouting ability makes it a prominent component of the early postfire community. It is exceptionally persistent with or without fire (Minnich and Howard 1984, Keeley *et al*. 1986). In coastal chaparral communities of southern California, Nuttall's scrub oak generally becomes dominant during the second decade after fire, and within 30 to 40 years communities on north-facing slopes have closed canopies. The vegetation composition of these sites remains essentially unchanged without further disturbance, with Nuttall's scrub oak continuing to dominate (Hanes 1971). Seedlings likely establish in unusually moist years but need litter, so this only happens in very old stands, similar to *Q. berberidifolia* (Zedler 1977) with which *Q. dumosa* will hybridize. | No special fire management recommended. This species is expected to be stable with or without fire. Continued existence of this species would not be expected to be jeopardized by fire. May increase cover without fire due to its height and ability to dominate the canopy. |
| *Heteromeles arbutifolia* toyon | Seeds tend to germinate based on rainfall, not fire. Populations probably depend upon the senescence of shorter-lived species to create gaps suitable for establishment. Species is expected to be stable or increase with extended fire-free period due to height and ability to dominate the canopy. Continued existence of this species would not be expected to be jeopardized by fire. | No special fire management recommended. |

*Table 2-14. Fire adaptations and potential management approaches for selected species of shrubs and trees on Point Loma. Shrub classification from Zedler (1977, 1995). (Continued)*

| Species | Wildland Fire Adaptation | Potential Fire Management Approaches |
|---|---|---|
| *Rhamnus crocea* spiny redberry | On chaparral sites in southern California, maintains itself primarily through sprouting. Little or no seedling establishment has been noted immediately following fire. Seedling establishment is never very abundant and is restricted to stands of mature chaparral, probably in gaps created by senescence of shorter-lived shrubs (Keeley 1981, 1986, 1987). | No special fire management recommended. Species is expected to be stable or increase with extended fire-free period. Continued existence of this species would not be expected to be jeopardized by fire. Considered fire resistant in horticultural setting. |
| *Rhus integrifolia* lemonade berry | Tall canopy dominant, moderately vigorous resprouter. Expanding on Point Loma. Seedling recruitment occurs under fire-free conditions (Lloret and Zedler 1991) and after fire but survivorship after fire has not been determined (Keeley 1998). Species is expected to continue to increase with extended fire-free period due to height and ability to dominate the canopy, as well as ability to recruit seedlings. | Monitor to detect if expansion on Point Loma is at expense of biodiversity of sensitive species habitats. Recommended in firesafe planting. |
| *Cercocarpus betuloides* var. *betuloides* birch-leaf mountain mahogany *Cercocarpus minutiflorus* mountain mahogany | Vigorous postfire resprouter from root crown. Seedling establishment occurs infrequently from seed blown onto a burn from off-site plants (Hanes and Jones 1967) or from on-site seeds that fall from the crown of lightly burned plants (Biswell *et al.* 1953). From 25 to 60% mortality has been observed following hot chaparral fires (Kinucan 1965, Tratz 1978). Low- to moderate-intensity fire may result in population expansion. | No special fire management recommended. |
| *Cneoridium dumosum* bush rue | Vigorous postfire resprouter. | No special fire management recommended. Considered an option for firesafe planting zones in San Diego County. |
| *Prunus ilicifolia* ssp. *ilicifolia* hollyleaf cherry | Hollyleaf cherry is a component of chaparral. Extended fire-free periods create conditions favorable to seedling establishment and population expansion. Seedlings utilize gaps created by the death of shorter-lived species (Zedler 1982). A highly persistent species and vigorous sprouter from the root crown. During extended fire-free intervals, hollyleaf cherry is able to outlive, overtop, and shade out many shorter-lived shrubs; seedlings then establish in newly created gaps beneath the mature canopy (Hanes and Jones 1967). | No special fire management recommended. Considered fire resistant in horticultural settings. |
| *Prunus ilicifolia* ssp. *lyonii* Catalina cherry | Similar to holly-leaf cherry, but many seedlings of Catalina cherry occur on San Clemente Island in the absence of fire. Most die during summer drought but a few recruit to sapling stage (E. Kellogg, *pers. obs*., U.S. Navy 2003). | No special fire management recommended, but Catalina cherry may be almost lost from the modern flora due to historic harvesting for fuel or other reason, and would benefit from reintroduction. |
| ***Facultative Seeders/Sprouters*** **(mixed seedling recruitment and vegetative resprouting). Mortality of the lignotuber (a woody swelling below or just above the ground, containing buds from which new shoots develop if the top of the plant is cut or burnt) can be very high if fire returns prematurely (Zedler *et al*. 1983, Haidinger and Keeley 1993). Since a premature fire also kills seedlings that germinated in response to the previous fire, facultative seeders show only limited ability to persist under repeated disturbance.** | | |
| *Malosma laurina* laurel sumac | Vigorously resprouts and produces abundant seed following fire. However, this extremely deep-rooted species apparently has low tolerance to water stress. In the Santa Monica Mountains most seedlings die (99%) in the first summer following a fire (Davis *et al*. 1998). The species behaves as an obligate resprouter. However, it appears to expand and even dominate coastal sage scrub with short-interval fire from both seedlings and resprouts in San Diego County (E. Kellogg, pers. obs.). Perhaps these conflicting observations are due to rainfall year when seedling observations were made. Keeley *et al*. (in review) reports substantial seedling recruitment following fire. | No special fire management recommended. |

*Table 2-14. Fire adaptations and potential management approaches for selected species of shrubs and trees on Point Loma. Shrub classification from Zedler (1977, 1995). (Continued)*

| Species | Wildland Fire Adaptation | Potential Fire Management Approaches |
|---|---|---|
| *Adenostoma fasciculatum* chamise | Chamise resprouts from dormant buds on the lignotuber following fire. The seed germinates at high rates only after fire, and seedling recruitment and population expansion are fire dependent (Keeley 1986). Different fire severities can shift the competitive balance between chamise and other potential dominants such as ceanothus (Howe 1976). Chamise has fuel characteristics which result in intense, fast-spreading, potentially large fires. May be eliminated from sites with late spring or early summer prescribed burns and replaced with *Eriogonum fasciculatum*. | No special management recommended. |
| *Xylococcus bicolor* Mission manzanita | A vigorous sprouter, rarely establishes seedlings, does not seem to be able to exploit closed canopy conditions (Zedler 1977). Short fire return interval can result in substantial mortality (Zedler *et al.* 1983). A facultative resprouter but shrub is known to require fire for seed germination--it has a very hard seed coat that benefits from scarification by fire. | Moderate-to high-intensity fire may result in population expansion. Further seed bank or seed germination studies would be useful. |
| *Eriodictyon crassifolium* felt-leaved yerba santa | Early botanist William Emory noted the dominance of this plant on the Point, whereas now it grows mainly along roadsides and disturbed areas. Moderate-severity fire is expected to top-kill this plant, with severe fire killing it completely. Survival of underground rhizomes is most likely after low- to moderate-severity fire. Yerba santa germinates from seed during the first postfire growing season. Seeds that have lain dormant in the soil for decades will germinate following a fire. | Burning may result in population expansion. |
| *Malacothamnus fasciculatus* chaparral mallow | Winter-deciduous shrub common after fires, on disturbed sites, and roadsides in chaparral. Vigorous sprouter from rhizomes, extremely clonal. Abundant postfire seedling recruitment. Benefits from post-fire canopy opening and probably from nutrient flush. Primary period of population expansion is post-fire and it is a recognized fire follower. Common in southern California. | No special fire management is recommended. |
| *Lycium californicum* California desert thorn | Leaves succulent, stress tolerator, root sprouter. Probably a weak resprouter that experiences variable mortality depending on fire intensity. May take 10-20 years for it to reach preburn densities on a burned site (E. Kellogg and D. Pivorunas, *pers. obs*. on San Clemente Island). Probably regenerates from root suckering and layering, as do other species in this genus. On San Clemente Island, has been observed to recover from fire through both resprouting and seed, but short fire intervals cause long-term loss (E. Kellogg, *pers. obs*.). Severe fires may kill desert thorn, but moderate-severity fires probably only consume its aerial portions. It may resist burning in low-intensity fires. Emery (1988) reports no treatment required for seed germination. | A conservative approach that minimizes fire impacts is recommended. Protection from short-interval fires. |
| ***Subshrubs (Coastal Sage Scrub).*** **Intermediate- to long-lived dominant and canopy species which tolerate fire, but do not require it for establishment; they are sensitive to fire intensity because it affects sprouting ability (Zedler in Kalen *et al*. 1995). The ability of surviving shrubs to seed in the first year after fire appears to allow coastal sage scrub to persist under fire frequencies that eliminate chaparral (O'Leary 1995).** | | |
| *Artemisia californica* California sagebrush | Cover and dominance may be declining on Point Loma (R. Taylor, *pers. comm.*). Can produce some seedlings in closed canopy conditions between fire events and in adjacent open areas if the soil is not disrupted, but the primary period of reproduction and population expansion is early post fire by seed (Zedler 1977). Low-intensity fires stimulate sprouting (USFS 1994), but severe fires cause widespread plant mortality and destruction of shallow buried seed (Malanson and O'Leary 1985). Stable cover condition recommended as habitat for California gnatcatcher and other dependent species. May benefit from some low-intensity prescribed fire. Short-interval fire will eliminate it. | Severe, long-interval fires may be destructive to re-establishment. Identify factors that have led to decline in total cover; determine if prescribed fire would increase cover and if it would provide a net benefit to the community as a whole. |
| *Salvia mellifera* and *S. apiana* black sage and white sage | Similar to California sagebrush, but higher intensity fires may favor the germination and repopulation by seed of black sage over *Artemisia* due to the more abundant postfire seeding of black sage (USFS 1994). | No special fire management recommended. |
| *Viguiera laciniata* San Diego County goldeneye | Declining but still found at many locations, where sometimes it is a dominant shrub. May colonize areas of mild disturbance and is readily grown from seed. Chaparral, coastal sage scrub, dry slopes. Responds favorably to fire, but does not require it for establishment. Ability to resprout is sensitive to fire intensity. | May expand with low-intensity prescribed fire. Plan for experimental burn. |

*Table 2-14. Fire adaptations and potential management approaches for selected species of shrubs and trees on Point Loma. Shrub classification from Zedler (1977, 1995). (Continued)*

| Species | Wildland Fire Adaptation | Potential Fire Management Approaches |
|---|---|---|
| ***Suffrutescents.* Smaller, short-lived shrubs with slightly woody above ground stem that is killed by fire with no ability to resprout. Fire-stimulated seedling establishment. Obligate seeders following fire but will respond to other disturbances. Mostly absent in older communities or persist in gaps. No special dispersal mechanism. Germination is heat or charate stimulated, with a portion germinating without treatment (Keeley *et al*. 1985).** | | |
| *Lotus scoparius* deerweed | Will decline as canopy closes. Resident with fire-stimulated establishment, but also the ability to respond to other disturbances. Maintains a large, dormant seed bank. | No special fire management recommended. |
| *Helianthemum scoparium* peak rush-rose | Will decline as canopy closes. Seeds germinate without treatment but germination nearly doubles with some heat treatment. | Monitor status of species. Determine if regular openings are naturally maintained in the community sufficient to provide for this species without fire. Additional seed bank work could help determine if it persists in the seed bank. |
| *Eriophyllum confertiflorum* golden yarrow | Will decline as canopy closes. Has fire-stimulated seeds but also persists in gaps in old chaparral. | No special fire management recommended. |
| *Lessingia filaginifolia* var. *filaginifolia* San Diego sand aster | Primarily in sandy openings in chamise on Point Loma. | Monitor status of species. Determine if regular openings are naturally maintained in the community sufficient to provide for this species without fire. Additional seed bank work could help determine if persists in seed bank. |
| ***Insufficient Information to Classify With Confidence.* Basic fire effects information is lacking: percent mortality and percent resprouting in mature plants, presence or absence of postfire seedling recruitment, postfire seedling survival, and presence or absence in the seed bank.** | | |
| *Adolphia californica* California adolphia, spineshrub | Shrub about one meter tall with spines, green stem photosynthesis. Dry sites in southern maritime chaparral, sage scrub, or coastal cliffs. Can sometimes dominate hillsides in San Diego County. Related to *Ceanothus* spp. Emery (1988) reports no treatment required for seed germination. | Research is needed on fire effects in this species. |
| *Euphorbia misera* cliff spurge | Succulent stems and small waxy leaves help keep water inside the plant. Probably a weak resprouter that experiences variable mortality depending on fire intensity. Many locations on west shore. Severe fires may kill cliff spurge; the effects of moderate-severity fires that top-kill the plants are unknown. It may resist burning in low-intensity fires. | Research is needed on life history and fire effects in this species. A conservative approach that minimizes fire impacts is recommended. Protection from short-interval fires. |

*Table 2-15. Classification of herbaceous species, including lichens. Classification is based on Zedler (1995) [in Kalen* et al.*], Keeley and Keeley (1984) and Keeley* et al. *(1985).*

| Species | Wildland Fire Adaptation | Potential Fire Management Approaches |
|---|---|---|
| ***Herbaceous Perennials.* Underground storage structures such as a bulb, tuber, rhizome, or large tap root; these plants are normally dormant when a fire passes through, so are not directly affected, but benefit from nutrient flush, canopy opening, and other aspects of altered competitive status. Obligate resprouters.** | | |
| *Coreopsis maritima* sea dahlia | Fleshy tap root, dormant when most fires occur. Resprouts. | No special fire management needed. |
| *Dichondra occidentalis* western dichondra | Rhizomatous perennial herb considered a fire follower in both chaparral and coastal sage scrub. Shade tolerant. Population favored by fire. | No special fire management needed. |
| *Orobanche parishii* ssp. *brachyloba* beach or short-lobed broomrape | Root parasite on shrubs such as *Isocoma menziesii*. Typically found on sandy sites near the ocean. One known site near Fort Rosecrans. Effects on plants when host plant is top-killed is unknown. | No prescribed burning within boundaries of population. Avoid burning coastal bluff scrub, coastal dunes. All populations should be fully protected from development with adequate buffers since is nearly extirpated from San Diego County (Reiser 1994). Survey any prescribed burn site in advance. |
| *Piperia cooperi, Piperia elegans,* and *Piperia unalascensis* chaparral orchids | Rhizomatous herbs, dying back each winter. Primarily on poorly drained sandstone and sandy soils in openings in coastal sage scrub, southern maritime chaparral, maritime succulent scrub. Local extinction may occur if soil seed bank becomes exhausted or canopy condition unfavorable. | Determine if regular openings are naturally maintained in chaparral sufficient to provide for this species without fire or if management intervention is required. Additional seed bank work could help determine if it persists in seed bank. Keep available open canopy gaps in southern maritime chaparral especially on sandstone sites. |
| **Herbaceous Perennials Dependent on Seed for Propagation. Generally germinate well without treatment, but high temperatures are lethal (Keeley *et al*. 1985)** | | |
| *Sagina procumbens* arctic pearlwort | Occurs only in the seedbank on Point Loma (Cummins 2003). Common elsewhere on wet, gravelly, or sandy soil, sidewalk cracks, roadsides, waste areas. Sometimes sold as Irish moss. Generally known from Central and North Coast locations. Germinates without treatment, high temperatures are lethal to seed. | No special fire management recommended. |
| ***Stem Succulents and Cacti.* Somewhat fire resistant due to succulence and low fuel loads associated with typically open habitats. No soil seed bank, so population recovery is slow if plants are killed by fire. Variability in different species ability to survive or resprout following fire. Most have some ability to resprout, but most also suffer some degree of mortality if fire is moderate or severe.** | | |
| *Dudleya caespitosa, D. edulis, D. lanceolata, D. pulverulenta* dudleya, Moran lady fingers, live-for-ever, chalk lettuce | Leaf succulence and habitat preference for rocky, shallow soils and open habitats limits fuel in proximity to plants and generally allows this genus to tolerate fire well. Canopy closure detrimental. Resprouts after fire. | If species is sensitive and number and area of the population small, determine if the fuel load presents a fire hazard and consider fuel modification for protection. If ubiquitous or common, rely on resprouting ability to survive wildfire. |
| *Yucca schidigera* Mojave yucca | Fire resistant. No postfire seeding recruitment; resprouts after fire, but most yucca species experience some degree of mortality. Shade intolerant, canopy closure detrimental. Persistent, long-lived, establishment independent of large-scale disturbance | No special fire management recommended. |
| *Agave shawii* Shaw's agave | Fire resistant. Shrubs here are low-growing and habitat is quite open. Propagation expected to be primarily vegetative. Is an abundant, sometimes dominant shrub of the northern Baja coast, growing by the many thousands (Reiser 1994), presumably in a fire-prone environment. | Protect from moderate- to high-intensity fire. |

*Table 2-15. Classification of herbaceous species, including lichens. Classification is based on Zedler (1995) [in Kalen* et al.*], Keeley and Keeley (1984) and Keeley* et al*. (1985). (Continued)*

| Species | Wildland Fire Adaptation | Potential Fire Management Approaches |
|---|---|---|
| *Opuntia californica* var. *californica* snake cholla *O. acanthocarpa* buckthorn cholla *O. basilaris* beavertail cactus | Fire resistant. Resprout from the root crown and from surviving stems, may spread by vegetative means in open postfire condition. Moderate-severity fire likely to kill *Opuntia* spp. Mortality after a fire is often greater than 50%, but rarely total (USFS FEIS, Benson and Walkington 1965). On San Clemente Island, *Opuntia* sp. appear to increase after low-intensity short-interval grass fires due to elimination of competitive grasses and shrubs (E. Kellogg, *pers. obs.*). | No management action necessary. |
| *Ferocactus viridescens* coast barrel cactus | Fire resistant. Barrel cactus have a thick cortex that insulates the vascular tissue. The cortex thickens with age, so older individuals may be more resistant to fire than younger ones. No offsets were reported after fires in southern Arizona; growth was from the apical meristem only; if fire damages apical meristem, the plant will die. Grows in fire-prone environments in chaparral at Marine Corps Air Station at Miramar. October 2003 fire there had mixed survival and kill. Cacti often escape fire in refugia and in areas with fuels too sparse to carry fire. Expected to decline under short fire return intervals. | Protect from fire return intervals less than 15 years. Recovery period has been estimated at more than 15 years. (USFS FEIS). |
| *Bergerocactus emoryi* velvet cactus | Moderate- or high-severity fire is likely to kill plants. Repeated fires will likely result in species decline. | Protect from fire intervals of less than 15 years to avoid decline. |
| ***Opportunistic Native Annuals*** **(Zedler 1995). Usually found in canopy gaps.** | | |
| *Lepidium virginicum* var. *robinsonii* Robinson's pepper grass | Annual herb grows in canopy openings in chaparral and sage scrub. Typically found on drier sites. Reported in 1912 from Point Loma. | Determine factors that might reduce the amount of open canopy that is available for this class of species. Evaluate if fire is an appropriate means of exotic control. |
| *Microseris douglasii* var. *platycarpha* Small-flowered microseris | Annual herb on clay lenses or mesic perennial grassland, open chaparral, sage scrub. | Determine if habitat openings are naturally maintained sufficient to provide for this species. Determine if likely to benefit from some fire by creating canopy openings and altered competitive status with exotics or native perennials. |
| *Chorizanthe procumbens* var. *albiflora* Fallbrook spineflower | Found in sandy soil, often in association with sandy barrens or openings in chamise chaparral, coastal sage scrub, and occasionally grasslands. | Determine if habitat openings are naturally maintained sufficient to provide for this species. Control exotics. |
| *Chorizanthe orcuttiana* Orcutt's spineflower | Fragmentation has rendered individual populations more susceptible to altered fire regimes. Its herbaceous annual habit will avoid most fire effects as long as they occur after seed dispersal. | Develop a plan based on whether habitat openings are naturally maintained sufficient to provide for this species. Experiment on suitable sites where this species is currently absent to see if there is a response to fire. Control exotic sand to determine if fire could be used to control competing invasives. |
| *Camissonia lewisii* Lewis' evening primrose | Coastal scrub, coastal dunes, grasslands typically on beach bluffs, sandy or clay soils. Reported on Point Loma by Beauchamp (1986). Reported to be declining throughout its U.S. range. | Do focused search to determine if still present on the peninsula. No special fire management recommended. Do not burn near coast due to erosion and sediment concerns. Control exotics in grasslands near the beach. |
| *Aphanisma blitoides* aphanisma | Coastal bluffs near the ocean and beach dunes. On San Clemente Island, this succulent annual only appears in extremely favorable rain years, where it may be found in maritime succulent scrub and desert thorn communities (E. Kellogg, pers. obs.). Rediscovered at CNM in 2003 in abundance by Rod Dossey (T. DiMattio, pers. comm.).Expected to be dormant during any wildfires. | No special fire management recommended. |

*Table 2-15. Classification of herbaceous species, including lichens. Classification is based on Zedler (1995) [in Kalen* et al.*], Keeley and Keeley (1984) and Keeley* et al*. (1985). (Continued)*

| Species | Wildland Fire Adaptation | Potential Fire Management Approaches |
|---|---|---|
| *Calandrinia maritima* seaside calandrinia | Sandy bluffs near the beach and sandy openings in coastal sage scrub. Steep slopes with open chaparral may also include potential populations. Gaviota fine sandy loams are utilized on Point Loma. On San Clemente Island, this succulent annual appears in open conditions in extremely favorable rain years, where it may be found in maritime succulent scrub and desert thorn communities, as well as on rocky bluffs (E. Kellogg, pers. obs.). Expected to be dormant during any wildfires. | No special fire management recommended. |
| *Polycarpon depressum* polycarp | Known only from the seed bank on Point Loma. In other locations it occurs on bluffs, gravelly or sandy soil, chaparral, fields, disturbed areas. | No special fire management recommended. |
| *Lotus hamatus* crab lotus | Known only from the seed bank on Point Loma. In other locations found in firebreaks, disturbed sites, gaps in coastal sage scrub at other locations | No special fire management recommended. |
| ***Pyrophyte Annuals* (Keeley and Keeley 1984). Considered fire followers because seeds stored in the soil seed bank are stimulated to germinate following fire by heat, smoke, or charate (ashy burned material). Fire eliminates canopy cover of competing species. No special dispersal mechanisms, largely disappear by third year after fire. Seed is long-lived.** | | |
| *Lotus salsuginosus* alkali lotus or humble lotus | Germinated from seeds in the seedbank at CNM. No plants were previously known from the Park (but it was documented on NBPL (U.S. Navy 2002); unlikely to appear during the interfire period (Cummins 2003). Seeds respond to heat stimulation (Keeley and Keeley 1982). | No special fire management action recommended; population likely to appear following either prescribed fire or wildfire. |
| *Phacelia distans* common phacelia *Lupinus succulentus* arroyo lupine | Species in these genera are generally considered pyrophytic. | No special fire management is recommended. Population expansion likely following either prescribed fire or wildfire, but these are fairly common species that appear able to maintain themselves at low levels without fire. |
| *Papaver californicum* fire poppy | Germinated from seeds in the seedbank at Cabrillo National Monument but no plants were previously known from CNM (but was documented elsewhere on Point Loma (U.S. Navy 2002); unlikely to appear during the interfire period (Cummins 2003). | No special fire management action recommended; population likely to appear following either prescribed fire or wildfire. |
| **Lichens** | | |
| *Roccella fimbriata* orchil lichen | Coastal rocks and bark in full sun (Brodo *et al.* 2001). More abundant in Baja California. Lichens are highly flammable because they desiccate when relative humidity drops. | Protect from fire or burn experimentally only. Should survey in advance of experimental burns, and should be part of fire recovery evaluation. At least some stands should be protected so they can get as old as possible, so they can act as refugia and sites of inocula to perpetuate lichens (Bowler and Riefner 2003). |
| *Dendrographa leucophaea* false orchil | On rocks and shrubs on the southern California coast and Channel Islands (Brodo *et al.* 2001). Foliose lichens are highly flammable because they desiccate when relative humidity drops. | Protect from fire. Should survey in advance of experimental burns, and avoid locations where this lichen exists. Investigate site-specific benefit or harm from mechanical fuel reduction around populations. |

### 2.3.4 Recreational and Scenic Values

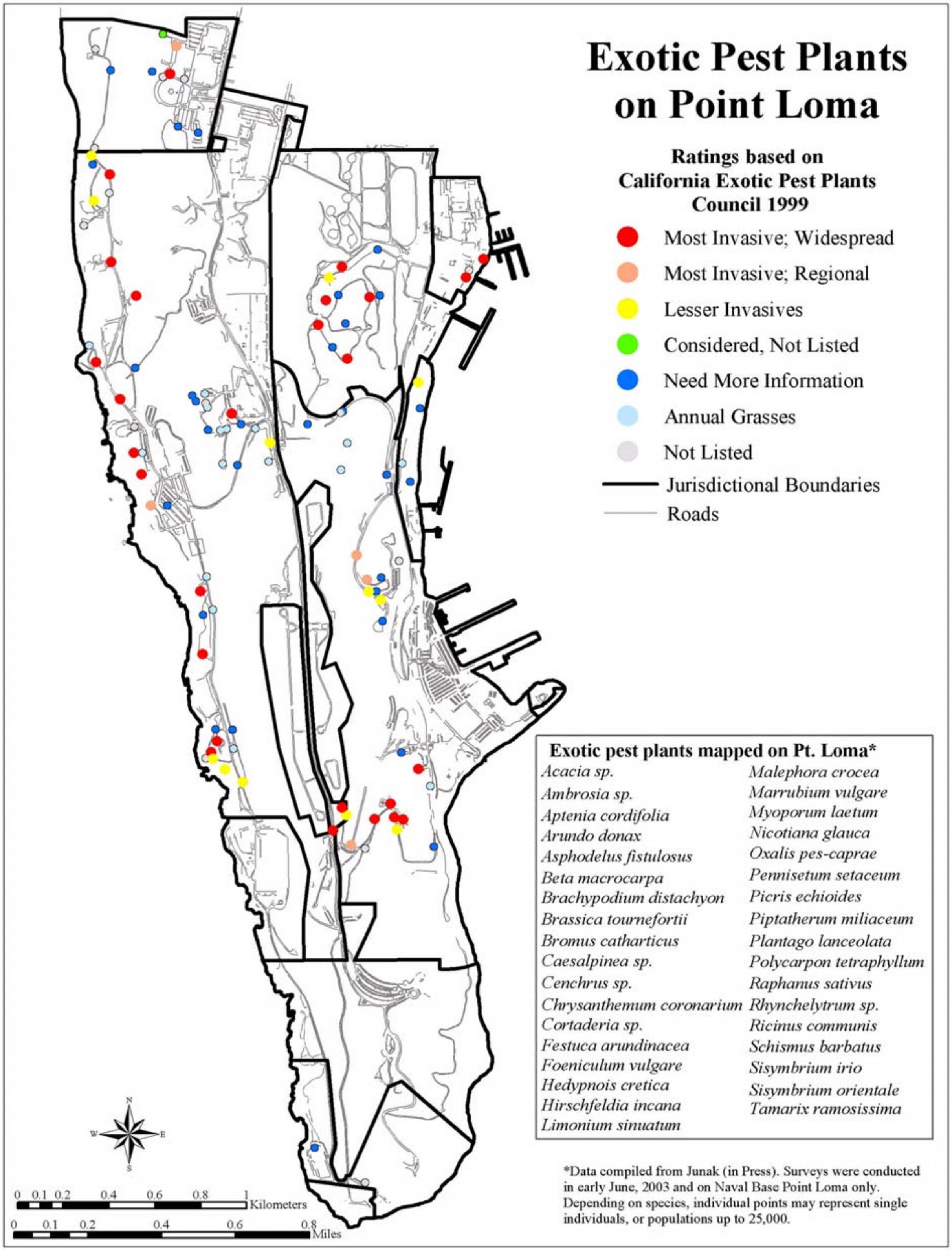
The cultural and natural resources within the CNM and on adjacent intertidal areas administered through cooperative agreements provide outstanding recreational opportunities for an average of 1.1 million annual visitors. Visitors are attracted by opportunities to see, photograph, and study a historically restored 19th century lighthouse, tide pools, coastal sage scrub habitat (by way of Bayside Trail), remnants of a WWII coastal defense system, and the world class view of the City of San Diego, its natural harbor, the coast of Mexico, the Pacific Ocean, and off-shore islands. During the winter, visitors come to watch the annual migration of Pacific gray whales *(Eschrichtius robustus)* from their feeding grounds in Alaska in the Bering and Chukchi seas to their calving grounds in sheltered lagoons of Baja California. Visitors can sometimes observe several dolphin species, and occasional killer whales, from cliff-top vantage points. Point Loma also offers opportunities for visitors to enjoy bird watching.

The CNM is host to the annual Cabrillo Festival, which attracts up to 6,000 participants, and other special events such as Kiwanis-sponsored non-denominational Easter Sunrise Service that attracts 400 participants, and the Naturalization Ceremony conducted annually by the Justice Department that attracts 600 new citizens and family members.

On NPBL, outdoor recreation activities such as walking, jogging, and bicycling are restricted to existing roadways or established trails in the naturally vegetated areas and the undeveloped beach areas. Other recreational facilities include baseball fields, several tennis courts, basketball courts, gymnasium, weight training facility, picnic areas, and exercise/jogging courses.

## 2.4 Invasives and Fire Effects

Probably second only to land use change, biological invasions play a significant role in determining the long-term fate of natural habitats and the species that rely on them (D'Antonio and Vitousek 1992). Biological invasions are most often facilitated by disturbances outside of the natural disturbance regime (Hobbs and Huenneke 1992), and the interaction of biological invasions and fire has been a topic of research (Keeley and Scott 1995, Barro and Conard 1991). Short fire return intervals or high fire frequencies are known to type convert native shrub communities in favor of herbaceous exotics. This shift can have severe consequences for community structure, function, and native biodiversity. On the other hand, prescribed fire can be an indispensable tool to eliminate invasives in the context of a restoration plan (Parson and Stohlgren 1989, Hastings and DiTomaso 1996, both as referenced in D’Antonio 2000). Invasive plants can be grouped in relation to fire effects in the same manner as native plants (Table 2-14).




*Map 2-7. Map of invasives based on 2003 surveys of NBPL (Junak, pers. comm.). Cabrillo National Monument was not included in the survey.*

Cummins (2003) documented large seed banks of several invasive exotic forbs and shrubs at Point Loma, which could lead to some areas becoming dominated by invasives if they are competitive with seedlings and resprouts of native shrubs. Map 2-7 depicts the distribution of exotics on NBPL, based on surveys in 2003 by Junak. CNM lands were not included in this survey. With Point Loma's mild climate and large urban interface, many horticultural plants have escaped into natural areas and now dominate them. For example, there are acres of habitat dominated by acacia trees with little understory on NBPL. They can also dominate in waste places.

The degree to which fire can influence community structure in Mediterranean shrublands depends most strongly upon the fire interval (Hobbs and Huenneke 1992, Keeley 2001, Zedler *et al*. 1983). The natural fire interval of southern California chaparral is believed to be greater than twenty years (Keeley 2001). Keeley (2001) states that chaparral is particularly immune to alien invasions because many exotic herbaceous growth forms cannot establish under the closed canopies of native shrubs. However, the canopy of native shrubs can be reduced by shortened fire intervals, by reducing the number of resprouters and killing obligate seeders. The decline of canopy species allows weedy annual exotics to gain a foothold. Once established, these annuals increase the surface fuel load, creating a positive feedback loop that facilitates low intensity frequent fires that can drive the community structure toward a sustained exotic annual grassland.

Fire timing and intensity can also play an important role in affecting community structure. For example, annual grass seeds are highly susceptible to fire damage in the spring (Keeley 2001). Perennials on the other hand can survive fire by resprouting from their basal clump. Thus, if native perennial grasses and invasive annuals co-occur on a site, spring burns can shift the community composition in favor of the native perennial grasses. In addition to timing, fire intensity also affects post-burn community structure. In intact chaparral, most wildfires are naturally high intensity and these fires facilitate the germination and regeneration of the shrub species. High-frequency, low-intensity burns in type-converted chaparral can fail to produce the heat needed to germinate native shrubs and to destroy seeds of some non-native annuals (Moreno and Oechel 1991 as referenced in NPS Santa Monica Mountains NRA Fire Management Plan 2003).

The effect of fire upon community structure can be spatially idiosyncratic when the fire occurs within a complex mosaic of natural and disturbed lands, with varying assemblages of weedy invasives. Firebreaks, which typically support large numbers of invasive annuals because of yearly disturbances and lack of canopy cover can act as 'highways' for non-native species invasion (Keeley 2001). Exotic annual seeds can often survive adjacent to high intensity fires because the intensity within the firebreak itself is often greatly reduced by the lack of fuel. After the fire has removed the canopy of the surrounding shrub land, invasives can spread outward from the firebreak. Similarly, when firebreaks are used as anchor points for prescribed burns they can act as seed sources for exotic annual species (Santa Monica Mountains NRA Fire Management Plan 2003). Other studies have found that burning in areas in which the natural habitat is highly fragmented can lead to invasion of exotic species. Zedler and Scheid (1983, as referenced in D'Antonio 1993) found that an experimentally burned fragment of coastal sage scrub was rapidly colonized by hottentot fig that was well-established in adjacent patches. This suggests that the burning of isolated fragments of natural habitats surrounded by invasive-rich disturbed habitats may facilitate the invasion of exotics.

Fire, in conjunction with other forms of disturbance, such as herbivory, can affect the degree to which exotics become established. D'Antonio *et al*. (1993) found that while fire does not improve germination of hottentot fig, excluding herbivores from freshly burned sites greatly increased the rate of growth of this succulent exotic.

## 2.4.1 Other Ecological Processes

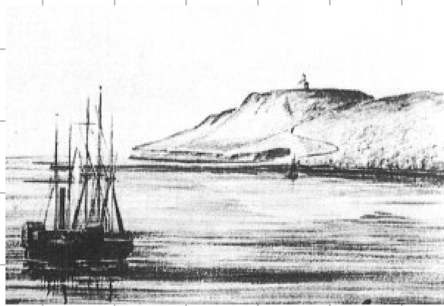
Conservation of species and rare community assemblages is a primary goal of both U.S. Navy and CNM natural resource management. This may mean managing for an array of vegetation conditions within the long fire-free regime characteristic of Point Loma. On Point Loma where just a small remaining fragment of a once larger system of coastal scrub/chaparral communities remains, we might also choose to manage for higher diversity per unit area than what is thought to be “natural” to maintain elements once spread spatially and temporally through a larger system.

We do not fully understand the range and extent to which certain organisms may respond to other ecological processes on Point Loma besides the fire regime. These additional processes may act at the landscape, community, or population scales. Examples include drought/El Niño cycles, inter-species competition that results in shifts in relative abundance of species groups, herbivory by native mammals, food chain dependencies, and dispersal and colonization. The following processes that are linked to plants and which interact with fire regime could be affected by fire management actions.

- Population processes
  - -Dispersal and germination of seeds
  - -Gene flow (seeds and pollen)
- Community processes
  - -Movement of seed dispersers
  - -Movement of pollinators
  - -Movement of herbivores, seed predators, and parasites
  - -Movement of mutualists (e.g. mycorrhizal fungi)
  - -Dispersal and colonization of exotic plant species
  - -Competition
  - -Herbivory
- Landscape or coarser scale processes
  - -Drought
  - -El Niño
  - -Global warming
  - -Habitat fragmentation and isolation
  - -Nutrient cycling

The life histories of plants are dependent on processes at all of these scales. Establishment of canopy gap-dependent species may require disturbance processes that are not fire dependent. Very few plants are capable of dispersing to a fully occupied habitat and maturing without relief, at some stage, from the competition of surrounding established individuals (Zedler 1982). Grime (1979) explained some of the reasons for this pattern. Some species appear to require large gaps in which the effect of competition is minimal, while others are capable of establishment in small gaps in which only limited growth is possible before competition with established individuals becomes significant. Capacity to invade depends not only on a plants's stress tolerance and competitive ability (Grime 1979), but also on dispersal characteristics which determine the ability of a species to find all the available habitat. During long fire-free periods, openings created by senescent shrubs are the likely location where gap species become established.

Many wildlife species are dependent on gap plant species and may be at a greater risk of extinction than the plants themselves. For example, the Palos Verdes blue butterfly *(Glaucopsyche lygdamus palosverdesensis)* was thought to be extinct on the Palos Verdes peninsula in coastal Los Angeles County, but was rediscovered in 1994. Like many moths and butterflies, the Palos Verdes blue is restricted in the host plants it can utilize. It has a shorter life span than the plant species it depends upon; California locoweed (*Astragalus trichopodes* var. *lonchus)* and deerweed. Both plants are known to be fire followers in a landscape that is essentially lacking in wildland fire. This places the butterfly at risk because the host plants usually occur at low densities, depending on localized disturbances such as landslides or animal trails. For organisms with extremely sedentary demographics, such as this butterfly, long fire-free intervals combined with habitat loss and drought have been catastrophic.





# 3.0 Fire Management Strategy

The fire planning environment at Point Loma is characterized by a relatively small fragment of natural habitats and low historic fire frequency due to coastal influence. However, the presence of fire dependent species demonstrates that these communities evolved with fire, and their composition and structure present fire risks. In addition, infrastructure development has created a complex wildland-urban interface. The fire management approach for Point Loma is relatively simple:

- Provide for pre-suppression protection of structures through fire-safe building construction and survivable space around each structure;
- Implement experimental prescribed fire plots on NPS lands to evaluate options for achieving ecological goals and managing native species populations, and;
- Implement fuel modification zones in key areas such as roadsides.

## 3.1 General Management Considerations and Decision Context

Fires are recurring events in southern California, and the wildland areas on Point Loma have the potential to burn in a wildfire. The purpose of this Point Loma Joint Wildland Fire Management Plan is to protect personnel, facilities, and natural and cultural resources from the impacts of wildland fire; prioritize assets to be protected in the event of a fire; ensure the perpetuation of native terrestrial habitats, fire adapted plant communities, and rare species; and minimize the total cost of fire pre-suppression and suppression practices on lands owned by the U.S. Navy and National Park Service on Point Loma. The fire management actions are selected for consistency with the INRMP, GMP, and RMP objectives (see Section 1.5), so that the agency missions, security and safety requirements, and conservation goals of both the U.S. Navy and NPS may be achieved.

In selecting fire management actions, the following options were considered from the "management toolbox":

- Wildfire prevention.
- Wildland fire suppression.
- Wildland fire use (managing unplanned ignitions to achieve resource benefits where private property and social values can be protected).
- Prescribed fire for ecological benefit.

- Fuels management (hazardous fuel reduction) using fire or mechanical treatment.

These options were evaluated using two separate decision frameworks, one that weighed ecological risk or vulnerability, and a second that assessed hazardous fuel reduction options to reduce threats to human life and facilities.

In the discussion below, risk combines the threat (probability) of ignition (based on historic ignition pattern, fire history, suppression resources response time), the fuel hazard or what can burn, and the vulnerability of human life and sensitive natural and cultural resources. The term “hazard” is used to refer to the condition of the fuels (vegetation condition, structures and their burnable parts, topography, resistance to control, etc.). Fire planning is in part a matter of weighing the relative importance of the fire threat, hazardous fuels, and vulnerability of human life and resources. Consistent with federal fire policy, these are evaluated based on the long-term cost and benefit of various means to minimize losses and achieve goals and objectives.

### 3.1.1 Decision Framework for Evaluating Ecological Risk

The decision framework that was used to weigh the risk to the ecosystem from the selected fire management actions can be outlined as follows:

1. What are each agency’s essential mission requirements?
2. What are each agency’s conservation goals and objectives?
3. What conservation goals and objectives are vulnerable to extreme fire scenarios, given the current condition and trend of the resources to be conserved?
4. What are the current disturbance processes and how do they affect ecosystem condition, trend, and vulnerability? Acknowledge uncertainties and additional information needs. Consider the effects that may be caused by differences between current disturbance regimes and historical disturbance patterns.
5. What do we know about the specific vulnerabilities of all classes of organisms at multiple conservation scales, and of the processes which sustain them? What are the unknowns? Is the potential of harm greater by doing nothing than by intervention?
6. Are certain risks short-term versus long-term?
7. What is the existing fire management capability to implement ecological objectives and manage the threat of ignitions and extreme fire scenarios?

In this Fire Plan, these questions are analyzed at three scales: regional/landscape, community, and species scales. In a *regional* context, Point Loma is unique for its southern maritime chaparral dominated by species other than the various species of narrowly endemic manzanitas *(Arctostaphylos* spp.*)* found in central and northern maritime chaparral; for its maritime succulent scrub with an abundance of stem succulents; for its island-like floristic affinities; for its concentration of rare endemics; and for its long fire-free history. Point Loma’s plant communities have more of a connection to Baja California, Mexico, or the Channel Islands, than to the rest of southern California.

The historic, non-anthropogenic fire regime was likely one of infrequent fires; either large fires that moved onto the peninsula from locations to the northeast, or smaller fires. A full range of fire severities likely occurred due to fuel, weather, and topographic conditions. Point Loma's fire regime is described only to understand its evolutionary and ecological origin, not as something to which we could return. Habitat loss and fragmentation, the precarious condition of rare species, the presence of invasive species, and an extensive urban interface are the dominant forces affecting resource management on Point Loma. This plan therefore focuses on specific fire management actions that will meet the goals and objectives that will best conserve communities and species.

At the *community* scale, the problem is to manage for conservation of a fine-grained mosaic of communities, with concentrations of rare endemics, when the scale of disturbance can be a complete stand-replacement fire. Different guilds or functional groups may require different management strategies, some of which are in conflict and mutually exclusive. For example, management for large, frequent and predictable disturbance that creates resource-rich but competitor-poor patches that favor the life histories of herbaceous species and shorter-lived shrubs (Zedler 1994), and the animals that may depend on them, are incompatible with longer lived closed canopy shrub communities. Hot fire that benefits chaparral may be harmful in maritime succulent scrub. As communities shift from post-fire recovery and the processes of competition and drought determine the relative abundance of species, are all species of concern preserved? Can the risk of canopy closure that excludes certain species be balanced with that of disturbance-dependent species, within the limits of their life expectancy and ability to wait out opportunities for regeneration?

Zedler's (1995) *species-level* analysis, which leads to the conclusion that there is plenty of time to wait for fire to recover obligate-seeders because the seed bank is very long-lived, looked at individual life histories of dominant shrubs and trees and did not consider life histories of all dependent plants, animals, and microbiota, nor processes of competition, invasion, and drought, which may interact with an organism's recovery post-fire. In this Fire Plan, an attempt is made to broaden the decision model to acknowledge the uncertainty with which we make decisions toward conservation objectives. By considering all classes of organisms and disturbance processes at multiple ecological scales, the risk of making decisions that result in unintended outcomes is minimized. It can help weigh the extreme, but not unlikely, scenarios of any uniform fire regime for the entire peninsula, whether it be losing all the vegetation in a single fire, or complete fire exclusion.

### 3.1.2 Decision Framework for Evaluating Approaches to Fuel Hazard Management

All of Point Loma is considered a wildland-urban interface (W-UI). W-UI can be defined as the portion of burnable vegetation within 1.5 miles of occupied structure densities greater than 1 unit/40 acres. Policy-specific criteria for defining a W-UI was published in the Federal Register (January 4, 2001 66 FR 751), which established a minimum density of one occupied structure per 40 acres (16 ha). The Federal Register also identified wildland-urban interface communities as those where housing was "within the vicinity" of forests and other wildlands, but did not quantify "vicinity." In its identification of a W-UI, the California Fire Alliance

(2001) defined "vicinity" as all areas within 1.5 miles (2.4 km) of wildland vegetation, roughly the distance that firebrands can be carried from a wildland fire to the roof of a house. Stewart *et al.* (2003) combined these into a quantified, operational definition of the W-UI as follows: "*Interface* areas have more than one house per 40 acres (16 ha), have less than 50 percent vegetation, and are within 1.5 miles (2.4 km) of an area (made up of one or more contiguous Census blocks) over 1,236 acres (500 ha) that is more than 75 percent vegetated. *Intermix* area have more than one house per 40 acres, and have more than 50 percent vegetation."

There is no place on the peninsula outside this criterion.

In order to evaluate different approaches to fuel hazard management, we are using the following decision model based on research by Conard and Weise (1998):

1. Is the action being considered necessary to strategically contain wildland fires within easily defended borders?
2. Will the action help to maintain a fire regime and vegetation condition that fosters a healthy, sustainable ecological community, with the least amount of impact on these communities?
3. Will the action help to separate urban interface areas from natural fuel complexes, both to protect urban interface areas from wildland fires and to protect wildlands from fire starts in the urban interface?

This framework is expanded in Section 3.7.

## 3.2 Summary of Wildfire Management Issues

The following summarizes fire control problems at Point Loma.

1. The Navy, in particular, has a highly significant investment in facilities on its NBPL properties, and these facilities vary significantly in their fire safety conditions. Due to the upslope proximity of natural vegetation and steep, unstable terrain, significant post-fire erosion or flooding could adversely impact this multi-billion dollar infrastructure, as well as shoreline structures and the harbor and waters surrounding them. Significant investment in erosion control by both Cabrillo and the Navy, as well as the City of San Diego at the Metropolitan Wastewater Treatment Facility, has been ongoing even without fire, due to steep slopes, and naturally unconsolidated shale and sandstone sediments.
2. Point Loma is relatively unusual within southern California in that it has been fire-free for most of the 20th century. However, the potential for wildfire exists under the right combination of climatic conditions and anthropogenic ignition, and cannot be eliminated. NBPL and CNM should be prepared to anticipate the effects.
3. A serious wildfire on Point Loma would most likely occur under the most extreme weather conditions when wildland firefighting resources are already committed and unavailable.
4. The current staffing at the Federal Fire Department does not meet standards of the National Wildfire Coordinating Group (NWCG) for compliance with

Federal Fire Policy. There are three persons assigned to each engine, although a minimum of four people are required on each to fight a wildland fire efficiently and safely according to the standards of the NWCG.

5. Fuel loads on the northern and eastern facing slopes are high. These slopes are steep, with minimal access for firefighting, narrow and winding roads and many structures and military facilities at vulnerable mid-slope and top-of-ridge positions. On the western slopes, fuel loads are generally less but more easily ignited due to the presence of fine fuels. This same condition exists on steep slopes, with limited ingress north of the San Diego Wastewater Treatment Facility. In addition, there are many ridge-top structures including old wooden structures. The concerns at specific locations regarding hazardous fuel conditions are identified in Appendix B. The hazardous fuel condition involving the Fort Rosecrans Historic District and intermixed eucalyptus trees is complicated by the fact that herons now use these trees for nesting.
6. Maintaining the historic fire regime is not possible in this wildland-urban interface (see Map 2-2). The federal properties are isolated from most natural sources of ignition by urban development, and have a higher probability of human ignitions for the same reason.
7. Wildfire would almost certainly have a dramatic impact on plant community composition and structure in the southern maritime chaparral, with a significant increase in individuals of obligate seeding, fire dependent species. In the maritime succulent scrub, species that respond well would increase. Succulents may experience a temporary decline in abundance or permanent loss if a wildfire were sufficiently hot to kill them completely.
8. There is evidence that the plant communities of Point Loma are changing due to an extended fire-free period, but it is not known if the current fire-free interval is outside the norms of the historic fire regime, and if any animal or plant has been permanently lost from the peninsula as a result. Certain species are decreasing in their amount of surface cover, while others are increasing. Lemonade berry, a species that recruits during fire-free periods, is increasing. Wart-stemmed ceanothus, which is fire dependent and considered a sensitive species, is decreasing in abundance, and wedgeleaf ceanothus has apparently disappeared from the peninsula, based on accounts from the 1800s. Catalina cherry is highly reduced in abundance, probably for reasons other than the long fire-free interval, such as historic harvesting for fuel needs of local people and industry. California sagebrush may be decreasing in cover. Within any chaparral stand, certain herbaceous natives are present only in the seed bank. While some of these changes are the result of human activity, major changes have occurred naturally as a result of succession, competition for resources, and stand aging without fire. Shifts in species abundance and cover are expected to continue toward taller canopy dominants. Decreases in shorter-lived species of smaller stature, herbaceous understory species, and gap components are also expected to continue. There may be future effects on wildlife or microbiota that cannot be assessed because they are not known at this time.
9. We do not have much information on species-specific longevity of many of the seeds in the seed bank or about the loss of viability or abundance of

seeds due to herbivory. The potential exists to lose this component of the flora that currently exists only in the seed bank. Also, wildlife dependencies on this portion of the flora have not been investigated.

10. The wildfire risks to succulent species in the maritime succulent scrub flora should be weighed against the risk of closure of the shrub canopy, erosion, or exposure to unplanned wildfires that burn on their own terms rather than within conservation objectives. Within similar plant communities in Baja California, which has a history of more frequent fires than does Point Loma, these same species of succulents remain abundant.They are also more common in inland coastal sage scrub areas where fire frequencies are higher than at Point Loma. Given their location, mostly outside of southern maritime chaparral and in open sage scrub or maritime succulent scrub, they are not exposed to any special risk if fires are not overly hot.
11. Fire management actions including hazardous fuels thinning could lead to an increase in invasive weeds. Disturbance to established vegetation, lichen communities, and microbiotic crusts may lead to an increase in erosion, and may be an unintended consequence of fire management actions taken under this Fire Plan.
12. Effective wildland fire policy for Point Loma requires interagency coordination; however the primary interagency group, the PLECA, has not taken on wildland fire management as part of its mission.
13. Point Loma is rich in archeological and historic resources and wildfire poses a threat to these resources.

## 3.3 Goals and Objectives

In Table 3-1 the goals from Chapter 1 are restated, along with Fire Plan objectives for attaining the goals. Strategies for achieving these goals and objectives are in the text of this and the following chapters.

*Table 3-1. Goals and objectives. These goals are not listed in priority order except for the first one. Strategies for attaining goals and objectives are described in the text.*

| |
|---|
| **Goal 1: Human Safety.** Provide for human safety as the first priority of every fire management activity. |
| Objective: All fire personnel will comply with the National Wildfire Coordinating Group (NWCG) and agency fitness requirements and will have personal equipment appropriate for the job or assignment. |
| Objective: Comply with staff qualification requirements and experience necessary to accomplish fire management program objectives in a safe manner |
| Objective: Follow all safety standards and guidelines identified within the NWCG's Interagency Incident Business Management Handbook (http://www.nwcg.gov/pms/pubs/IIBMH2/cover-zero_sm.pdf). |
| Objective: Apply the Job Hazard Analysis (JHA) process for all potentially hazardous fire management activities. |
| **Goal 2: Facilities.** Protect the economic investment in facilities and infrastructure on Point Loma by strategically reducing the risk of ignitions and hazardous fuel conditions immediately adjacent to structures. |
| Objective: Based on structure-by-structure analysis, modify fuels out to an appropriate distance around all sides of each structure that cannot afford to be lost in a wildfire to provide survivable space. |
| **Goal 3: Cultural.** Protect cultural resources of Point Loma, including all historic, archeological, and commemorative resource values. |
| Objective: Prevent damage to cultural resources by fully integrating concerns into fire planning, providing for compliance with the San Diego Metro Programmatic Agreement (on Navy lands), DO-58 for NPS historic structures, and Section 106 of the NHPA, and providing sufficient location and value information to firefighters and fire planners to identify and prioritize suppression or pre-suppression response. |

*Table 3-1. Goals and objectives. These goals are not listed in priority order except for the first one. Strategies for attaining goals and objectives are described in the text. (Continued)*

| | |
|---|---|
| | Objective: Evaluate historic structures within 5 years to determine if, by virtue of the its significance or a museum or collection, adequate fire detection, warning, and suppression systems are warranted to be installed. Alternatively, determine if a change in the management and use of the structure, rather than modify the structure itself, is the most cost-effective approach. |
| | Objective: Develop pre-fire plans within 5 years for historic structures and buildings housing museum or library collections designed to identify the floor plan, utilities, hazards, and areas and objects requiring special protection. This information will be reviewed and updated annually and made available to FFD and NPS fire personnel. |
| **Goal 4:** | **Ecological.** Ensure the sustainability of ecological resources, including the full range of natural plant community structure and native biodiversity of plants, animals, and microbiota, emphasizing endemic species, while controlling exotic species. |
| | Objective: Seek perpetuation of native plant community structure such that the full range of species composition and structural diversity that was present before Europeans arrived is present or potentially present in the seed bank, while controlling introduction and spread of exotic species. |
| | Objective: Over the long term, restore the above- and below-ground plant and animal communities to a condition such that the species diversity and density of a reference condition (as this can be surmised based on long-term monitoring plots and historic data) are self-sustaining. |
| | Objective: Foster conditions such that disturbance processes (fire, drought-El Niño cycles, animal burrowing, invasive species introduction, etc.) function together to achieve the goal of ecological conservation. For example:<br>- A sufficiently long inter-fire period, at least 40 years in southern maritime chaparral, should be provided for obligate-seeding species to establish sufficient seedbank to replace their populations when a burn occurs.<br>- Lichens and other species dependent upon older stands should have refugia for recolonization after disturbance such as fire.<br>- Soil erosion due to fire should not exceed the rate of soil formation, about one ton per acre per year, and that sedimentation due to fire does not affect water quality of surrounding ocean and bay waters.<br>- Conduct rehabilitation of sites affected by suppression so that there is no permanent loss of natural or cultural resource values. |
| | Objective: Conduct research and monitoring to guide fire management, improve the scientific soundness of decisions, and the future adaptive management of fire. This will be done through the Annual Review and Update meeting and JWFMP 5-year update process by regularly refining the conceptual models presented in Chapter 2 of the JWFMP, screening requests to conduct research on lands involved in the JWFMP by their ability to support refined conceptual models and management decisions, publicly announcing areas of interest to researchers, developing synopses of research interests, and requesting funds to conduct research as appropriate. |
| | Objective: Update the JWFMP, prescriptions, and treatment priorities as data suggest and agreed upon by the necessary attendees and under the terms of the Annual JWFMP Review and Update meeting and the 5-year JWFMP update. |
| | Objective: Conduct rehabilitation of sites affected by fire management practices so that there is no permanent loss of natural or cultural resource values, and all necessary work to achieve this is completed within 2 years of a fire. |
| **Goal 5:** | **Suppression.** Suppress all unplanned wildland fires, regardless of ignition source, to the smallest size possible but no more than 10 acres, protecting all values at risk in a prioritized manner. |
| | Objective: Ensure suppression resources and agreements are in place to confine, contain, and control wildlfires at the start of each fire season and that they have passed an annual review based on content of the Annual Preparedness Meeting. |
| | Objective: Ensure that no wildland fire leaves the federal reservation lands and enters private lands. |
| **Goal 6:** | **Fire Risk and Hazardous Fuels.** Control fire risk and hazardous fuels such that ecological, cultural, and social values are not placed at risk from extreme fire behavior or fire management actions. |
| | Objective: Prevent unplanned ignitions as the initial line of defense against wildfire threat through education and ensuring employees have the expertise and equipment to take initial action to suppress it while fire response authorities are on their way. |
| | Objective: Align fire ignition risk with fuel hazard conditions to reduce wildfire occurrence using an effective Fire Danger Rating System (FDRS) that reduces ignition potential under severe and extreme hazard fire and weather conditions. |
| | Objective: Reduce fuel hazard cost effectively for the values at risk, using risk assessments that consider fire history, fuel hazard, ecological condition, location of sensitive resources, and other factors to identify and prioritize appropriate treatments to achieve the maximum benefit for the least impact and cost. |
| **Goal 7:** | **Compliance.** Comply with policies of both the U.S. Navy and NPS with regard to fire planning and management programs. |
| | Objective: Perform all CNM fire management activities in accordance with the principles, policies, and recommendations of Departmental Manual, Parts 350 - 354 and 620 DO60, Aviation Management. |
| | Objective: Integrate explosive safety requirements (NAVSEA OP 5) and security requirements for clear zones and access to property boundaries (OPNAVINST 5530.14C) with fire safety planning. |
| | Objective: Maintain the highest standards of professional and technical expertise in safely implementing an effective wildland fire management program. |
| | Objective: Effectively serve the missions of NBPL and CNM while minimizing the total long-term costs of fire management. |
| **Goal 8:** | **Education.** Implement a communication and education program that enhances understanding of the fire management mission and fosters informed participation in fire management activities for both internal and external audiences. |
| | Objective: Educate employees and the public about the scope and effect of wildland fire management, including fuels management, prevention, hazard/risk assessment, rehabilitation, and the role of fire in the southern California ecosystem. |
| **Goal 9:** | **Staff Expertise.** Develop and maintain staff expertise in all aspects of fire management. |
| **Goal 10** | **Within Agency Fire Program Integration.** Effectively integrate the fire management program into all agency activities and operations. |
| **Goal 11** | **Interagency Fire Program Integration.** Foster and maintain interagency fire management partnerships and, as feasible, contribute to the firefighting effort at the local, state, and national level. |

# 3.4 Fire Management Units

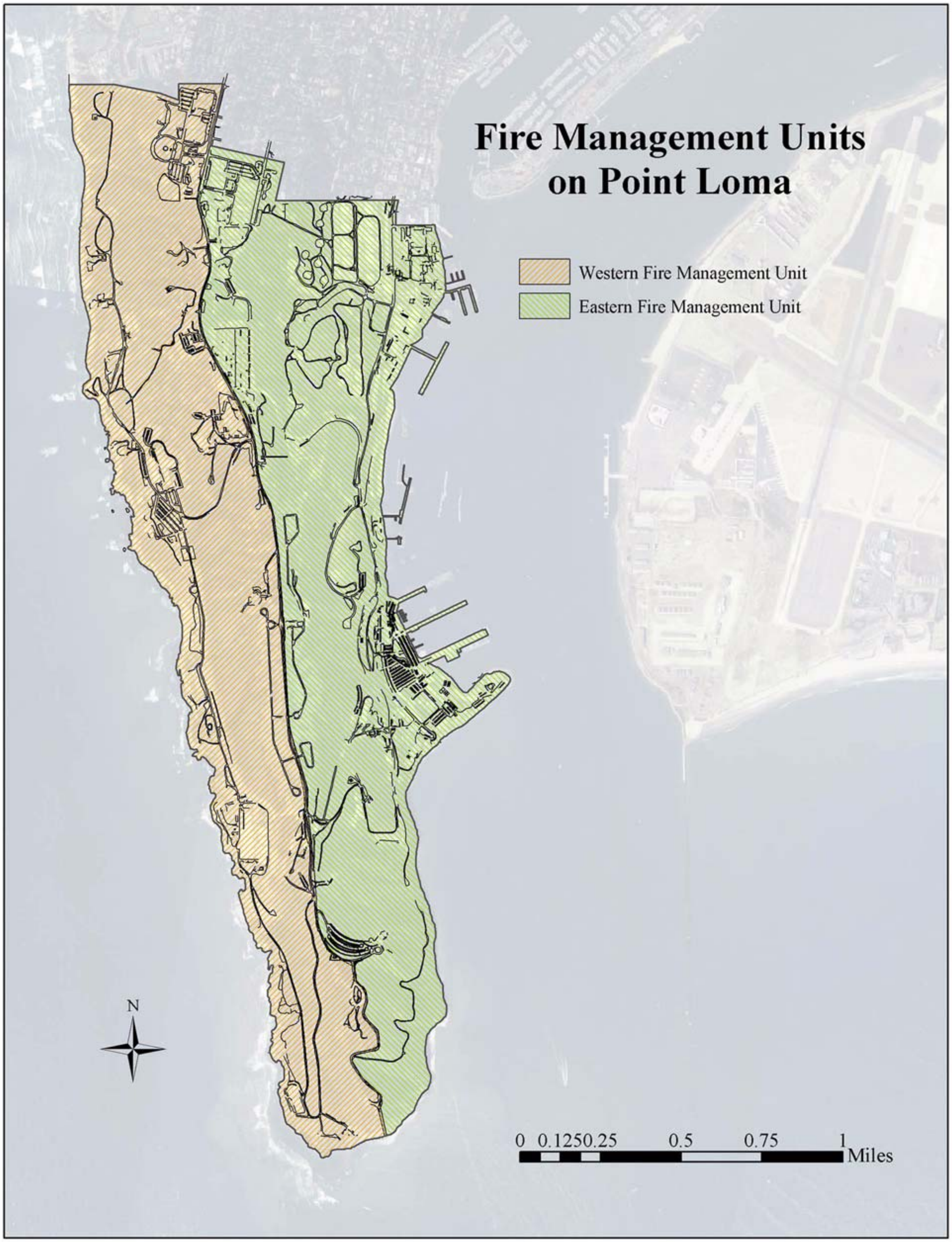
It is practical for fire planning purposes and to achieve the above goals and objectives to divide the landscape into fire management units (FMUs). A FMU is any land management area definable by objectives, topographic features, access, values-to-be-protected, political boundaries, fuel types, or major fire regime groups, etc., that sets it apart from management characteristics of an adjacent unit.

## Strategy for Fire Management Units

- Map 3-1 depicts two FMUs for Point Loma. These were delineated based on topographic features and the different fuel loading and ecological communities on the east side versus the west side of the peninsula. The West Side FMU is mostly resilient to cool or moderately-hot fires with many succulents and shrub dominants typical of coastal sage scrub. These areas may be damaged by hot fires. The East Side FMU has more chaparral species resilient to, and dependent upon, moderately-hot to hot fires.
- Table 3-2 summarizes the fire management control problems and values at risk in each FMU, all of which are addressed in the sections that follow. On both the east and west sides of Point Loma, all wildfires will be aggressively suppressed. In addition, management strategies include experimental prescribed fire for ecological restoration on small plots; continued security vegetation management along fence lines between Navy and private property, and 50 feet of pruning and thinning around assessed structures using hand tools, and mechanical treatment of fuels along roadsides (with criteria for shortening this distance–see Section 3.7).

*Table 3-2. Point Loma fire management units and summary of control problems and values at risk addressed by this Plan.*

| | |
|---|---|
| **East Side FMU** | |
| **Control Problems** | **Values at Risk** |
| Steep slopes, heavy fuels, minimal access, narrow and winding roads and lots of structures and military installations at mid slope and at top of ridge. | Extensive human occupation and infrastructure at mid slope and along the main ridge top, Cabrillo NM Visitor Center. Old Point Loma Lighthouse. Fort Rosecrans Historic District. Southern maritime chaparral with unique endemics. Sensitive Essential Fish Habitat and waters of San Diego Bay. Coastal sage scrub. Endangered and sensitive flora and fauna. |
| **West Side FMU** | |
| **Control Problems** | **Values at Risk** |
| Flashy fuels, steep slopes, ingress is limited north of SD wastewater treatment facility, lots of structures along the ridge top including old wooden structures. | Extensive human occupation, infrastructure and administrative facilities along the main ridge top on the north end of the Federal property. Maritime succulent scrub with rare endemics. Active erosion. Tide pools sensitive to sedimentation. Essential Fish Habitat and waters in kelp beds. |




*Map 3-1. Fire Management Units (FMUs) on Point Loma.*

## 3.5 Wildland Fire Suppression

Depending upon the weather at the time, a wildfire on Point Loma could range from a low-intensity, slow-moving, smoldering fire to a fast-moving wildfire with flame lengths in excess of 30 feet, potentially consuming more than 100 acres in six minutes assuming no initial attack. Under the burning conditions that led up to and occurred during the 2003 Paradise, Cedar, and Otay fires, all of the wildland open space areas of Point Loma could burn if a fire started on the east side of the peninsula. The fire would be very short in duration perhaps not lasting more than an hour. In October of 2003, major wildfires were burning throughout southern California prior to the onset of the three largest San Diego County wildfires, with many San Diego County firefighting resources sent north to neighboring counties. The conditions in October of 2003 were much like the southern California fire-storms of 1970, 1980, and 1993. Firefighting resources were quickly over-whelmed and became extremely limited. Point Loma has not burned in 144 years, but some day it is expected to, and most likely it would burn during one of these extreme burning periods that occur approximately once every ten years.

Air tanker support is available through a mutual aid agreement (Appendix E) from the USFS/California Department of Forestry Joint Air Tanker Base at Ramona, California. Nonetheless, since this Fire Plan is designed under the assumption that any wildfires burning on Point Loma will be under conditions when suppression resources are scarce, support with a helicopter water bucket is important. The FFD has access to a City fire response helicopter based at Montgomery Field under a mutual aid agreement (Appendix E), however it too, may be unavailable. FFD can access this helicopter through normal radio requests, and it is free to the user, provided it is available and not already com-mitted to another wildfire.

### Strategy for Wildland Fire Suppression

- All fire management activities would have as the highest priority firefighter and public safety. Appropriate management responses for all wildland fires (regardless of ignition source) would be rapid containment and suppression to protect the public, check fire spread onto private property, and protect the natural, cultural and historic resources at risk.
- The Stage I Initial Fire Assessment is defined as including a Fire Situation and Decision Criteria Checklist, which documents the current and predicted situation, all appropriate administrative information, and aids managers by providing them with criteria to make the initial decision on the suppression action. On Point Loma, this Fire Plan completes the Stage I Initial Fire Assessment that provides the decision framework for selecting the appropri-ate management response.

  -There is only one management response. Suppress all unplanned wildland fires, regardless of ignition source, to the smallest size possible but no more than 10 acres, protecting all values at risk in a prioritized manner. Based on potential fire behavior and spread, and the human, natural, and cultural resource values at risk, all unplanned wildland fires will be rap-idly and efficiently suppressed at the smallest size possible.

-If initial attack fails, a confine and contain approach will be taken to restrict the wildfire to the smallest size possible using roads and natural breaks. All responses will be for the purpose of control. This approach is recommended after comprehensive consideration of the resource values to be protected, firefighter and public safety, and costs. Minimum Impact Suppression Tactics (MIST) will be emphasized (Section 3.5.3.1 ). Only the most complex fires being managed for resource benefits would require completion of all stages of a Wildland Fire Implementation Plan (WFIP), and such fires are not anticipated on Point Loma.[1] Similarly, a Wildland Fire Situation Analysis (WFSA) would be prepared for those fires exceeding one operational period (very unlikely on Point Loma).

- Continue existing Mutual Aid agreements (Appendix E).
- An additional suppression agreement should be explored with the Navy's reserve helicopter wing (COMHELWINGRES HC-85) stationed close by at Naval Air Station North Island (NASNI) for response to a wildland fire on Point Loma, or for enhanced accessibility of the City of San Diego helicopter. (Use of the latter is free through existing agreements for the first 24 hours.) Such support is recommended because the City helicopter is not likely to be available during a busy fire season in southern California, and the Navy helicopter already has a similar agreement to respond to fires on San Clemente Island, which is much farther away. However, the existing mission of the Navy reserve unit does not include stand-by time for fire alert, so this would have to be modified at a high level in that organization. The ready-alert status of helicopter aerial support would be based on the projected daily Fire Danger Rating during the fire season (Section 3.5.1).
- A new agreement is needed between FFD and NPS so that resources can be shared for experimental prescribed fire, vegetation management, as well as for a wildfire. This agreement would be similar to the agreement that the Cleveland National Forest has with Federal Fire and separately with NPS. It will be necessary for NPS staff to determine what master agreement to use for negotiating the local agreement.

### 3.5.1 Fire Danger Prediction

No National Fire Danger Rating System (NFDRS) has been established for NBPL and CNM because there had been no previous requirement for a fire plan at either location. The weather station at Lindbergh Field (San Diego International Airport) can be used as a base for evaluating fire weather conditions, but only for temperature, relative humidity, wind speed, and wind direction. The closest remote automated weather station (RAWS) for predicting fire weather is at NASNI and is operated by the National Weather Service. It is most appropriate for providing the baseline information for running a NFDRS.

1. A WFIP is in essence a decision tree that allows the Fire Manager to go through a check-off process to see if the wildfire is burning within agreed-to parameters. If so, the fire will be allowed to burn (much as would a prescribed fire) as long as it continues to stay within prescription and long-range weather forecasts continue to look favorable. If these parameters do not exist the wildfire is extinguished. The Point Loma property is too small with too many structures to consider to allow wildfires to achieve resource management objectives.

### Strategy for Fire Danger Prediction

- Since neither NBPL nor CNM have had an ongoing fire management program, all NFDRS information will need to be generated by the Santa Monica Mountains National Recreation Area (SMMNRA) Fire Management Officer (FMO) for Cabrillo. The NPS has specific breakpoints for fire danger (Interagency Standards for Fire and Fire Aviation Operations, Chapter 7). They are:

  -Extreme - 97th percentile
  -Very High - 90th percentile

- "Fire Family Plus" is a collection of Fire Management computer programs which should be used as the analysis tool to complete the work on determining the Burning Index (BI), or the burnability of various wildland fuels, and which equates to each of the NFDRS breakpoints and the associated adjective rating. Since this analysis work has never been completed, the NPS FMO should do this. This software is available to the NPS SMMNRA office.
- A new agreement among NPS, NBPL, and the NASNI meteorological unit should provide access to the RAWS data from the NASNI meteorological unit (see below Section 3.5.1) in order to refine a Fire Danger Rating System.
- The SMMNRA FMO should be provided access to the North Island Weather data to run it through the NFDRS. As this information becomes available it should be added as an addendum to the FMP during its annual review and verification. The NASNI meteorological office would forecast daily fire weather for Point Loma, during the fire season, and for San Clemente Island as required in the Navy's Fire Plan for San Clemente Island (U.S. Navy, in Final Draft). Such a forecast would be sent out at 0800 and 1300 hours each day on a website accessible to Navy, CNM, and SMMNRA personnel, or by other method agreeable to the PLECA Working Group, translated into five classes of Low to Extreme.
- To support fire weather prediction, CNM staff should chart live fuel moisture levels in key fuel species. The start and end of fire season should be declared when live woody fuel moisture reaches or drops below about 200% (live herbaceous would be about 50%). Details of this are in Section 3.8.2.
- Until data are available and are run through the NFDRS, a preliminary FDRS is presented in Table 3-3 for Point Loma. This FDRS is designed around a five-minute fire engine getaway (the time it takes the suppression asset to depart after firefighting crews receive notice of a fire), 15-minute helicopter getaway and 30-minute response to a fire. The fire danger ratings were based on weather conditions distributed during the Spring (May 15–July 15), and Summer (July 16 –September 15), and Fall (September 16 –November 15) portions of the fire season, and by early morning, midday, and early evening time periods. They showed an expected peak fire danger time during the 1300 hour, and this is expected to continue through mid- to late afternoon. It would then be expected to subside in the evening when onshore winds bring in moisture-laden air.

*Table 3-3. Proposed Fire Danger Rating System for Point Loma.*

| POINT LOMA DAILY FIRE DANGER RATINGS and RESTRICTIONS | | |
|---|---|---|
| **Fire Danger Rating** | **Caution to Be Exercised** | **Necessary Precautions** |
| LOW<br><4 mph 20-ft wind speed><br>11-12 % 1-hr FFM | Use normal caution. Fires may start easily, but will have low rate of spread and fire intensity. | Care should be taken; Smoking is not permitted in vehicles or in remote areas of Point Loma. Survivable space standard fuel treatment measures will be in place by June 15 annually. |
| MODERATE<br>4-5 mph 20-ft wind speed<br>11-12 % 1-hr FFM | Use extra caution. Fires may start very easily. Fires are expected to have moderate rate of spread and fire intensity. | All Low Fire Danger Precautions are in place. This condition is the beginning of a fire ignition concern. |
| HIGH<br>6-8-mph 20-ft. wind speed<br>9-10% 1-hr FFM | Use extra caution. Fires are expected to have high rate-of-spread and fire intensity. | All Moderate Fire Danger Precautions are in place. |
| VERY HIGH<br>9-10 mph 20-ft wind speed<br>6-8 % 1-hr FFM | Extra protection caution. Fires will start easily and spread rapidly. Fires are expected to exceed 100 acres in one hour and burn very hot. Fires will be hard to contain at designated roads and fuel treatment areas without helicopters and 2 wildland fire engine companies. | All High Fire Danger Precautions are in place. Suppression assets should be on fire alert during the hours of 1000 to 1900 hours, staged to meet the goal of a 15-minute elapse time for responding to the site of any fire occurring on Point Loma. |
| EXTREME<br>>10 mph 20-ft wind speed<br><6% 1-hr FFM | Use extreme caution. Fires will spread at extreme rates of spread and will burn at unacceptable fire intensities. Fires will spread by long distance spotting. | All Very High Fire Danger Precautions are in place. Confine visitors to CNM to paved roads and trails. |
| FFM = Fine Fuel Moisture. This is the actual fuel moisture content of the cured grass and other stems 1/4 inch or less in diameter. These fuels are very responsive to changes in the moisture content of the air, and are very difficult to ignite when herbaceous FFM exceeds 20%. | | |

## 3.5.2 Communication between FFD and Suppression Helicopter

### Strategy for Communication During Aerial Suppression

- The standards for FFD's communication among agencies during use of a helicopter on Point Loma should be as follows:

  -All agencies involved should be able to talk to each other from key locations on the peninsula immediately and on the same frequency.

  -Communication systems should be such that reporting of a fire incident would reach Federal Fire within three minutes or less from time of first knowledge.

  -City of San Diego and any military helicopter operators (if an agreement for military helicopter use can be achieved) should have communication with the Fire Chief during a fire. Helicopter pilots need communication capability so the pilot can hear military frequencies, air-to-air frequencies and the incident commander on the ground.

## 3.5.3 Pre-attack Plan

### Strategy for the Pre-Attack Plan

- Initial attack is an aggressive suppression action consistent with firefighter and public safety and values to be protected. This approach is applied as the only suitable response for a wildland fire on Point Loma. The initial attack suppression strategy is confinement, in lieu of wildland fire use, to maximize firefighter safety and minimize suppression costs, and to maximize availability of critical suppression and management resources during periods of high fire danger associated with fire in other locations.

- Firefighting using trucks from roads, firing out[1], and water drops are the approaches expected for suppression on Point Loma. No heavy equipment use is expected, such as constructing fire lines with bulldozers. Bulldozers are not a realistic suppression resource on Point Loma. There are no suppression restrictions or special concerns by management unit; suppression response is the same for both FMUs. All sensitive cultural resources should be noted on Point Loma pre-attack maps utilized by all fire suppression resources.
- Anyone who discovers a fire should take initial action to suppress it while fire response authorities are on their way. Fire extinguishers should be mounted on Navy and NPS buildings, and these should be maintained and tested annually. Vehicles of Navy, NPS, and contractor personnel who regularly work in the wildland environment on Point Loma should be equipped with gloves, a shovel, and a pulaski.

#### 3.5.3.1 Minimum Impact Suppression Tactics (MIST)

The Navy and NPS staff will use methods to suppress wildland fires that minimize impacts of the suppression action, and are commensurate with effective wildfire containment and control strategies, firefighter and public safety, and resource values to be protected. Minimum Impact Suppression Tactics (MIST), involve adjusting tactics, where feasible, to avoid sensitive natural resources and cultural resources. This is the policy for all fire management activities on NPS lands. MIST can reduce the degree of long-term impacts associated with wildland fire suppression. All unplanned wildland fires will be suppressed in a prompt, safe, aggressive, and cost-effective manner to produce fast, efficient action with minimum damage to resources.

For Point Loma, these guidelines are as follows.

- Use helicopter long lines (Federal Aviation Administration approved cables with an electronic hook-up to eject a load in an emergency) to carry heavy payloads instead of constructing helispots.
- Use roads and natural barriers instead of line construction. Minimize the impacts associated with cold trailing the edge of the fire (a method of controlling a partly dead fire edge by carefully inspecting and feeling with the hand for heat to detect any fire, digging out every live spot, and trenching any live edge).
- Resource Advisors will be assigned on all fires and for post-fire monitoring.
- Command and General Staff will:

1. Firing out is used where it is necessary to construct an indirect fireline because the flanks, or edges of the wildfire, are too hot to construct a direct line on the active edge of the wildfire. As the indirect line is constructed the unburned vegetation between the wildfire edge and the indirect line is fired out. Often, existing roads are also used to fire out standing vegetation between the wildfire edge and the road that is serving as the containment line or fireline. Backfiring and firing out are two distinct kinds of operations. Firing out is a minimal impact means of containment and is readily utilized by all wildland fire suppression agencies.

- Evaluate each and every suppression tactic during planning sessions to see that they meet the PLECA objectives and minimum impact suppression guidelines.
- Discuss minimum impact techniques with fire staff during briefings to gain full understanding of tactics.
- Ensure minimum impact techniques are implemented during any resource disturbing activities.
- Use Minimum Requirement Analysis (decision screening questions so that the minimum environmentally-damaging tool is employed to accomplish the job).

- Prohibit the use of bulldozers for fire line construction.
- Protective mitigation measures for known historic and cultural resource sites in or near the project area would be assured before a prescribed burn project is initiated.
- Due to sensitive resource concerns, allow chainsaw use only under specific authorization by the agency landowner.
- Due to sensitive resource concerns (see Section 3.11), allow off road use of fire apparatus only under specific authorization by the agency landowner.
- Due to sensitive resource concerns, use paved surfaces such as parking areas to stage crews, equipment and supplies.
- Use existing roads and parking areas for helicopter landings. Provide security to keep people out of helicopter landing areas.
- Minimize the number of retardant drops to what is essential for control of the fire. Retardant drops require the preseason approval of the agency landowners.
- For the mop-up phase:

-Consider using "hot-spot" detection devices along perimeter (aerial or hand-held).

-For light fuels, cold-trail areas adjacent to unburned fuels. Do minimal spading; restrict spading to hot areas near fireline only.

-For medium and heavy fuels, cold-trail charred logs near fireline; do minimal scraping or tool scaring. Minimize bucking of logs (the process of cutting a felled tree into logs) to check for hot spots or extinguish fire; preferably roll the logs. Return logs to original position after checking or the ground is cool. Refrain from making boneyards (storage areas); burned/partially burned fuels that are moved should be re-arranged in a natural position as much as possible. Consider allowing larger logs near the fireline to burn out instead of bucking into manageable lengths. Use lever, etc. to move large logs.

-For burning trees and snags, the first consideration is to allow burning trees and snags to burn themselves out or down (ensure adequate safety measures are communicated). Identify hazard trees with either an observer, flagging, and/or glow-sticks. If burning trees or snags pose a serious threat of spreading firebrands, extinguish the fire with water or soil. Felling by chainsaw will be the last means to be considered.

- Remove all signs of human activity (plastic flagging, small pieces of aluminum foil, litter) resulting from fire suppression activity.
- Pack out all garbage and unburnables.
- Assign qualified Resource Advisors from both the Navy and NPS to facilitate compliance with MIST.

## 3.5.4 Extended Attack and Large Fire Suppression

Extended attack and large fire suppression events are not expected to occur, since the entire peninsula can potentially burn in less than an hour.

## 3.5.5 Prevention First

A fire prevention program will be instituted commensurate with resource values at risk. Public education is addressed in Section 3.10.

### Strategy for Prevention First

- The Navy, NPS, and other agencies of Point Loma should cooperate in all activities that promote fire prevention in order to reduce fire ignitions.
- The Navy and NPS should continue to evaluate the cause of fires and support projects that effectively limit fire starts, especially arson and roadside ignitions.
- Fire prevention at CNM should emphasize periods of heavy use, such as three-day weekends from Memorial Day through Labor Day at CNM. Fire prevention education should be provided to anyone working in or adjacent to the wildland environment, such as construction crews that operate during the fire season.

## 3.5.6 Preparedness Actions

To prevent loss of life and injury, survivable space enforcement and evacuation plans should be implemented by all agencies as the highest priority for community safety.

### Strategy for Preparedness

- On a regular basis, FFD should inspect burning permits, industrial operations, powerlines, and occupied structures for survivable space standards. Annual pre-season maintenance checks should be scheduled for all firefighting vehicles, pumps, hoses. FFD issues burning permits for Navy property on Point Loma. For CNM such a permit would be issued by FFD in conjunction with the NPS under the existing or an updated MOU.
- NBPL and CNM should consider safe ingress and egress when siting new structures. In areas with heavy fuel load, avoid mid-slope road locations, and long lengths of access.
- To prepare for each fire season, an Annual Preparedness Meeting should take place each spring with all entities that provide fire protection services under written agreements. The meeting would involve the Federal Fire Department,

National Park Service, City of San Diego Battalion Chief for the Point Loma geographic area, U.S. Navy personnel including a representative from Commander, Helicopter Wing Reserve HC-85 if appropriate, and possibly the U.S. Forest Service Cleveland National Forest and NASNI Meteorological Division. The existing agreement between CNF and FFD has an operating plan which calls for an “annual on-site meeting,” apparently on San Clemente Island which is also covered by this agreement. This agreement was used to send two or three FFD units to one of the October 2003 fires (C. Smith, *pers. comm*.). This meeting should occur in the spring, and could be coordinated with the PLECA meetings. FFD Zone meetings already occur once per quarter, so perhaps it should be coordinated with these already-established meeting schedules.

- At the Annual Preparedness Meeting:

  -Any fire event on Point Loma will be reviewed.

  -All aid agreements would be reviewed, a determination would be made whether they are up-to-date and accurate, and they would be amended if needed.

  -There should be an annual safety refresher and brief.

  -The supporting agencies should review lists of key contacts, maps noting the locations of hydrants, water tanks, and sensitive resources that will require protection. Any use of fire retardant drops require the preseason approval of the agency landowners. An update of GIS maps and sensitive species and habitat locations should be provided.

  -An annual field visit to familiarize fire personnel with sensitive resources should be considered as part of the Annual Preparedness Meeting.

  -Evacuation plans should be reviewed. This JWFMP does not address evacuation plans for Point Loma, and this should be done jointly by FFD and the City of San Diego Police Department.

  -An Air Hazard map that includes the location of all overhead powerlines should be prepared ahead of time and should be made available to pilots.

  -This Fire Plan should be discussed, including explicit review of the integration of fire management with all other aspects of CNM and NBPL management, and the status of the Fire Plan Update.

  -Minutes of each of these meetings should be placed in Appendix G of this Plan, and should be provided to the PLECA Working Group.

- A representative from CNM and the CNRSW natural resources staff should attend the Annual Preparedness Meeting to discuss results of any fire management actions taken in the previous year, and any desired new activities for the coming year. The purpose would be to provide the FFD with a revised annual fire management activity implementation schedule.

- Participants in the Annual Preparedness Meeting should forward any findings or recommendations to the membership of the Annual JWFMP Review and Update meeting (see Section 4.2.1).

- Federal Fire Department should institute a San Diego County Department of Navy Wildland Fire Coordinating Group, which was also proposed action for the FFD in the San Clemente Island Fire Management Plan. The purpose of the Coordinating Group is to ensure everything possible is being done through agreements to share wildland and prescribed fire personnel, equipment and specialized skills, establish Standard Operating Procedures when sharing these resources, and to conduct joint wildland and prescribed fire training exercises. This group should have a charter and rules of operation.
- The FFD, Navy, and NPS should continue annual training in order to maintain the highest standards of professional and technical expertise in planning and safely implementing an effective wildland fire management program. Within the FFD and NPS fire organizations, training plans should be implemented for each employee to reach target qualifications for the positions in the fire management organization. The latest developments in fire management technology should be known by fire personnel through attendance at conferences. In addition, natural resources support staff should attend conferences to keep abreast of the latest understanding in fire ecology. Personnel should also keep up-to-date on weed management practices and innovations in roadside management of native vegetation.
- The NPS Fire Management Officer or designee will stay abreast of aviation policy changes by maintaining periodic contact with the regional aviation manager.
- All fire personnel will comply with the NWCG and agency fitness requirements and will have personal equipment appropriate for the job or assignment.
- Follow all safety standards and guidelines identified within the NWCG's Interagency Incident Business Management Handbook (http://www.nwcg.gov/pms/pubs/IIBMH2/cover-zero_sm.pdf), which is used by all wildland fire protection agencies.
- Routinely apply the Job Hazard Analysis (JHA) process for all potentially hazardous fire management activities. This is a standardized form for evaluating all of the safety hazards associated with a particular job. The analyses are used in safety briefings.

## 3.6 Experimental Prescribed Fire and Wildland Fire Use

All fires burning in natural or landscaped vegetation in National Parks are classified as either wildland fires or prescribed fires. The term "Wildland Fire Use" means the management of unplanned ignitions, such as lightning-caused fires, for achievement of a specific resource benefit. Wildland Fire Use is not an option for Point Loma because proximity to people and facilities at nearly all locations necessitates aggressive suppression of any unplanned ignitions. On Point Loma all unplanned wildland fires will be suppressed at the smallest size and as efficiently as possible.

Prescribed fires are those fires ignited by land managers to achieve resource management objectives. Related prescribed fire activities include monitoring programs that record fire behavior, smoke behavior, fire decisions, and fire effects to provide information on whether specific objectives are met. Prescribed burning is used exclusively to provide resource enhancement, including control of exotic species and restoration of natural communities.

### Strategy for Experimental Prescribed Fire and Wildland Fire Use

- Prescribed fire will not be used for accomplishing fuels management objectives or as an aid to future suppression logistics. Mosaic burning for fuels management purposes is not proposed.
- Since the use of prescribed fire to achieve ecological objectives still faces uncertainties with respect to how to achieve a desired outcome, it will only be used in small scale experiments, and future use of prescribed fire will be determined based on the on results of the proposed experimental burns.

## 3.6.1 Experimental Prescribed Burn

Four separate experimental plot burns on NPS land are proposed to help develop an appropriate long-term management plan for sensitive species, which may result in more extensive prescribed burning in the future. The plant community will be tested for its response to fire in order to evaluate its use for ecological restoration, to assess its potential role in achieving conservation objectives, and to determine the most ecologically sound approach to resource management.

### Strategy for an Experimental Prescribed Burn

- Four experimental plots would be burned, each measuring 30m x 30m. Each burned plot would be paired with an unburned control plot for comparison. Two of these experimental plots would be located in the East Side FMU in southern maritime chaparral, with a hot fire planned as the most appropriate for this plant community. The other two plots would be located in the West Side FMU, in maritime succulent scrub, with a moderate-intensity burn planned. This intensity burn should provide sufficient stimulation to fire-dependent seeds, while burning out some of the larger weed seeds with high moisture content (mostly the exotic grasses). All plots would be located on NPS land.
- Each plot would be fully surveyed above ground for biota in all classes both before and after the burn. In addition, soil core samples would be collected to analyze content of the seed bank and soil characteristics.
- Before burn initiation, all compliance requirements regarding cultural and natural resources would be complete.
- Immediately after the experimental prescribed burn, each plot would have a barrier installed to prevent migration onto the site by small mammals or other wildlife that would be attracted to each plot. This would avoid complications with interpreting burn plot results. The barrier would be removed following the initial plot sampling.

- Each plot would be manipulated by hand to blend into the landscape before the burn. Burns would occur in late July or August after most vegetation is no longer blooming to allow for low fuel moistures. A low impact hand line will be cut around the plot. Cut vegetation could be thrown or dragged into the area to be burned.
- Firing techniques would be determined after the plots are located. In addition to a low impact hand line, the surrounding vegetation would be sprayed with gum-thickened, 75 phoschek or foamed to prevent escapes into the surrounding landscape. The firing pattern, whether strip burning or perimeter burning with center ignition, would be planned to achieve a high-intensity fire in chaparral, and a moderate- or low-intensity fire in maritime succulent scrub that would be designed to avoid mortality of succulents.

  -The ecological effect of the foam or retardant application depends on which product is applied. Foams act as surfactants (like a soap), while retardants have a mild fertilizer effect due to the ammonia component of the chemical (Hamilton *et al.* 1998). If conditions are sufficiently moist after retardant application, biomass production will likely increase during the growing season when the chemical is applied, but the effect will not persist. Under dry conditions, no effect on biomass production is likely (Hamilton *et al.* 1998). Weedy grasses that can exploit the additional nitrogen could gain an advantage over native plants under moist conditions. Annual grassland in California doubled its biomass from approximately 6 t/ha to 12 t/ha following application of diammonium phosphate retardant (Larson and Duncan 1982, cited in Adams and Simmons 1999). Native legumes germinated, but failed to establish on retardant-treated areas. Similar decreases in native legumes the first growing season after application of ammonium-based retardant were shown in an Australian eucalyptus community (Bradstock *et al.* 1987). In laboratory studies with algae, aquatic invertebrates, and fish (Hamilton *et al.* 1998), short-term toxicity tests showed that both fire-retardant and foam-suppressant chemicals were very toxic to aquatic organisms including algae, invertebrates, and fish. Foam suppressants were more toxic than fire-retardant chemicals. Both foams and retardants have variable degradability but generally the persistence of effects depend on post-application weather patterns (Larson and Duncan 1982; Larson and Newton 1996; Hamilton *et al.* 1998). The material is expected to last until there is about one inch of rain, or repeated fog can have the same dissipating effect (M. Rogers and R. Montague, pers. comm.).
- The experimental burns would be located on NPS lands.
- Location of the burns would be decided jointly by FFD and CNM. Locations with sensitive lichen species or with federally listed species will be avoided.
- To make go/no-go decisions about the experimental prescribed fire, a Burn Plan would be developed. An example is in Appendix F. On-site weather information will be taken on the ground the day of the burn at intervals set by the burn boss. Other weather monitoring capability would be as described in Section 3.5.1, with data coming either from the San Diego Airport at Lind-

bergh Field or the Meteorological Division at NASNI. Fuel models would be those already described in Section 2.2.2.

- The Navy and CNM resource staffs would jointly perform annual monitoring of the control plots and burned plots. Photo points will be established prior to the burning of any of the plots. Additional monitoring staff will come from the NPS Point Reyes fire monitoring staff. Assuming NPS fire monitoring protocols are to be used as proposed in Appendix H, NPS should take the lead in this monitoring, and Navy and CNM resource staff would support them whenever they visit.

### 3.6.1.1 Staffing

**Strategy for Staffing the Experimental Prescribed Burn**

- Staffing for the experimental prescribed burns would be supplied by Federal Fire or the NPS or both. The Superintendent of CNM is responsible for approving any burn plan on NPS lands. On a burn involving both properties, line officers from both agencies would sign the burn plan. A detailed Experimental Prescribed Burn Plan will determine the specific management objectives, desired weather conditions, the intensity of the fire needed to meet the objectives and the organization and staffing required to conduct the burn.
- The incident Burn Boss will meet the NWCG requirements. This is a nationally recognized standard.
- Resource Advisors, both for cultural and natural resources, should be present at experimental prescribed burns.
- Additional firing and holding resources could be obtained under an existing agreement with the Cleveland National Forest.
- Step-up staffing policy is described in reference to fire danger rating in Section 3.5.1.

### 3.6.1.2 Air Quality, Smoke Management, and Visual Resources

The experimental prescribed fire burns will be of very short duration resulting in a minimal impact to air quality. In order to comply with Clean Air Act requirements, the prescribed fires will be implemented only on regionally permissive burn days that allow for good convection and upper-level transport. This will avoid exacerbating air quality problems if the burns on Point Loma occurred simultaneously with prescribed burns by other local agencies. The planned plot burns would not produce enough smoke to impact airport operations at Lindbergh Field or NASNI. A smoke management plan will be made by FFD or the NPS Fire Management Officer to include all potential measures and techniques to prevent or mitigate adverse smoke events. Smoke-sensitive areas include Point Loma Nazarene College and Point Loma residential areas. There are no Class I airsheds on or near Point Loma for special smoke consideration.

**Strategy for Protecting Air Quality and Visual Resources**

- Fires are expected to affect local air quality minimally for a very short period of time on the burn day, with air quality quickly returning to normal afterwards. With particulate matter being the primary air pollutant, and its effects usually localized in the vicinity of the burn, no significant long term impact to human health is expected. Short term localized effects to residential areas can be serious in terms of particulate matter and visibility; however, these burns are far too small to have this effect. As an added precaution, these effects can be minimized with good smoke management planning and public notification. Any prescriptions implemented would consider wind patterns that disperse smoke from sensitive areas and fuel moisture conditions, which promote rapid burnout and good convection and upper air transport, to reduce air quality impacts. Coordination with the San Diego Air Pollution Control District and implementing burns only on regionally permissive burn days will ensure that air quality standards are not impaired by experimental prescribed burning activities.

- The proposed fires are very small, but if hazardous or unhealthful smoke conditions occur and become difficult to control under prescribed burn status, the fire can be declared a wildfire in order to cease ignition and suppress it with a full brush response available from fire departments. Unhealthful conditions are defined as chronic smoke that exceeds federal ambient air standards (PM-10 exceeding 150 /mg for 24 hours) in a smoke sensitive area. Further ignition is precluded, and immediately reverses the smoke production trend.
- If hazardous or unhealthful smoke conditions are observed (visibility less than three miles) in smoke-sensitive areas, the Fire Management Officer will advise the Chief Ranger and the Public Information Officer. The Public Information Officer will coordinate notification about the smoke conditions and provide information about potential health impacts, after consultation with the Burn Boss and Fire Management Officer. The Superintendent has the option to close the park area impacted or have the local rangers advise visitors to leave areas impacted by unhealthful smoke, the Public Information Officer would advise the media and answer phone calls.
- Visual resource impacts will be managed by:

  -Avoiding high use periods at CNM, such as holiday weekends.

  -Monitoring air quality sensitivity indicators, such as visibility and lichens, to establish baseline conditions.

  -Designing and implementing management activities to meet or exceed adopted visual quality objectives of NPS.

## 3.6.2 Potential Impacts of Experimental Prescribed Fire

While there is always the possibility of a prescribed fire escaping confinement, the precautions described within the Burn Plan (see Appendix F for an example) make the possibility of an escape very remote. Although it is not expected that an experimental burn would escape and get out of control, it is prudent to assess the potential impacts of such an event and identify measures to avoid an escape and minimize its potential impacts.

### Strategy for Avoiding Potential Impacts of an Experimental Prescribed Burn

- In the unlikely event of an escaped burn threatening the residential areas on the north end of the peninsula, it would immediately be declared a wildfire, requiring an all-out fire suppression response. All prescribed burning would immediately stop and prescribed fire personnel would convert to wildfire suppression responsibilities.

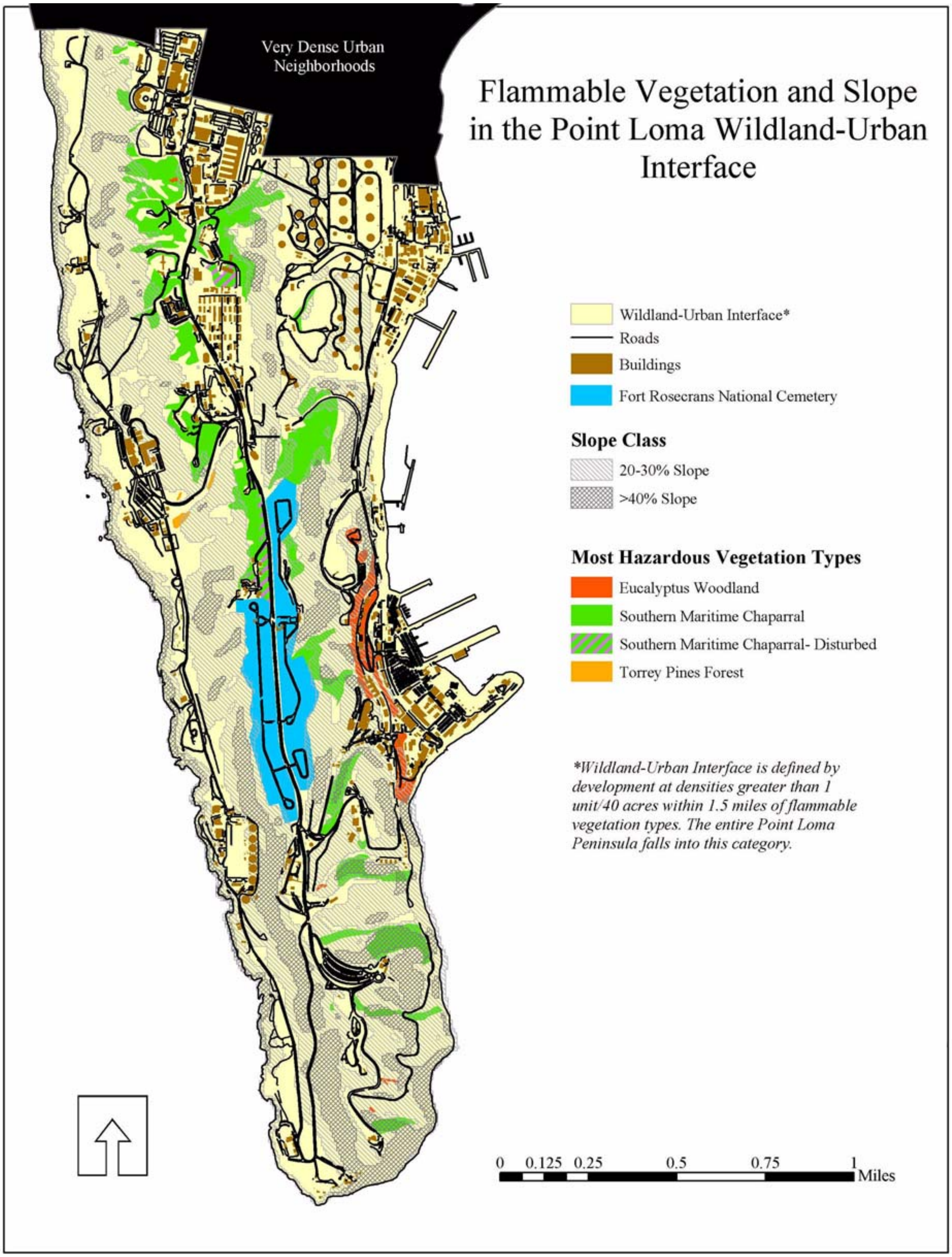
# 3.7 Fuels Management

## 3.7.1 Strategic Fuelbreaks Not Recommended

The tactical value of fuelbreaks is defined as the ability to provide anchor points for ground-based firefighting and increase effectiveness of water or fire retardant delivered by air tankers and helicopters by creating lower fire intensities in the treated area and improved production rates by firefighters. On Point Loma, there is no strategic benefit in providing fuel breaks in addition to the existing security road networks because the conditions that maximize their utility do not occur there.

### Strategy for Fuelbreaks

- The existing road and infrastructure system provide a well-distributed system of anchor points for firefighting.
- The strategic slopes where fuelbreaks would be useful are non-existent on Point Loma. Slopes steeper than 40% provide limited tactical firefighting options on the ground because of limited accessibility for mechanized equipment. For slopes < 20% (optimum) to 40% (moderately feasible), tactical firefighting options could be considered. However, coastal sage scrub has lower fuel loads and rapid regrowth, so fuel modification in this plant community provides low tactical benefit to firefighters and is not cost-effective. Grassland, roads, and landscaped areas (such as the Fort Rosecrans National Cemetery) already serve as fuelbreaks. Areas with mature chaparral (greater than 35 years old) or groves of non-native trees have the highest fuel loads, most intense and hazardous fuel conditions. However, there are no locations on Point Loma where chaparral fuel modification would provide added tactical value to firefighters in addition to the road system that already exists. Furthermore, many structures on Point Loma are placed midslope, where fuelbreaks will not help to stop a fire. Finally, the east winds expected during a fire make an expanded fuelbreak (beyond the normal security fenceline vegetation management zone) on the northern Navy boundary adjoining private lands ineffectual.
- To underscore the lack of strategic value of fuelbreaks, Map 3-2 depicts the wildland-urban interface of Point Loma (considered the entire peninsula), slope categories, the most flammable vegetation types, and existing roads.




*Map 3-2. Flammable vegetation and slope in the Point Loma Wildland-Urban Interface.*

## 3.7.2 Prescribed Fire for Hazard Fuel Reduction

**Strategy for Using Prescribed Fire for Fuels Management**

- Prescribed fire will not be used for fuels management or fuel modification purposes.

## 3.7.3 Mechanical Treatment for Hazard Fuel Reduction

**Strategy for Using Mechanical Treatment for Fuels Reduction**

- The only fuel management that will occur on Point Loma is mechanical treatment immediately around structures and along roads. Fuel management around structures has been shown to be the most effective at preventing structure loss and provides a safety zone for firefighters. It will permit firefighters to concentrate on suppressing the wildland fire and will minimize their need to focus on structure protection and evacuating people during a fire. Roadside fuels reduction (thinning) along major transportation routes is for the purpose of reducing the potential for accidental or unintentional ignitions along roads, where they are most common. An alternative is to spray roadside vegetation with fire retardants each year.

### 3.7.3.1 Survivable Space

The Federal Fire Department currently does not have enough Engine Companies on Point Loma to simultaneously make an initial attack on a wildfire and protect all of the structures and facilities in its path. This is why creating survivable space around all occupied structures is necessary. The survivable space concept provides for structures to survive a wildfire without the immediate intervention of the Fire Department personnel who would be already committed to attacking and containing the fire. Knowing that a fire, accidental or otherwise, will consume the vegetation on Point Loma and in the process may destroy a significant amount of high-value property, the most effective approach is to create survivable space between the standing dense vegetation and the structures that currently occupy the landscape.

There are two conditions that contribute to the loss of a structure during wildland fires. The first is the direct impact of radiant heat. To protect a structure from the effects of radiant heat, adequate survivable space should be maintained. The second condition is wind blown embers that land on roofs or are blown up under exposed eaves or beneath structures. The only defense against such embers is a fire resistant structure (Section 3.7.3.3 ).

Neither the National Park Service nor the Department of Defense has developed guidance or requirements for the establishment of survivable space around structures. Guidance may be gleaned from codes for the State of California. The federal government, however, is not required to adhere to the requirements found in these state codes.

The State of California, Public Resources Code, Section 4290/4291, requires that a minimum zone of 30 feet be maintained around all *habitable* [emphasis added] structures, with clearing up to 100-feet from structures or to the property line, whichever is closer, with a written order from the fire authority. The California Government Code, Section 51182, requires that "Any person who owns, …controls, operates or maintains any *occupied* [emphasis added] dwelling or …structure in, upon, or adjoining any … brush-covered land, …or any land that is covered with flammable material, which …is within a very high fire hazard severity zone designated by a local agency pursuant to Section 51179, shall at all times …(1) Maintain around and adjacent to the …structure a firebreak made by removing and clearing away, for a distance of not less than 30 feet on each side…, all flammable vegetation or other combustible growth. (2) Maintain around and adjacent to the occupied …structure additional fire protection or firebreaks made by removing all brush, flammable vegetation, or combustible growth that is located from 30 feet to 100 feet from the occupied …structure…, as may be required by the local agency if the local agency finds that, because of extra hazardous conditions, a firebreak of only 30 feet…is not sufficient to provide reasonable fire safety. Grass and other vegetation located more than 30 feet from the …structure and less than 18 inches in height above the ground may be maintained where necessary to stabilize the soil and prevent erosion."

There are exemptions, however. Section 51184, subsection (a) of the California Government Code states that Section 51182 shall not apply to any land or water area acquired or managed for one or more of the following purposes or uses:

1. Habitat for endangered or threatened species, or any species that is a candidate for listing as an endangered or threatened species by the state or federal government.
2. Lands kept in a predominantly natural state as habitat for wildlife, plant, or animal communities.
3. Open space lands that are environmentally sensitive parklands.
4. Other lands having scenic values, as declared by the local agency, or by state or federal law.

(b) This exemption applies whether the land or water areas are held in fee title or any lesser interest. This exemption applies to any public agency, any private entity that has dedicated the land or water areas to one or more of those purposes or uses, or any combination of public agencies and private entities making that dedication.

NBPL and CNM are located within the federal reservation on Point Loma, an area of exclusive federal jurisdiction, and are not subject to state law. In addition, as a unit of the National Park system, CNM meets criteria (1) through (4) above, while the Navy land within the Point Loma Ecological Reserve and some of the Navy land outside the reserve meets at least one of these criteria. Furthermore, Point Loma and the federal reservation therein have not been designated as a "very high fire hazard severity zone," and therefore are not subject to the requirements of Section 51182.

While the NPS and the Navy are not subject to the state codes identified above, these codes do provide a framework for creating survivable space. The NPS and the Navy are committed to protecting the lives of their employees, contractors and visitors and the structures in which they work and recreate. Each one owns public, administrative and historic structures around which survivable space should be maintained to ensure the safety of their employees and partners and to protect the government's investment. The NPS and the Navy are also committed to the long-term preservation of the sensitive habitats found on Point Loma within their respective jurisdictions. They are concerned about the possible effects of fuel reduction on erosion, natural processes, appearance and the further infestation of noxious weeds into native habitat.

### Strategy for Survivable Space Fuel Management Zones

- The State of California, the County of San Diego, and the City of San Diego require the management of native vegetation within a 100-foot wide fuel management zone around structures located in the wildland urban interface. Fuel models for Point Loma indicate that fuel management zones of 50 feet would adequately protect most structures from the impacts of radiant heat. For the purposes of this FMP, a fuel management zone of 50 feet should be maintained around structures that cannot afford to be lost in a wildfire. Appropriate fuel modification zones may be further refined, either expanded or reduced, following a building-by-building inventory conducted by a building assessment team, which must consider the factors listed below. The team should consist of a botanist or plant ecologist, structural engineer and fire behavior specialist. In rare instances, it may be appropriate to reduce the fuel management zone to less than 50 feet based upon one or more of the following criteria.

  --Sensitive habitat for endangered or threatened species, or any species that is a candidate for listing as an endangered or threatened species by the state or federal government.

  --The conservation or scenic value of the adjacent vegetation.

  --Whether the structure is occupied by people, or is a contributing feature to, or listed on the National Register of Historic Places.

  --Whether the structure is constructed of fire resistant materials.

  --The value of the building and its contents.

  -The structure's location with respect to burnable vegetation and the fire threat.

  Such a reduction would be based on recommendations from the building assessment team and would require the written approval of the landowner.

- Generally, fuel modification zones will include areas within 30 to 50 feet measured horizontally from the edges of structures; however, the extent to which vegetation management is needed to create survivable space is based on site-specific conditions and may not be uniform for all structures.

- In all case, vegetation management will be conducted outside the breeding season for migratory birds covered under the Migratory Bird Treaty Act, or the vegetation will be searched in advance for nests.

- Hazard reduction around all buildings should be accomplished using hand tools such as pole saws, pruning shears and weed whackers for pruning, cutting and thinning out the surrounding vegetation. Cut vegetation should be clipped into four-inch lengths and left on the site as mulch, not to exceed four inches in depth, at the discretion of the CNRSW Botanist for Navy land, and the Chief, Natural Resource Science for CNM. Some cut material may introduce invasive weeds, so may not be approved to be left on site. A combination of 30 feet of irrigated green space in developed areas or thinning (still allowing for lawn, groundcovers, bedding plants, low perennial shrubs, bulbs, and perennial grasses), pruning of the most flammable species of native vegetation, and thinning for a distance of 50 feet from the edge of all structures would adequately provide for the survivability of the structures from radiant heat. Fuel treatment does not mean that all vegetation needs to be removed within the fuel modification zone. The spacing between shrubs left behind should be about 2.5 times their height. Trees may be left if they are limbed up and the vertical distance between the nearest shrub and the lower fuel layer of the tree branches is 10 feet. Separation of tree canopies should be 10-30 feet depending on slope. Certain species should be shortened to four–six inches in height in the fuel management zone because of their flammability. These are: California sagebrush *(Artemisia californica),* buckwheat *(Eriogonum fasciculatum),* sage species *(Salvia* spp.*)* and chamise *(Adenostoma fasciculatum).*

- All exotic shrubs or trees, such as acacia and myoporum, shall be removed during fuel reduction/treatment, and weed control will be performed annually to prevent the accumulation of thatch from invasive exotic plants. Also, acacia should be removed from all locations of NBPL because it is invasive and escapes into native habitats.
- Any vegetation manipulation will occur outside the breeding season or trees will be checked for nests in advance of the work.
- Any vegetation modification around structures needs to take into consideration cultural landscape concerns and the appropriate Navy or NPS cultural resources staff should be consulted.
- The Navy should investigate the potential for removing eucalyptus (*Eucalyptus spp.*) trees where they are adjacent to burnable structures, and from the peninsula as a whole, because they are exotic as well as highly flammable. Removal of the eucalyptus trees around the barracks may require NHPA Section 106 consultation or compliance with the Navy's San Diego Metro Programmatic Agreement (Appendix D). These trees were apparently planted in the 1920s (A. Yatsko, pers. comm.) and may be considered part of the cultural landscape around the historic buildings.
- Removal of eucalyptus at Fort Rosecrans is important because these highly flammable stands of trees are adjacent to the historic wooden buildings where people live and work. In recent years, the Navy has considered replacing eucalyptus or ficus trees with heron nests at a 1:1 ratio with Torrey pines. The Navy is currently developing a Heron Management Plan which incorporates removal of nesting trees. Both eucalyptus and ficus trees have problematic characteristics in a landscape setting. However, Torrey pines are also considered a hazardous fuel due to accumulation of dead pine needles and the tree's highly flammable resin. Blowing, burning pine needles could also be a problem without solid skirting on the historic structures near certain of the eucalyptus stands. If Torrey pines were to replace the eucalyptus stands near Fort Rosecrans, they should be planted no closer than 100 feet to the wooden structures, and fallen pine needles should be removed on a regular basis.

- The Torrey pines on the west side of the Point Loma Federal Fire Station are too close to the Fire Station Engine Garage and should be removed.
- Many of the structures on Point Loma have open crawl spaces and no foundations to block embers from blowing beneath the buildings during Santa Ana wind events. There are also some buildings with broken or open windows that could provide a ready access point for wind blown embers which could ignite material inside the structure, causing the structure to burn from the inside out. The addition of skirting around the base of the historic structures that are vulnerable to entry of flying embers at their base is one way to prevent ignition of the structures. Any such installation of skirting around the barracks may require NHPA Section 106 consultation or compliance with the Navy's San Diego Metro Programmatic Agreement (Appendix D).
- Designs for any new construction should include fire-resistant materials and, at a minimum, a 50-foot fuel management area or an appropriate fuel management zone.

Map 3-3 depicts recommended treatment areas for creating survivable space around structures. Table 3-4 shows the acreages and percentages of native habitat affected by creating a survivable space of 50 feet around all above ground structures on Point Loma. Acreages are given for effects occurring within the PLECA, and across the JWFMP area more broadly. These acreages also include both a 30-foot buffer extending south from the northern fence of NBPL at the property line (this treatment area is required under existing Navy perimeter security requirements and enhances fire protection as a side-benefit), and a 10-foot buffer extending from the edge of all roads. The acreage included in Table 3-4 for fuel management along public, paved roads for up to 10 feet is much more than the actual acreage to be affected because it is expected to be needed only at small, localized sites which are not possible to quantify before a site-specific inventory. About 25 acres would need to be surveyed for this potential need, with 50-60% of these acres already classified as in a disturbed condition. Table 3-5 shows the relative impact of each of these three survivable space treatments on Point Loma, and within the PLECA specifically. Table 3-5 shows the maximum contribution of each treatment type (i.e. 50-foot buffer around buildings, 10-foot buffer around roads, and 30-foot clear zone inside NBPL's northern boundary) to the total impact for each vegetation type. The map overestimates the expected impacts due to the precautionary practices for conducting the work described above in this section.

Encroachment into native habitat can be reduced considerably by evaluating each structure individually in a building-by-building inventory, which could justify reducing some survivable space distances below 50 feet. About 45 acres, or 6% of native habitat, could be affected if a 50-foot buffer is used. Much of this area is already disturbed, and certain roads and buildings would be unaffected, and an on-the-ground survey is necessary to quantify actual impacts.

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Map 3-3. Recommended treatment areas for creating survivable space around structures.

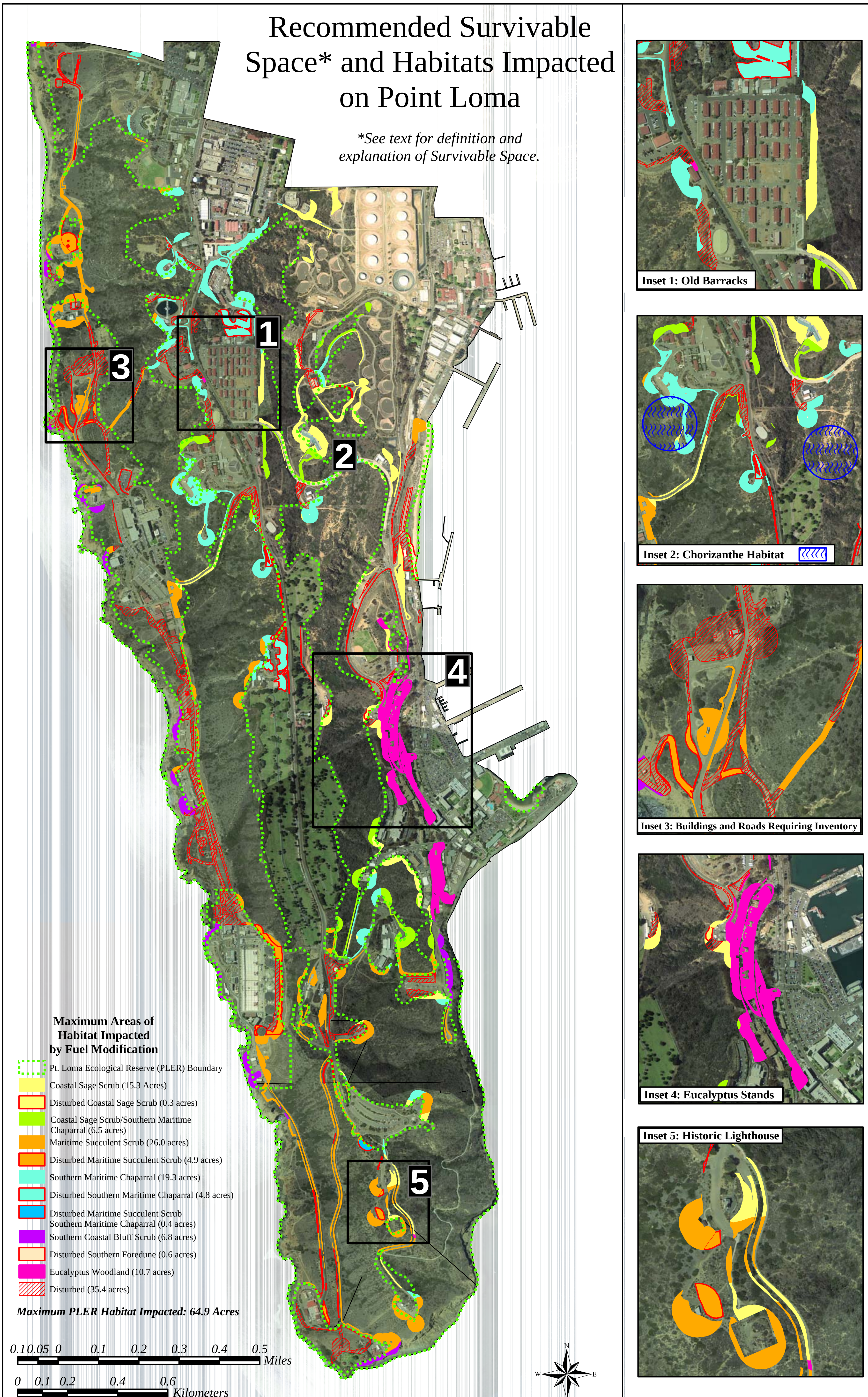

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*Table 3-4. Mapped acreages of natural vegetation impacted by creating a 50-foot survivable space buffer around all buildings on Navy and NPS properties of the Point Loma peninsula. These acreages include both the maintenance of a 30-foot buffer extending south from the northern fence of NBPL (required with existing Navy perimeter security requirements), and a 10-foot buffer extending from the edges of all roads.The 25 acres included for fuel management along public, paved roads for up to 10 feet is much more than the actual acreage to be affected because it is expected to be needed only at small, localized sites which are not possible to quantify before a site-specific inventory. About 50-60% of these acres already classified as in a disturbed condition.*

| Mapped Vegetation Type Occurring Around Structures, Along Roads, and Along Northern Property Line of Naval Base Point Loma | Maximum Acres Impacted with 50-ft Buffer | Percentage of Vegetation Type on the entire Point Loma Peninsula | Maximum Acres Impacted with 50-ft Buffer within the PLECA | Percentage of Total Vegetation Type within the PLECA |
|---|---|---|---|---|
| Coastal Sage Scrub | 8.01 | 5.8% | 2.54 | 2.4% |
| Coastal Sage Scrub- DISTURBED | 0.18 | 9.7% | 0.05 | 5.5% |
| Coastal Sage Scrub/ Southern Maritime Chaparral | 2.67 | 4.8% | 1.76 | 4.7% |
| Disturbed | 29.07 | 25.9% | 4.34 | 27.5% |
| Maritime Succulent Scrub | 16.48 | 4.6% | 8.86 | 2.8% |
| Maritime Succulent Scrub- DISTURBED | 2.86 | 14.6% | 0.73 | 6.6% |
| Maritime Succulent Scrub/Southern Maritime Chaparral- DISTURBED | 0.11 | 7.9% | 0.05 | 3.7% |
| Southern Coastal Bluff Scrub | 2.08 | 4.2% | 1.39 | 2.8% |
| Southern Foredune- DISTURBED | 0.11 | 6.7% | 0.08 | 5.0% |
| Southern Maritime Chaparral | 8.93 | 8.0% | 3.73 | 4.2% |
| Southern Maritime Chaparral- DISTURBED | 3.00 | 42.7% | 0.42 | 28.9% |
| **Total** | **73.48** | | **23.95** | |

*Table 3-5. Contribution of each treatment type to mapped acreages of natural vegetation impacted by creating survivable space composed of a 50-foot survivable space buffer around all buildings, a 10-foot buffer around all roads, and a 30-foot buffer inside the northern boundary of NBPL. These acreages were generated independently, and thus the sum of the treatments for any given vegetation community will likely exceed the on-the-ground value due to overlap.*

| Vegetation Type | Acres Impacted Due to 50-ft Buffer Around Buildings | Acres to Be Surveyed and Potentially Impacted Due to 10-ft Buffer Along Roads | Acres Impacted Due to 30-ft Buffer, Northern NBPL Boundary |
|---|---|---|---|
| Coastal Sage Scrub | 2.77 | 5.34 | 0.05 |
| Coastal Sage Scrub-DISTURBED | 0.01 | 0.17 | None |
| Coastal Sage Scrub/Southern Maritime Chaparral | 1.19 | 1.52 | None |
| Disturbed | 8.83 | 20.22 | 0.09 |
| Maritime Succulent Scrub | 5.87 | 10.18 | 0.77 |
| Maritime Succulent Scrub-DISTURBED | 1.27 | 1.81 | None |
| Maritime Succulent Scrub/Southern Maritime Chaparral-DISTURBED | 0.09 | 0.02 | None |
| Southern Coastal Bluff Scrub | 1.59 | 0.59 | 0.05 |
| Southern Foredune Total-DISTURBED | 0.11 | None | None |
| Southern Maritime Chaparral | 5.14 | 3.95 | 0.09 |
| Southern Maritime Chaparral-DISTURBED | 1.73 | 1.27 | None |
| **Grand Total** | **28.60** | **45.07** | **1.05** |

### 3.7.3.2 Eucalyptus Grove Replacement Trees

The eucalyptus trees at SUBASE have been identified as a major fire hazard for the Fort Rosecrans Historic District buildings and other structures. They should be removed and replaced with larger specimens of native species that are fire resistant and that also comply with cultural requirements under the NHPA, with Executive Order (EO) 13148 (see below), and with agreements between the Navy and USFWS under the Migratory Bird Treaty Act. There has been much discussion on the status of these trees over the past two decades because they are used by herons for nesting.

Section 207 of Executive Order (EO) 13148 requires environmentally and economically beneficial landscaping on federal properties. It states that each agency shall strive to promote the sustainable management of federal facility lands through the implementation of cost-effective, environmentally sound landscaping practices, and programs to reduce adverse impacts to the natural environment.

### Strategy for Eucalyptus Groves

- Implementing guidelines for EO 13148 require that native plants be incorporated into landscaping schemes (although the EO does not require the exclusive use of natives). For this reason, fire-resistant native species are recommended as replacements where the eucalyptus now grow. If possible, the area should be irrigated.
- Some candidate horticultural trees for replacements could be one of two native cherries, both of which are already on the species list for Point Loma: Catalina cherry *(Prunus ilicifolia* ssp. *lyonii)* (as referenced in Zedler [1995]) and hollyleaf cherry *(Prunus ilicifolia* ssp. *ilicifolia)*. These trees have been used elsewhere for stabilizing steep, erodible hillsides and require little maintenance. On poor sites, transplants can reach heights and spreads of three to five feet within 20 years. On good sites, especially in landscaped areas where the trees receive some care, growth is much faster. Due to its shiny, evergreen leaves and profusion of feathery blooms, hollyleaf cherry is sometimes cultivated as an ornamental hedge.
- Another candidate, fire-resistant shrub for replacing the eucalyptus is the evergreen spiny redberry *(Rhamnus crocea),* which is also useful for erosion control. However it only grows to one meter tall on the coast, and about six feet across. Since the berries are preferred by a variety of bird species, spiny redberry is also a good selection for wildlife. It has low water requirements. Other native trees that are fire resistant that could be planted when replacement needs occur include native oaks, sycamores, cottonwoods, willows, and alders. Sycamores, cottonwoods, alders, and probably willows are not native to Point Loma.
- The CNRSW Botanist should be consulted about other candidates for replacing these trees. The concern about nesting herons should be addressed also through CNRSW. Either a decision could be made that it is inappropriate to support heron nesting at this location and an alternate site for nesting may be found, or trees may be selected that are compatible with future nesting. A Heron Management Plan is currently being developed.

## 3.7.3.3 Building With Fire Resistant Materials

Special fire protection features are necessary for all structures occupied by people in a fire-prone environment. These recommendations comply with the National Fire Protection Association (NFPA) standards and the Uniform Building Code (UBC). While not required of federal agencies, these standards were developed based on actual losses and are reasonable to implement.

### Strategy for Building With Fire Resistant Materials

The following fire construction and design features will enhance protection for all occupied structures in brush covered areas, and are recommended on existing buildings after a building-by-building assessment. All new construction should comply with these measures.

- A building-by-building survey and assessment should be conducted to determine the need and priority for building retrofits and economic fixes to existing problems, balanced against the recommended width of the fuel management zone in conservation areas. A qualified fire behavior officer, a structural engineer, and a botanist should conduct this inventory.
- One-hour rated constructed eaves should be on all structures located within two hundred (200) feet of wildland areas. The entire structure perimeter will comply.
- All exterior walls should be protected with two-inch nominal solid blocking between rafters at all roof overhangs, behind the exterior wall covering.
- No attic ventilation openings or ventilation louvers should be permitted in soffits (the undersides of structural components), in eave overhangs, between rafters at eaves, or in other overhanging areas.
- Attic or foundation ventilation louvers or ventilation openings in vertical walls should not exceed 144 square inches per opening and will be covered with ¼-inch mesh corrosion-resistant metal screen or other approved material that offers equivalent protection. Attic ventilation will also comply with the requirements of the UBC. Ventilation louvers and openings may be incorporated as part of access assemblies.
- All projections (exterior balconies, decks, patio covers, unenclosed roofs and floors, and similar architectural appendages and projections) should be of non-combustible construction, one-hour fire resistive construction on the underside, or heavy timber construction. When such appendages and projections are attached to exterior fire-resistive walls, they will be constructed to maintain the fire-resistive integrity of the wall.
- All glass or other transparent, translucent or opaque glazing materials, including skylights, should be constructed of tempered glass or multi-layered glazed panels. No skylights will be allowed on the roof assembly facing hazardous vegetation. Vinyl window assemblies are deemed acceptable if the windows have the following characteristics

  -Frame and sash are comprised of vinyl material with welded corners.

  -Metal reinforcements in the interlock area.

  -Glazed with insulating glass, annealed or tempered.

  -Frame and sash profiles are certified in AAMA Lineal Certification Program.

  -Certified and labelled to ANSI/AAMA/NWWDA 101/LS2-97 for Structural Requirements.
- Any chimney, flue or stovepipe should have an approved spark arrester. An approved spark arrester is defined as a device constructed of nonflammable

materials, 12 gauge minimum thickness, or other material found satisfactory by the Fire Department, and having 1/2 inch perforations for arresting burning carbon or sparks and installed to be visible for the purposes of inspection and maintenance.

- All structures 3,000 square feet or larger should have sprinkler systems installed, and the Interior Sprinkler System will meet NFPA 13d.
- Protective skirting should be installed around structures that have raised foundations to prevent embers from blowing underneath the structure and causing ignitions (See photos 19, 21, 25 in Appendix B).
- Historic structures may only be retrofitted after consultation with the Architectural Historian at CNRSW for NBPL, and after section 106 consultation.

### 3.7.3.4 Roadside Management

In keeping with the decision framework for fuel management in a wildland-urban interface and a conservation area, a key is to maximize the likelihood that fires do not start under conditions where they cannot be controlled, and that any fire starts will most likely stop within pre-established, easily defended borders. On Point Loma, this means using the existing road system to maximum effect. In a conservation area, the effect of roadside fuel management activities should be balanced against the need to protect habitat, and the risk that a wildfire will eliminate all the habitat on the Point in a single event.

A roadside buffer area is needed for road maintenance as well as fire management, since most fires start along roads. The roadside thinning is also necessary from a public safety standpoint during evacuation. Chances of achieving fire suppression are increased with a fuel modification zone along roads, since flame lengths will be shorter there. Also, a palette of low-stature, fire-resistant native plants that could be managed along road margins would allow roads to function better as firebreaks and would benefit roadside as well as survivable space management.

#### Strategy for Roadside Management

- Each road should be evaluated on a case-by-case basis for fuel management distances, conservation concerns, erosion concerns, the risk of ignitions in that location, hazardous fuel condition, nearby structures, and the effectiveness the road could serve in stopping a fire. The emphasis during this evaluation will be on roads used by the public since they are the most heavily traveled and the most likely to be the location of incidental ignitions.
- *Thinning for New and Existing Roadways.* The area on each side of the improved width of roads should comply with the requirements of a fuel modification zone. The minimum dimensions of the fuel modification zone recommended by the County of San Diego are indicated in Table 3-6. Federal property managers are not required to comply with county regulations, and the Navy or NPS land manager has the latitude to manipulate vegetation within a narrower zone if this meets program objectives for the specific road. These dimensions may be reduced as long as access for firefighting vehicles is not impaired and there is no unacceptable risk to public safety. For the purposes of impact calculations, this Plan assumes that a 10-foot fuel modification zone along certain roads on Navy and NPS lands would be sufficient;

however, as stated previously, all roads should be evaluated on a case-by-case basis to determine appropriate distances within which vegetation should be managed.

*Table 3-6. San Diego County guidelines for vegetation modification distances for roads in the wildland-urban interface.*

| Road Width | Fuel modification Zone Distance From Each Side of Roadway |
|---|---|
| 16 ft | 20 ft |
| 24 ft | 16 ft |
| 28 ft | 12 ft |
| 32 ft | 10 ft |

- Roadsides should be planted to low-growing, native, fire resistant plants to reduce the need for annual maintenance and the risk of spreading exotic weeds. Perennial grasses stay green most of the year, for example, and will keep flame lengths low. Succulents are naturally fire resistant. Since example plantings of such native, fire-resistant plantings in natural environments are lacking, and there is concern about fostering the spread of exotic species and the cost of annual weed abatement, we recommend a demonstration project be implemented on both Navy and NPS lands, as well as evaluating the impacts of similar vegetation modification along fencelines, before undertaking a new maintenance program for all roads.

#### 3.7.3.5 Annual Maintenance and Compliance Inspection

**Strategy for Annual Maintenance and Compliance Inspection**

- Annual maintenance of fuel modification zones along roads and around buildings will be completed by June of each year.

## 3.8 Fire Reporting, Monitoring, Evaluation, and Research

### 3.8.1 Fire Reporting

**Strategy for Fire Reporting**

- Utilizing new data and information and adjusting management in response is key to adaptive fire management. Wildfire reporting and record keeping is an important step of this process. The FFD should maintain records of all fires of any size, including: severity, intensity, mapped extent, size, point of origin, time of start, time of containment, ignition source, vegetation communities involved, fire weather, and fire behavior.These reports should be provided to all parties at the Annual Preparedness Meeting. The NPS also files reports for all fires occurring on its lands.

### 3.8.2 Live Fuel Moisture Monitoring

The moisture content of living fuels plays a significant role in fire initiation and spread in these fuels; however, we presently cannot model plant moisture content using actual Point Loma data. Using live fuel moisture data from elsewhere in San Diego County will over-predict fire behavior on Point Loma. We can, however, monitor live fuel moisture content, associate it with observed fire behavior or compare it to elsewhere in the county, and develop prescribed fire management guidelines specific to Point Loma. Among wildland fire practitioners, fuel moisture is almost exclusively measured on a dry weight basis. The dry weight measurement is preferred because it only responds to changes in the amount of water present in the fuel and not the fuel physiology (Pyne *et al*. 1996). The difference between the oven-dried weight and the pre-oven weight is expressed as a percentage. Fluctuations in live fuel moisture are a function of the amount of water available to the plant as well as its geographical location within the plant community. Unlike dead fuel moisture, the fluctuation in live fuel moisture is a seasonal phenomenon. Consequently, live fuel moisture measurements will be more influenced by long-term environmental conditions than dead fuel moisture.

How to sample for live fuel moisture is described in the 1979 Countryman and Dean publication “Measuring Moisture Content in Living Chaparral: A Field User's Manual.”

### Strategy for Live Fuel Moisture Monitoring

- We recommend that CNM staff regularly chart live-fuel moisture in the key fuel species chamise, since this species is often used in fuel moisture measurements elsewhere. California sagebrush *(Artemisia californica)* could also be measured as a representative of the coastal sage scrub community rather than chaparral. These data can then be shared with NBPL through the PLECA Working Group. This would also support fire weather prediction, since the start and end of fire season should be declared when live woody fuel moisture reaches 200%. There may be years when vegetation on Point Loma never dries to EXTREME fire danger levels when the rest of the county does. By way of an agreement with the Cleveland National Forest, the collected samples can be taken to the joint CNF-California Department of Forestry Emergency Communications Center for processing where fuel samples are oven-dried and live fuel moisture is recorded. In the long run, it maybe possible to index local readings to fire danger predictions at inland locations. However, the coastal location of Point Loma is so very different from these inland sites, that it is important to spend some years developing a local readings for comparison.
- Some guidelines for establishing live fuel moisture plots are as follows:

  -*Site Selection.* Countryman and Dean make the following observations about selecting sampling sites and sample size: 1) Climatic variation, including microclimates, is the primary parameter to consider in setting the boundaries of sampling areas, and 2) The sampling location chosen should be large enough so that the sampling itself does not adversely affect the shrubs due to repeated sampling, yet small enough that microclimate does not change within the sampling area. We suggest a sampling area not larger than 2500 $m^2$ (0.25 hectares ~ 0.6 acres), and a sample size of at least two plants in a sampling area.

  -Given manpower constraints, we recommend monitoring live fuel moisture at four sites at CNM, revisiting each site once per month.

  -*Site Characterization.* Prior to the onset of data collection, initial site characterization measurements will be made. Each site characterization should enumerate the slope, aspect, approximate shrub size, cover, density, and distribution of shrub species. In addition, photographs and GPS measurements should also be taken at each site for future reference. Sites will be marked with inconspicuous flagging and rebar to signal the approximate boundaries of the sampling locations.

-*Species Selection.* A species that draws down fuel moisture quickly in the summer and is common to other locations should be selected, so that data may be shared. For example, the USFS uses chamise on the Angeles National Forest, as does the County of Los Angeles. Purple sage *(Salvia* sp.*),* black sage *(Salvia mellifera),* California sagebrush, manzanita *(Arctostaphylos* sp.*),* and hoary-leaf ceanothus *(Ceanothus crassifolius)* are used at other sites in southern California, but not nearly to the extent as chamise. We recommend both chamise and California sagebrush at Point Loma to support regional comparisons.

-*Field Techniques.* After an area has been selected and flagged for sampling, field personnel will simply browse in a pseudo-random fashion through the sampling area clipping branchwood with foliage from new growth and old growth on the shrub species being sampled. Branchwood sampled should be no larger than 1/8 inch in diameter. Field personnel should contact the lab prior to collection to confirm that processing can occur that day, and to inform the staff that the samples will be arriving within a certain period of time. Since the fuel moisture is expected to vary vertically, most of the samples should be taken from the upper limbs of each shrub. Care should be taken so that no more than two new-growth and two old-growth clippings are taken from any single shrub. In addition, sample material should be loosely arranged within the container, compressing the sample will bias the results. Old growth and new growth are readily apparent to the naked eye, but field personnel will be trained to distinguish the two during a "sampling orientation." Current protocols make no distinction between the fuel moisture in the foliage and in the twigs, only between new and old growth; however, variability of the foliage measurements is expected to be much higher in foliage than in branchwood. Consequently, crews should separate the foliage from the branchwood for both the old and new growth.

-The foliage and branchwood from the old and new growth should be placed in four separate sampling containers. Each container should have already been weighed in the lab to the nearest 0.1 g. Polypropylene sampling bottles rated up to at least 130 degrees C should be used for storing and weighing the samples. The use of these bottles is recommended in place of traditional paint cans because of their improved seal. Label each bottle individually, making sure to label both the bottle and its associated cap. Countryman and Dean recommend weighing three old growth and new growth samples, each containing at least 25 to 35 grams of sample dry. Since the mass of the sample dry is only known after the experiment, this roughly translates into approximately 3/4 of a one quart paint can during the middle summer months.

-Altogether 12 samples should be taken at each site: three old-growth foliage; three old-growth branchwood; three new-growth foliage; three new-growth branchwood. After the samples have been collected, crews should place them in an ice chest for transport to the laboratory. The ice chest should be kept cool enough to keep the samples from physiologically decomposing, approximately 15 degrees C, but not so cold such that the sample is damaged by freezer burn.

- Countryman and Dean (1979) recommend that all samples be weighed and placed in the drying oven within two to three hours of collection. In addition, all samples should be collected between 11:00 AM and 3:00 PM in the spring and 11:00 AM and 2:00 PM in the fall. Do not collect any samples if the shrubs are wet from rain, dew, or fog. Prior to departure from the site record the following observations: (a) wet and dry bulb temperature from a sling psychrometer; (b) percent cloud cover; and (c) condition of the fuels (a descriptive list should be provided enumerating available choices).
- *Laboratory Technique.* The following section is adapted from Countryman and Dean (1979). Upon arrival at the laboratory, weigh and record each collection bottle to the nearest 0.1g making sure that there is no accumulated dirt on the exterior of the bottle during weighing. Unscrew the bottle cap and place only the bottle inside of the mechanical drying oven. The caps can be set aside. As mentioned above, the oven should be preheated for at least one hour to between 103 degrees C and 105 degrees C prior to inserting the samples. The samples should be allowed to dry for at least 15 hours prior to removal from the oven. Upon removal from the oven, seal the bottles immediately to prevent them from absorbing the moisture present in the laboratory. Re-weighing of the dried samples can only occur after the cans have sufficiently cooled in order to prevent additional error. Weigh and record the sampling bottle to the nearest 0.1g after cooling.
- *Logistic Arrangements.* CNM will need 24 bottles (12 bottles/site and two sites/day). Sampling teams of two people may work best. A sampling day, covering two sites, should only require 1.5 hours (20–30 minutes to collect samples from each site, the remaining time for lab work and transit time). Each group will also be responsible for returning to the lab the following day to remove the samples from the oven and re-weigh them.

### 3.8.3 Fire Effects Monitoring and Evaluation

Goal 11is to refine management practices by improving knowledge and understanding of fire through research and monitoring. Research and monitoring supports the adaptive management process (see Section 4.2.1). Point Loma has a low natural lightning ignition rate and is relatively unusual in southern California because the majority of the land has been fire-free for most of the 20th century. There are very few data on the effects of fire in some of the more uncommon vegetation types that occur on the peninsula. Monitoring provides basic information on the effects of fire and fire management actions, and provides the foundation of future planning decisions. The primary purposes of fire monitoring are:

- to ensure that any fire management activities proposed and implemented are meeting management objectives;

- to provide guidance to the fire protection agencies;
- to help protect neighboring properties; and
- to ensure that the NBPL and CNM collect at least the minimum information necessary to evaluate this fire management program (USDI NPS Fire Monitoring Handbook [FMH] 2001) including the environmental effects of fuels management.

The benefits of establishing standardized data collection procedures in a fire monitoring program include detecting trends, identifying future research needs, and facilitating information exchange between resource protection staff and fire suppression agencies. The fire-monitoring Inventory and Monitoring standards and protocols will be in accordance with the FMH as previously cited. Database standards will be consistent with the NPS Fire Ecology Assessment Tools (FEAT) as they apply to the needs of the CNM and NBPL.

### Fire Effects Monitoring Responsibility

Point Reyes National Seashore is the host park for the Fire Effects Monitoring Crew associated with SMMNRA, and therefore CNM. Fire effects monitoring is funded through the National Fire Office and does not impact CNM from a financial standpoint. The crew visits the CNM to read established plots on a schedule defined in the Fire Monitoring Handbook. This schedule requires the plots to be monitored one, two, five and ten years after an experimental prescribed fire treatment. The Fire Ecologist at SMMNRA is the point-of-contact for the crew and maintains the data associated with these monitoring plots.

For the Navy, the responsibility for monitoring decisions lies with the Botanist for Commander Navy Region Southwest. For CNM, monitoring decisions will be made jointly by the Chief Scientist, CNM, and both the Fire Ecologist and Fire Management Officer from the Coast Mediterranean Network SMMNRA. These persons will decided what level of post-burn monitoring effort will be implemented.

### Post-Burn Checklist and Critique Format

A post-burn checklist and critique format is presented in Section XVII of the Burn Plan in Appendix F. It is the minimum post-burn monitoring and evaluation requirement.

### Strategy for Fire Effects Monitoring and Evaluation

Consistent with the FMH, four levels of monitoring are identified using a tiered or modular framework, in order to be flexible with available budgets. Each of the four monitoring levels builds on the one below it. For example, *Level IV* monitoring assumes that each level below it is implemented. The approach laid out below also implements the basic framework of fitting a monitoring program to a goal, then conceptual model, then mechanisms or actions. At all levels, the sampling frequency should be decided by CNM or the Navy based on the rate of change of the variable of interest, management objectives, risk assessments, and resource constraints.

The methods proposed incorporate those used for fire monitoring by the NPS such that data can be compared to those collected on their public lands. They also incorporate at certain Levels the use of descriptive relevés for vegetation consistent with the California Native Plant Society's methods for describing California vegetation such that the Navy and NPS can support the statewide effort to improve vegetation mapping.

*Level I:* Ambient environmental baseline conditions and presence/absence lists, organized different ways related to how the conceptual models predict community and habitat values.

*Level II:* Monitoring of vegetation and short-term fire recovery using stratified random approach, primarily for trend rather than statistical description of attributes and variables. Not as statistically robust as higher levels. Try to identify a reference site with little to no fire history or one with lots of fire history. Still mostly habitat-based, using cover and frequency as primary metrics.

*Level III:* Monitoring of short-term change in populations, recruitment, or habitat conditions for covered or management focus species, with effort to get at abundance trends to a defined statistical certainty. Abundance- and trend-focused rather than presence/absence. Adds density as a metric in plant communities to get better information on rare plants and recruitment/mortality. Adds a metric for monitoring landscape mosaics.

*Level IV:* Monitoring long-term change by adding *repeated* measures to those at lower levels. Adds a definition of minimum detectable change. Adds other environmental attributes and species groups, spatial studies, and objective-based monitoring for prescribed burns–did we achieve prescribed burn objectives?

Details on this monitoring is described in Appendix G.

### Special Monitoring Needs for Point Loma

Not all of the following recommendations can be funded by NPS or Navy programs; however, cooperators should seek implementation of the following specific monitoring needs:

- Gain as much information as possible from experimental burning of 900-$m^2$ plots. Conduct an exhaustive above-ground survey prior to burn and monitor regrowth. Survey the control site and burned plots for plant and seed bank response. Take photos each year from an established photo point. Develop a specific experimental protocol which details questions to be addressed, data to be collected, data analysis (including a power analysis). A different number or size of experimental burn plots may be needed to maximize the efficiency of the experiment to answer key questions.
- Proper implementation of this JWFMP requires that NBPL and CNM be able to study fire effects on the local plant communities from unpredictable fire events on an opportunistic basis. Existing Inventory and Monitoring plots may be adapted for this purpose. CNM should address how to fund emergency-type projects that will occur after the beginning of the fiscal year and will need to be carried out for a five-year time horizon beyond the first funding year.

- The NPS and Navy should be prepared to monitor any sensitive plant populations that experience wildfire in order to develop basic information on fire effects in these species. Basic information on species response to fire should be collected through literature review and field observation and shared through the PLECA Working Group. Fire response information should be incorporated into the sensitive species database as part of the Navy's and NPS's individual inventory and monitoring programs.
- Monitor reproduction and extent of boxthorn (*Lycium californicum*) as a key species, and one that may be affected by an altered fire regime.
- Map weed species locations and abundance every two to three years. Develop an Invasive Weed Management Plan that considers whether fire promotes weed spread. The invasive weed plan should: analyze the driving factors behind exotic species establishment and spread, identify the manageable dimensions of the problem, and prescribe actions for containment and control. Monitor for weeds post-fire and take advantage of any opportunities for weed control actions.
- NBPL should begin and CNM should continue collecting seed from mature plants to use in restoration of degraded areas if necessary. Currently, there are no other sources of locally native seed to use for restoration activities.
- Conduct effects monitoring of fuel hazard reduction for survivable space and roadsides that focuses on invasive weeds, erosion and loss of habitat. Include both short term and long term monitoring objectives for fire and non-fire applications, including stabilizing and preventing further degradation of natural and cultural resources lost in and/or damaged by impacts of fire management activities, and any issues or concerns identified in related NEPA documents.

### 3.8.4 Fire Effects Research

The primary objective of fire research for the JWFMP is to provide information for making fire management decisions (consistent with RM-18, Chapter 15). Research plays a critical role in fire management programs by identifying area-specific fire regimes; determining whether human activity has affected native ecosystems; developing techniques for predicting fire behavior; documenting and analyzing fire effects, and other topics as needed. Research may also provide the framework needed to justify maintaining historic scenes, investigate techniques to create these scenes, and determine the impacts of fire control actions and management on cultural and natural resources.

Research serves to define the natural and aboriginal role of fire for use in formulating and implementing such fire use actions as prescribed fire, suppression strategies and tactics, hazard fuel abatement, and prevention measures (RM 18, Chapter 15). As this JWFMP is implemented and tested, additional research will inevitably be identified for such purposes as refining prescriptions, improving the understanding of fire behavior and fire effects, developing monitoring protocols, defining fire return cycles, describing fuels dynamics, describing the impacts on cultural and natural resources, threatened and endangered habitat areas, etc. as well as other information needed for operational fire and resource management.

The fire research program can also help identify the most effective strategies for wildland fire management so that threats to life, property and park resources are reduced at the urban interface; to assess how variation in the fire regime is likely to affect the future trajectory of community structure and composition; to examine the effect of long fire-free intervals on the biological diversity of the flora, especially that portion of the flora considered to be uncommon or rare; and to evaluate fire as a restoration technique. Prescribed fire is expected to be used only for small experimental test burns during the five year period of this plan. Any future use of prescribed fire is expected to be primarily for restoration of a natural ecosystem process.

### Strategy for Fire-Related Research

- Conduct research and monitoring to guide fire management, improve the scientific soundness of decisions, and the future adaptive management of fire. This will be done through the Annual Review and Update meeting and JWFMP 5-year update process by regularly refining the conceptual models presented in Chapter 2 of the JWFMP, screening requests to conduct research on lands involved in the JWFMP by their ability to support refined conceptual models and management decisions, publicly announcing areas of interest to researchers, developing synopses of research interests, and requesting funds to conduct research as appropriate.
- Determine gap abundance and distribution within the shrub canopy as a first step to understanding the dynamics and needs of species that require habitats that are rich in resources (such as light and nutrients) but without strong interspecific competition.
- Investigate invertebrate dependencies on post-fire herbs and short-lived shrubs. Little is known about the symbiotic relationships between invertebrates, their host plants, and their general life histories on Point Loma. Is the lack of herbaceous species affecting this faunal group? This type of research is especially relevant for management considering the potential presence of species such as the endemic Jerusalem cricket (*Stenopelmatus fuscus*) on the Point Loma Peninsula.
- Develop projects related to using invertebrates and lichens as bioindicators of ecosystem health and of fire history. Both of these groups have potential to act as important biomonitors for a variety of environmental assessments. Invertebrates, because they are predominately short-lived, have the potential to respond quickly to changes in environmental conditions. Invertebrates have been used extensively in water quality monitoring. Lichens, on the other hand, can be long-lived in the absence of disturbance. Thus the presence of lichens in a particular area can signal relative habitat stability. However, lichens are particularly susceptible to changes in air quality, and can provide efficient and low-cost indices of airborne pollution levels.
- Determine whether cliff spurge (*Euphorbia misera*) is reproducing, by determining age classes present. The abundance of cliff spurge on Point Loma is significant in that these individuals represent the northerly mainland distribution edge of this species and one of the few populations in the United States.

Assess how fire would affect the demography and population structure of this species.

- Determine the effect of the long fire-free period on community structure and demography of fire-dependent species such as *Ceanothus verrucosus* and *Ceanothus tomentosus.* Determine whether obligate seeders have sufficient presence in the seedbank to regenerate the stand after a fire.
- Use ecological modeling and decision theory to evaluate the risks and benefits from alternative management options.
- Develop the concept of resilience monitoring of species and communities into more a focused research program through the use of management focus species and other means.

## 3.9 Public Safety

An essential element in addressing wildland-urban interface issues is determining what the hazards to humans, homes and the surrounding natural and cultural resources are and where they are located, as has been done in Chapter 2. An indispensable part of reducing these risks is to have homeowners and residents assume personal responsibility for their properties, and have people working on the peninsula aware of their influence and the impacts their actions can have.

### Strategy for Public Safety Education

- NPS and NBPL staff should participate with the City of San Diego to provide education and assistance for fire-safe planning of nearby homes.
- Evacuation plans should be developed collaboratively by the NPS, Navy, Coast Guard, Department of Veterans Affairs, and Metropolitan Wastewater Department, City of San Diego, and reviewed annually by cooperating fire agencies for Point Loma at the Annual Preparedness Meeting.

## 3.10 Public Education, Information, and Interpretation

The goal of public education with respect to wildland fire is to implement communication and education programs that reduce wildland fire risks and hazards to people, homes and resources, enhance understanding of the fire management mission, and foster informed participation in fire management activities for both internal and external audiences. For the Navy, the Public Affairs Officer for CNRSW would have responsibility for this work. In the National Park Service, the SMMNRA Fire Information Officer would handle this effort.

### Strategy for Public Education, Information, and Interpretation

- For the planned experimental burns, the public information officers should provide a minimum of 48-hour notice to residents adjacent to experimental prescribed burn areas, and notify all who might view smoke on Point Loma through news organizations.

- NBPL and CNM should, at a minimum, post signs asking visitors to prevent all fires. Visitor entry points should disseminate a brief fire prevention message.
- An educational program should be conducted among all Navy and NPS personnel assigned to Point Loma that emphasizes:

  -Prevention and safe response to fire are of paramount importance. This should include information about any evacuation plans for Point Loma communities. Trailhead brochures on fire safety should be a NPS project.

  -Information on fire-safe construction should be disseminated to NAVFAC Southwest (since they normally handle military construction) and to Navy Public Works officers. Explore grants for fire-safe construction.

  -Interpretive programs on fire ecology should be developed on Cabrillo National Monument. The NPS should build a public information program for park visitors around Southern California fire ecology and the concept that the Point Loma landscape is unique with an unusually long period without fire which has interesting biological consequences. The NPS mission at CNM is to perpetuate examples of vegetation conditions that existed prior to European settlement.

  -Employee and neighborhood community education about the scope and effect of wildland fire management, including fuels management, resource protection, prevention, hazard/risk assessment, mitigation and rehabilitation, and fire's role in ecosystem management by cooperating with the Division of Interpretation to develop fire education and interpretation programs.
- The NPS Fire Information Officer and the NBPL Public Affairs Office should develop "step up” public information activities and capabilities in response to escalating fire danger, fire activity, and/or public and media scrutiny. They should provide or recommend development of a list of key agency, interagency, state, and congressional delegation contacts for inclusion in each Wildland Fire Implementation Plan at the Stage III level.

## 3.11 Protection of Sensitive Resources

### 3.11.1 Cultural Resources

Cultural resource protection should be integrated into the strategic planning of all fire suppression operations. Given the nature of the fuels and small size of the property, resource damage will be most easily avoided before a fire ever starts. The ability to be proactive once ignition occurs is greatly reduced and damage will inevitably occur. Since the use of bulldozers to create fire lines during suppression is not anticipated, impacts to cultural resources may be due to water drops, to the fire itself, looting, or erosion.

Cultural resource areas of concerns are defined on the map in Appendix D, which shows areas to avoid ground disturbance during suppression, or that require consultation with cultural resources staff for pre-suppression actions. This map is not to be provided to the public because it depicts the locations of protected resources; however, it will be provided to the FFD and City of San Diego Fire Department.

### Strategy for Protecting Cultural Resources

- Through the use of the Incident Command System and at the Annual Preparedness Meeting (see Section 3.5.6), the cultural resources map (Appendix D) will be reviewed by both NPS and CNRSW staff. Fire personnel will receive a cultural resource protection briefing from the cultural staff of each landowner. Periodic field visits to familiarize fire personnel with sensitive resources should be considered as part of the Annual Preparedness Meeting.
- Fuel modification to create survivable space is called for in some areas on Point Loma on areas mapped as archaeological sites. A review of these sites by CNRSW and funded for 2004 may result in boundary adjustments or even removal of some sites from protected status. Regardless, all planned fuel modification projects on U.S. Navy or CNM lands that fall within areas currently defined as an archaeological site (Appendix D) will first undergo review by the appropriate agency's cultural resource specialist. Additionally, a NPS cultural resource specialist should approve the location and practices associated with experimental burn plots in advance of the burns.
- In the preservation of historic structures and museum and library collections, every attempt will be made to comply with national building and fire codes. When these cannot be met without significantly impairing a structure's integrity and character, change in the management and use of the structure should be considered to minimize potential hazards, rather than modify the structure itself.
- When warranted by the significance of a historic structure or a museum or collection, adequate fire detection, warning, and suppression systems will be installed. Pre-fire plans will be developed for historic structures and buildings housing museum or library collections designed to identify the floor plan, utilities, hazards, and areas and objects requiring special protection. This information will be kept current and made available to FFD and SDFD personnel.
- For NBPL, compliance with section 106 of the National Historic Preservation Act (16 U.S.C. 470s) will be governed by Stipulation 10.D. of the CNRSW San Diego Metro Programmatic Agreement, executed February 23, 2003 (provided in Appendix D). Removal of the eucalyptus trees and the installation of skirting around the barracks may require NHPA Section 106 consultation or compliance with the Navy's San Diego Metro Programmatic Agreement. Proposals to reduce the threat of fire by clearing vegetation away from historic buildings, or other modifications to the buildings must be reviewed by the CNRSW Cultural Resources Office (CRO) for their potential to adversely affect, either directly or indirectly, character-defining elements of an eligible property. If the proposals are determined to be adverse, then additional consultation with the California State Historic Preservation Officer and other interested parties must be completed by the CRO before work can begin.

- Unoccupied historic buildings on NBPL will not receive special treatment during fire suppression.
- Due to the nature of fire suppression and the need to protect life and property, it may not always be possible to avoid the location of sensitive cultural resources. An affected area should be examined by a qualified archaeologist as soon as possible to determine if any cultural resources were impacted; Advisory Council on Historic Preservation (Council), SHPO, and tribal consultation may be required if resources are impacted. All post-fire rehabilitation activity that occurs in areas mapped with cultural resources will also be cleared by the appropriate landowner's cultural resource staff.

### 3.11.2 Sensitive and Other Natural Resources

Chapter 2 describes the natural resources requiring special treatment or consideration in fire planning and project implementation. The primary actions proposed to prevent or mitigate negative impacts to these resources and to achieve the goal and objectives of this Fire Plan are to provide better assurance of the availability of a suppression helicopter, and to conduct experimental burns in order to understand better how to plan for resource protection and sustainability.

#### Strategy for Protecting Sensitive Natural Resources

- Over the long term, restore the above- and below-ground plant and animal communities to a condition such that the species diversity and density of a reference condition (as this can be surmised based on long-term monitoring plots and historic data) are self-sustaining.
- Provide a long enough inter-fire period, at least 40 years, for fire-dependent species to establish sufficient seedbank to replace their populations when a burn occurs.
- Ensure that lichens and other species that depend upon older stands have refugia for recolonization after disturbance such as fire. An approach can be developed after identifying the specific location of these species.
- Soil erosion due to fire will not exceed the rate of soil formation, about one ton per acre per year, as measured using the Revised Universal Soil Loss Equation.
- Sedimentation due to fire will not affect water quality of surrounding ocean and bay waters.
- Existing roads and trails will be used for fire lines rather than introducing new ones.
- To mitigate potential weed invasion as a result of survivable space fuel treatments, all fuel modification zones should be monitored for the presence of serious invasive plant species, and these plants eradicated as part of a weed abatement plan. Species known to be aggressive invaders of wildland areas, such as acacia, are recommended for control as part of the mechanical fuel treatment activity.
- To avoid unnecessary vegetation removal and species changes that degrade habitat without increasing fire safety or reducing fire ignitions, a building-by-building inventory is recommended for structures within 100 feet of wildland

areas. To minimize fuel modification zones, the Navy and NPS and other agencies should work together to identify the amount of fuel modification required to protect structures from radiative heat loss or from loss due to direct flame impingement.

- While not directly affecting federal properties, the Navy and NPS should cooperate with the City of San Diego to improve outreach to inform residents about appropriate fuel modification techniques. This includes the importance of using native species; limiting non-natives that increase fuel load; preserving slope vegetation; and appropriate structure siting to limit the size of the necessary fuel modification zone.
- The Navy and NPS and other agencies will cooperate in all activities that promote fire prevention in order to reduce fire frequency.
- Research is recommended on the role and significance of the current long fire-free intervals in conservation planning.
- Fire management approaches or activities that could exacerbate habitat fragmentation are avoided by only conducting fuels management activities on habitat boundaries, so contiguous, large blocks of natural habitat remain intact. Fire prevention and suppression techniques are used to reduce the probability of large-scale, catastrophic wildfires in natural areas.
- Inadequate data are available to evaluate impacts due to the combined effect of fire exclusion and the isolation of Point Loma habitats. This is ameliorated by recommending experimental burns and supporting research projects.
- The potential impact of weed spread by hazard reduction projects along roads and around structures is mitigated by evaluating fenceline and roadside vegetation management projects for effectiveness, eliminating invasive species as part of vegetation cutting, pruning, or thinning, planting replacement native species, recommendation against grubbing of native plants, and providing annual weed abatement.
- Impacts from wildfire suppression that could damage or destroy sensitive species or habitat are mitigated by pre-fire Incident Command consultation. Sensitive habitat locations (such as the location of Orcutt's spineflower) will be identified annually and provided to the FFD and SDFD as a location to be avoided, especially for ground disturbance, to the maximum extent feasible. Since fire spread is expected to be rapid, the Navy and NPS can only provide pre-fire biological and cultural resource consultation to the Incident Command System to make recommendations to minimize impacts to any sensitive species potentially affected by fire control operations.
- The NPS and Navy should be prepared to monitor any sensitive plant populations that experience wildfire in order to develop basic information on fire effects in these species. Basic information on species response to fire should be collected through literature review and field observation and shared through the PLECA Working Group. Fire response information should be incorporated into the sensitive species database as part of the Navy's and NPS' individual inventory and monitoring programs.

- Potential impacts to geology and soils are reduced by improved wildfire suppression to keep wildfires small; reduced fuel modification requirements through a building-by-building inventory; recommendation for improved siting of structures away from habitat edges; avoiding fire line construction during suppression; the small size of experimental prescribed fires; and use of existing roads and trails for fuelbreaks. The Fire Plan objective for controlling soil erosion due to wildfire or fire management actions is that erosion will not exceed the rate of soil formation, and sedimentation due to fire or fire management actions will not affect water quality of surrounding ocean and bay waters. If any of these occurs, then action will be taken to prevent further damage.
- Potential impacts to health and safety of firefighters and others are prevented by improving wildfire suppression; implementing policies that identify firefighter safety as a first priority during incidents; providing adequate survivable space as a highest priority for community safety; developing and communicating evacuation plans; and improving coordinated education and notification procedures. For smoke issues, the minimum 48-hour notice provision to residents and compliance with burn days avoids smoke impacts. Burn days are selected for their ability to transport smoke to upper elevations and lessen the impacts to the local populations. Smoke sensitive areas are also identified in advance, and burn plans will be developed to carry smoke away from smoke sensitive areas.
- To protect health and safety and avoid impacts to native habitats, appropriate land use planning that limits new structures in areas that lack safe ingress and egress due to mid-slope road location, length of access road, or heavy fuel load is recommended.
- Potential impact to scenic resources is avoided by planning experimental burns outside of high use periods at CNM such as holiday weekends. Air quality sensitivity indicators will be monitored, such as visibility and lichens, to establish baseline conditions. Designing and implementing management activities to meet or exceed adopted scenic resources objectives of NPS. No distinct edge between treated and untreated areas will be evident so the burn will not be easily distinguishable from a distance.
- Potential impact to recreation is prevented by avoiding the introduction of new fire lines that could cause a proliferation of trails. The important role of fire is explained by an emphasis on environmental interpretation of fire ecology, including at experimental prescribed fire sites to show the ecological effects of fire.
- Improved coordination of fuels management will improve the effectiveness of fire suppression activities involving Navy and NPS lands. Through better coordinated efforts, fuels management activities can occur across jurisdictional boundaries, increasing the overall effectiveness of both suppression and fuels treatments.

## 3.11.3 Short and Long-term Rehabilitation Guidelines and Procedures

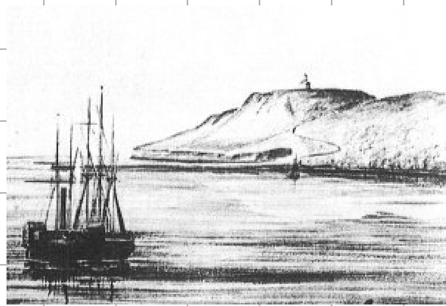
Post-fire rehabilitation would be initiated through the Burned Area Emergency Response (BAER) funding request process to mitigate a broad range of threats to natural and cultural resources critical to NBPL and CNM mission and resource protection mandates. See RM18, Chapter 12 for guidelines to implement BAER. Interdisciplinary, cooperative teams are formed from federal agencies to assess damage caused by the fire and to implement a rehabilitation plan that will provide erosion control to prevent loss of life and property and reduce natural resource damage.

### Strategy for Short and Long-term Rehabilitation

- The post-fire BAER team would consider the possibility of sedimentation of sensitive waters and how to protect them. The Fire Plan objective is that sedimentation will not affect water quality of surrounding ocean and bay waters. If the potential for this occurs, then action will be taken to prevent damage.
- Stabilizing and protecting archeological sites may be an important aspect of a BAER plan. See the latest BAER guidance in Department of Interior Manual 620DM3.
- Mechanical means will be used to control short-term erosion. This could include mulching, jute matting, wattling, culvert clearing, installation of debris racks in channels, or temporary water diversion structures.
- Revegetate disturbed areas consistent with long-term goals for the site.
- Erosion control through seeding will not be conducted as a general practice, but only with proper justification in a written rehabilitation plan that contains success criteria. Seeding after fires in southern California is generally not considered effective for erosion control and can be detrimental to native plant community development (Conard *et al.* 1995). Natural regeneration will be the primary approach for revegetation of natural areas post-burn. No short-term erosion control will be implemented using non-native seed, or other actions that may inhibit natural regeneration. Ryegrass will not be used for post-fire seeding. Ryegrass is a non-native which has been shown to persist for years in the restored environment. In addition, research has shown that ryegrass provides no more erosion control benefit than native species within the first year after a fire (Beyers *et al.* 1994).
- Formulate a post burn weed eradication plan that can be implemented after wildfires to prevent major infestations and establishment of noxious weeds. The plan would be simple and focus on exotics present at Point Loma at the time it is prepared or updated. The plan should estimate costs in terms of supplies and labor hours/acre so that the cost estimate can be rapidly updated. (This is key because after a fire there is often so much to do that preparing a proposal for funding might not get done quickly enough so that weeds are controlled in a timely manner.)
- Areas of concentrated fire suppression activity should be rehabilitated immediately after fires and prior to the subsequent rainy season. Only seed from Point Loma should be used. No outside commercially-available seed should be imported and used for rehabilitation. NBPL and CNM should collect seed from mature plants to use in revegetation of disturbed areas. There are no

commercial sources of locally native seed to use. As a last resort, commercially available native seed from elsewhere in San Diego County might be used, but only under very special circumstances with the approval of the CNRSW Botanist or the CNM Chief Scientist.

- Mulch as necessary to hold soil, prevent weed establishment, and provide for the establishment of native seed. Apply only carefully selected mulch material. Most mulches generated by chipping of landscape waste are unacceptable because they introduce invasive exotic plants to wildland areas.
- If any post-burn rehabilitation work is completed, it should be completed following procedures described in Level I monitoring in Appendix H "Fire Monitoring and Evaluation Protocols."





# 4.0 Planning and Implementation

Continuing to follow the decision framework for fire planning as presented at the beginning of Chapter 3, the fire management approach proposed in this Plan is relatively simple and based on the assumption that wildland areas on Point Loma are expected to eventually burn in a wildfire, and that one realistic scenario when this happens is that the entire peninsula could burn in less than one hour. In order to protect human life, facilities, and natural and cultural resources from detrimental impacts of a wildland fire, certain fire management actions are necessary in this wildland-urban interface. The fire management actions are selected so that the agency missions, security and safety requirements, and conservation goals of both the U.S. Navy and NPS may be achieved.

With proper planning, the Navy and NPS can avoid spending when resources are not threatened and help focus suppression and pre-suppression efforts where they are needed most. In the past, many federal properties such as military bases and small national parks and monuments had no fire management plans. During years of high nationwide fire activity, critical resources could be stretched too thin to provide assistance in all areas where they were needed. In order to protect lives, property, and to efficiently allocate fire fighting resources, especially during periods of high fire activity, the 1995 National Fire Plan mandated that all federal properties have a fire plan.

Proper planning also provides for pre-suppression work, such as fuel treatment and building with fire resistant materials, in order to reduce suppression costs and avoid losses due to fire. An appropriate suppression response will match potential resource damage. Most experienced wildland firefighters can speak of instances when hundreds of thousands of dollars have been spent on suppression decisions that in retrospect would not have been made had there been a wildland fire plan and sufficient knowledge of the values at risk in place.

Implementing this Fire Plan depends upon the availability of funds. The federal Anti-Deficiency Act provides that no federal official or employee may obligate the government for the expenditure of funds before funds have been authorized and appropriated by Congress for that purpose.

# 4.1 Fire Management Responsibilities

## 4.1.1 Responsibilities

The Superintendent has the overall responsibility for the execution of the fire management program at CNM. For the Navy, the Commanding Officer of NBPL has this responsibility. Responsibility for fire suppression lies with FFD and its cooperators through mutual aid agreements. Federal Fire reports to the NBPL Commanding Officer for all fires on Navy property, and to the NPS Superintendent at CNM for all wildland fires in NPS jurisdiction. Fire management organization and responsibilities will remain as stated in Section 1.9, and can be identified as follows:

- *Fire Analysis/Fire Management Team.* The Fire Management Team, as assigned by the Superintendent of CNM and the Commanding Officer of NBPL, should meet annually for the Annual Preparedness Meeting to discuss areas of responsibility, review and update the FMP, and to discuss/evaluate fire management capabilities and review and, if necessary, revise agreements.
- *Fire Management Analysis Committee.* This post-fire review team is assembled immediately after a wildland fire, and may or may not be comprised of the same people as on the above Fire Management Team (which assesses annual preparedness and long-range planning). It will consist of the following:

  -FFD-Chair

  -Superintendent, CNM

  -Chief, Natural Resource Science (NRS), CNM

  -Chief Resource Management & Visitor Protection (RM&VP), CNM

  -Fire Management Officer, SMMNRA

  -Fire Ecologist, SMMNRA

  -CNRSW Natural Resources Botanist and Cultural Resources representative
- *NBPL Commanding Officer and CNM Superintendent.* These people will:

  -Certify annually that Point Loma is in a state of preparedness for suppression of wildland fires. Signatures are required. Direction for this annual review can be found in NPS Director's Order 18, Chapter 4. The CNM Superintendent under certain conditions may delegate this responsibility to another organizational level.

  -Approve the Fire Management Plan and any proposed revisions.

  -Be apprised of the daily fire situation during fire season.

  -Be the sole authority to approve any prescribed burn plans on NPBL or CNM property, respectively.

  -Provide direction to the Type I or Type II Incident Commanders, or designate a representative to do so.
- *Deputy or Acting Superintendent.* The Deputy or Acting Superintendent is delegated all decision making responsibility when the Superintendent is absent from CNM. Similarly, the CO of NBPL will be represented by his designee.

- *Chief Resource Management & Visitor Protection and CNRSW Natural Resources Program Director.* These people will:

  -Carry out fire activities called for in this plan.

  -Manage wildland fire plan implementation, review, and revision.

  -Approve filling vacant fire management staff positions (this may be handled at the SMMNRA level).

  -Make at least an annual inspection, with the FMO, of fire suppression, detection, dispatch, and training facilities and procedures (this may be handled at the SMMNRA level).

  -Direct the CNM fire suppression and preparedness program.

  -Evaluate prescribed fire prescriptions.

- *NPS Fire Management Officer, CNRSW Botanist or FFD Wildland Fire Management Officer.* These people:

  -Have immediate responsibility for overseeing all aspects of the fire management program.

  -Translate science and research to policy and fire management practices.

  -Develop short and long-range plans for Navy and CNM wildland fire management programs.

  -Establish liaison with cooperating agencies, and coordinate and maintains cooperative agreements.

  -Prepare, and/or revise annually, cooperative agreements concerning wildfire management, prescribed fire, smoke management, and cross-agency fiscal matters.

  -Formulate and direct the budget accountability program for preparedness, hazard fuels operations, emergency fire accounts and approve any FirePro or other fire-related expenditures.

  -Respond to regional and national office information requests.

  -Maintain fire weather/fire records and FirePro data, if applicable.

  -Coordinate CNM-wide and NBPL-wide fire training and equipment acquisition.

  -Maintain crew lists and equipment records.

  -Maintain Weather Information Management System (WIMS) and NPS's Shared Applications Computer Systems (SACS) data input.

  -Coordinate annual review of this plan.

  -NPS FMO and FFD Wildland Fire Management Officer advise the Emergency Operations Center Manager on fire dispatch and reporting responsibilities.

  -NPS FMO and FFD Wildland Fire Management Officer perform administrative duties, i.e. approving work hours, completing fire reports for command period, maintaining property accountability, providing or obtaining medical treatment and evaluating performance of subordinates.

-NPS FMO and FFD Wildland Fire Management Officer ensure fire reports (DI-1202) are properly prepared and submitted to the Pacific West Regional Office and/or entered into SACS.

-NPS FMO and FFD Wildland Fire Management Officer maintain qualification and training records.

- *Chief, Natural Resource Science CNM, Fire Ecologist SMMNRA, CNRSW Wildlife Biologist, CNRSW Botanist, and CNRSW Cultural Resource Specialist*. These people will provide scientific expertise, technical advice, and review regarding:

-Ecological effects of fire and fire suppression activities.

-Effects of fire and suppression activities on natural resources.

-Distribution of vegetation, fuels, and natural and cultural resources, including sensitive resources.

-Geographic information system (GIS) databases and analysis options.

-Park and resource management alternatives related to fire.

-Resource, Fire Management, and site-specific burn plans.

- The *CNRSW Cultural Resources Office and NPS cultural staff* have the following responsibilities:

-All planned fuel modification projects on U.S. Navy lands that fall within areas currently defined as an archaeological site (Appendix D) will first undergo review by the CNRSW Cultural Resources Office. Additionally, a cultural resource specialist should approve the location and practices associated with experimental burn plots in advance of the burns.

-Any area burned in a wildfire should be examined by a qualified archaeologist as soon as possible to determine if any cultural resources were impacted. All post-fire rehabilitation activity that occurs in areas mapped with cultural resources will also be cleared by the appropriate landowner's cultural resource staff.

-Ensure compliance with Stipulation 10D of the CNRSW San Diego Metro Programmatic Agreement (provided in Appendix D). Removal of the eucalyptus trees and the installation of skirting around the barracks may require NHPA Section 106 consultation or compliance with the Navy's San Diego Metro Programmatic Agreement.

- The *Public Affairs/Information Officers* of both the Navy and NPS will coordinate notification about any fire or smoke conditions and provide information about potential health impacts, after consultation with the Burn Boss and FMO. The Public Affairs or Information Officers would advise the media and answer phone calls regarding experimental burns or wildfires.
- The *Fire Management Officer* will advise the Superintendent, who has the option to close the park area or have the local rangers advise visitors to leave areas impacted by fire or unhealthful smoke.

### 4.1.2 Interagency Coordination

Two JWFMP goals relate to interagency partnerships. Goal 10 is to effectively integrate the fire management program into all agency activities and operations. Goal 11 is to foster and maintain interagency fire management partnerships and contribute to the firefighting effort at the local, state, and national level. These goals show a commitment to interfacing with other agency operations in so much as they have the potential to affect fire management activities and vice versa. For example, setting desired future conditions and planning weed control programs with the fire program can be important. Developing memorandum of understanding and enhanced mutual aid agreements are important steps to cooperative firefighting on a regional basis.

- Interagency coordination will take place functionally through the Annual Preparedness Meeting, the joint annual certification process described above, with other matters addressed through the PLER Working Group. An expanded PLER MOU would be a useful mechanism for providing coordination, communication, and joint funding opportunities for fire management on Point Loma. Minutes of the Annual Preparedness Meeting should be provided to the PLER Working Group.
- At a minimum, interagency coordination should include NBPL FFD, CNRSW natural resources staff, CNM, SMMNRA, the NASNI meteorological unit, City of San Diego, and USFS Cleveland National Forest.
- The other federal property owners on Point Loma should be asked to participate in and sign this Fire Plan through the PLER. This Plan provides compliance with federal fire policy, and a fire management plan is required for all federal landowners with wildland vegetation.

### 4.1.3 Agreements

Section 1.9.1 describes current agreements and cooperators with respect to fire management for Point Loma. In addition, this Fire Plan recommends an additional agreement be established between NPS, NBPL, FFD, and either the City of San Diego or COMHELWINGRES HC-85. NBPL and CNM should seek improved assurances of access to nearby helicopter suppression assets with the City of San Diego or HC-85 through this agreement (see Section 3.5). A new agreement is needed between FFD and NPS so that resources can be shared for prescribed fire as well as for a wildfire (see Section 3.5). This agreement would be similar to the agreement that the Cleveland National Forest has with Federal Fire and separately with NPS. It will be necessary for NPS staff to determine what master agreement to use for negotiating the local agreement. A separate agreement is recommended between NBPL, CNM, and the NASNI meteorological unit for fire danger prediction (see Section 3.5.1).

## 4.2 Fire Critiques and Annual Plan Review

Any fire event on Point Loma will be critiqued for what worked and what did not work, starting with the fire report and the initial attack through work-up and final control. All agreements must be reviewed after a fire to determine their effectiveness in providing resources, paying for services, replacement of equipment expanded, etc. The fire event will be reviewed again at the Annual Preparedness Meeting. See Section 3.5.6 about the Annual Preparedness Meeting and what should be covered at that time.

### 4.2.1 Updating the Plan

Adaptive management is not trial and error. It is a committed process of evaluating objectives and actions, in part to ensure that too much money is not spent. Intended to be a starting point for adaptive decision-making, this Fire Plan will require revision to remain current and relevant. Its loose-leaf format provides for updates as frequently as needed. Updating would be appropriate, for example, when results of monitoring efforts reveal new insights and indicate a change in strategy.

The U.S. Navy has an obligation to review, and as appropriate, update in annual increments on a five-year basis as part of the INRMP. The NPS by policy is required to do an annual review of the fire management program and plan. The highest standards of professional and technical expertise in planning and safely implementing an effective wildland fire management program is supported through implementing annual program reviews. This review should explicitly support integration of fire management with all other aspects of CNM and NBPL management. It is at this time that fire planning should be coordinated with each agency's strategic plans. This would be CNM's General Management Plan and Resource Management Plan, and the Navy's Integrated Natural Resource Management Plan.

While the Annual Preparedness Meeting described in Section 3.5.6 is designed to prepare protection measures for each fire season, a broader adaptive management review is also necessary. An Annual JWFMP Review and Update meeting will be held to coordinate this review. Similarly to and along with minutes of the Annual Preparedness Meeting, minutes to Annual Fire Plan Review and Update meeting will be placed in Appendix G of this Plan, and should be provided to the PLER Working Group.

- The necessary attendees at this meeting would be at least the following:

| National Park Service | U.S. Navy |
|---|---|
| Superintendent, CNM | Director, Environmental Operations, Environmental Department, CNRSW |
| Chief, Natural Resource Science, CNM | Fire Chief, Federal Fire Department, CNRSW |
| Chief, Resource Management & Visitor Protection, NPS Cabrillo National Monument | Botanist, CNRSW |
| Fire Management Officer, NPS Coast Mediterranean Network, SMMNRA | Wildlife Biologist, CNRSW |
| Fire Information Officer, NPS Coast Mediterranean Network, SMMNRA | Cultural Resources Program Manager, CNRSW Environmental Department |
| Fire Ecologist, NPS Coast Mediterranean Network, SMMNRA | Regional Architectural Historian, Environmental Department, Operations Division Natural and Cultural Resources Office, CNRSW |
| | Tactical Planner, Public Works Center, CNRSW |

- The subject matter to be covered in the Annual Fire Plan Review and Update meeting should include:

  -Results of the Annual Preparedness Meeting

  -An update of new findings of cultural resources, sensitive species and habitat locations and a means to provide these on GIS maps and distribute.

  -Report on any ignitions and a map of all fires, including burn size and burning intensities across each burn as determined from extent of vegetation and litter removal.

  -New fire frequency, year-of-last-fire maps if fires occurred. Number of fires and acres consumed in areas that had a previous fire within the past five years.

  -Experimental fire acreages and reports of results.

  -New fire risks or protection requirements such as new facilities.

  -New Biological Opinions, MOUs, or other policy adoptions.

  -New resources or equipment acquired by the Fire Department.

  -Prescribed or experimental burns for the upcoming year.

  -Any new scientific findings, or new management approaches, or results of monitoring which reveal new insights and indicate a change in strategy should be reported. Management success criteria will be adjusted based on past accomplishments, new risks and hazards, new biological information, and changes in policy. The conceptual models described in Section 2.0 for plant communities, and plant and wildlife response to fire, describe what is understood about the relationship between community stress, functional state, and management actions. They depict what is understood about how fire interacts with this landscape and what assumptions we are working with (the conceptual or threat models), and how monitoring is connected to the JWFMP. Any management or monitoring action should be tied to these models and the objectives that flow from them. These conceptual models should be updated and management or monitoring actions related to them adjusted as new information emerges. In this way, the management and sampling program incorporates an adaptive management element. Management decision are explicit when tied to these models, and thus a feedback loop to management can function.

  -Fire weather for the past year in relation to weather cycles, both short- and long-term.

## 4.3 Implementation Procedures

### 4.3.1 Funding Codes and Cost Accounting

As a non-FirePro funded Park, Cabrillo National Monument has no allocated preparedness dollars related to fire that a larger park would have, such as operating program accounts or project work accounts, permanent staffing, training, monitoring, and accountable equipment purchases. FirePro are intended to be spent on the minimum acceptable standards which each park fire management program should achieve. Without direct funding through FirePro, the Park must subsidize any preparedness activities, such as training and acquisition of personal protective equipment, from regularly-allocated NPS funding sources. As adequate FirePro funds are not appropriated, CNM would need to supplement fire management with other funding to achieve minimum fire management capability. Table 4-1 shows funding codes for the standard NPS fire management work elements.

*Table 4-1. Standard NPS Fire Management Project Work Elements (PWE).*

| NPS Project Work Element Code | Work Element |
|---|---|
| P11 | Fire Suppression Preparedness |
| P13 | Fire Research |
| H11 | Hazardous Fuels Program management |
| H12 | Hazardous Fuels Prescribed Fire Treatments |
| H13 | Hazardous Fuels Planning and Administration |
| H14 | Hazardous Fuels Monitoring |
| W11 | Wildland -Urban Interface Program management |
| W12 | Wildland -Urban Interface Prescribed Fire treatment |
| W13 | Wildland -Urban Interface Planning and Administration |
| W14 | Wildland Urban Interface Monitoring |
| W22 | Wildland Urban Interface Mechanical Treatments |
| E11 | Emergency Fire Suppression |

Project-specific hazardous fuels treatment or wildland-urban interface funds may be requested through the Pacific West Region utilizing the National Fire Program Operating and Reporting System (NFPORS). Requests for project funding are entered into NFPORS by the network FMO for consideration by the Regional Fuels Specialist. Approved projects will be funded at the park level with accomplishment reporting managed by the cluster FMO. Project specific accounts are required to for all hazardous fuels or wildland-urban interface fuels treatment projects. The Navy can also request W-UI related funds for hazardous fuels management.

Emergency fire suppression money is available to the park for all wildland fires that burn federal lands or which are deemed a threat to federal lands. The Regional Fire Program Assistant will establish the emergency account for the park, based upon a request from the network FMO. The Angeles National Forest's Emergency Operations Center will pull a "firecode" to be used as part of the account number for the fire. Emergency suppression funds are limited in application to firefighting activities and activities directly related to fire suppression rehabilitation.

The Superintendent through the network FMO is responsible for cost accounting for all fire management related funding. Records concerning the use of fire management funds will be maintained by the network FMO, who is also responsible for monitoring the status of funds for all non-emergency fire accounts used at Cabrillo National Monument. The FMO will provide the Superintendent a quarterly status-of-funds for non-emergency accounts and will coordinate with the Regional Fire Fiscal Control Specialist on all funding issues.

## 4.3.2 Implementing Mechanical Fuels Reduction

### Strategy for Implementing Mechanical Fuels Reduction

- Prepare an annual planned project list for fuel treatment. Survivable space projects can be funded through federal Wildland-Urban Interface funding mechanisms.
- CNRSW and NPS should jointly develop a format for critiques of mechanical treatment projects.
- Describe reporting and documentation requirements for fuel treatment. Provide a consistent means of cost accounting for fuel treatments.

## 4.3.3 Funding for Experimental Prescribed Burns, Monitoring, and Research

### Strategy for Funding Experimental Prescribed Burns, Monitoring, and Research

- Funding opportunities should be sought for conducting experimental prescribed burns, as well as research and monitoring support which could be available through the Navy agricultural program and normal natural resource operations budgeting. For the NPS, funds are obtainable from the NPS fire program, recreational fees, natural resource funds, and visitor entrance funds. The SMMNRA FMO should lead procurement of funds for NPS. For CNRSW, the Natural Resources Program Director should provide the lead.

## 4.3.4 Task or Project Summary and Priorities

Table 4-2 is a summary of the key tasks and projects of this Fire Plan which could require new funding or a realignment of existing funds. The tasks and projects were weighted based on the Priorities and Guiding Principles of federal fire policy as described in Table 1-5. Each is assigned a priority ranking from 1 (highest meaning necessary due to human safety or legal compliance concerns) to 3 (necessary for better fire or land management).

*Table 4-2. Task or Project Recommendations Summary. Each is assigned a priority ranking from 1 (highest meaning necessary due to human safety or legal compliance concerns) to 3 (necessary for better fire or land management).*

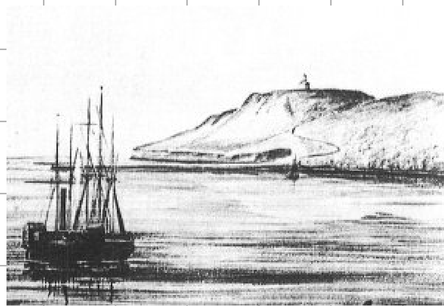
| Priority | Section | Recommendation |
|---|---|---|
| 2 | 3.5 | NBPL and CNM should seek improved assurances of access to nearby helicopter suppression assets with the City of San Diego or the Navy's reserve helicopter wing (COMHELWINGRES HC-85). |
| 2 | 3.5 | A new agreement is needed between FFD and NPS so that resources can be shared for prescribed fire as well as for a wildfire. This agreement would be similar to the agreement that the Cleveland National Forest has with Federal Fire Department and separately with NPS. |
| 2 | 3.5.1 | A new agreement among NPS, NBPL, and the NASNI meteorological unit should provide access to the RAWS data from the NASNI meteorological unit in order to refine a Fire Danger Rating System. |
| 3 | 3.7.1 | To support fire weather prediction, CNM staff should chart live fuel moisture levels in key fuel species. The start and end of fire season should be declared when live fuel moisture reaches or drops below ~ 120%. |
| 1 | 3.5.3 | Fire extinguishers should be mounted on Navy and NPS buildings, and these should be maintained and tested annually. Navy and NPS vehicles on Point Loma should be equipped with gloves, a shovel, and a pulaski. |
| 1 | 3.5.6 | On a regular basis, FFD should inspect burning permits, industrial operations, powerlines, and occupied structures for survivable space standards. Annual pre-season maintenance checks should be scheduled for all fire-fighting vehicles, pumps, hoses. |
| 3 | 3.6 | Experimental burns should be implemented on NPS lands. Based on the results, the Navy may elect to conduct additional burns on its land at some future date. Location of the burns would be decided jointly by FFD and CNM. Staffing for the experimental prescribed burns would be supplied by Federal Fire or the NPS or both. Develop a specific protocol for the burn study prior to implementing it. |

*Table 4-2. Task or Project Recommendations Summary. (Continued) Each is assigned a priority ranking from 1 (highest meaning necessary due to human safety or legal compliance concerns) to 3 (necessary for better fire or land management).*

| Priority | Section | Recommendation |
|---|---|---|
| 1 | 3.7.3.1 | Protect structures through fire-safe building construction and survivable space around each structure. A fuel management zone of at least 50 feet should be maintained around all structures that cannot afford to be lost in a wildfire. Determination of actual fuel management distances will be made after risk is assessed on a case-by-case basis. A building-by-building survey and assessment should be conducted to determine the need and priority for building retrofits and economic fixes to existing problems, balanced against the recommended width of the fuel management zone in conservation areas. Encroachment into sensitive native habitats can be reduced by a building-by-building inventory where it is determined that the fire threat does not require 100-ft modification. Prepare an annual planned project list for fuel treatment. CNRSW and NPS should jointly develop a format for critiques of mechanical treatment projects. Provide a consistent means of cost accounting for fuel treatments. Develop a monitoring plan to assess impacts to natural and cultural resources. |
| 1 | 3.7.3.1 & 3.7.3.2 | Develop tree removal/replacement plan for fire safety.The Navy should investigate the potential for removing eucalyptus trees where they are adjacent to burnable structures, especially adjacent to the Fort Rosecrans historic buildings. The Torrey pines on the west side of the Point Loma Federal Fire Station should be removed. |
| 2 | 3.7.3.3 | Building retrofits should be considered in lieu of survivable space. For example, the addition of skirting around the base of the NBPL historic structures that are vulnerable to entry of flying embers at their base would prevent ignition of the structures. Any such installation of skirting around the barracks may require NHPA Section 106 consultation or compliance with the Navy's San Diego Metro Programmatic Agreement. |
| 2 | 3.7.3.4 | Implement fuel modification zones along certain public roads. Each public road should be evaluated on a case-by-case basis for fuel management distances, conservation concerns, the risk of ignitions in that location, hazardous fuel condition, nearby structures, and the effectiveness the road could serve in stopping a fire. The minimum dimensions of the fuel modification zone should be as required by Table 3-6. Exceptions are upon approval by the Fire Authority Having Jurisdiction (FFD or the Structural Fire Officer in the NPS Pacific Regional Office). Roadsides should be planted to low-growing, native, fire resistant plants that are endemic to that type of habitat to reduce the need for annual maintenance and the risk of spreading exotic weeds. A demonstration project should be implemented on both Navy and NPS lands before undertaking a new maintenance program for all roads. Develop annual weed abatement plan for fuel modification zones, to be completed by June of each year. |
| 3 | 3.8.1 | The FFD should maintain records of all fires of any size, including: severity, intensity, mapped extent, size, point of origin, time of start, time of containment, and ignition source. |
| 3 | 3.5.6 | The FFD, Navy, and NPS should continue annual training to maintain the highest standards of professional and technical expertise in planning and safely implementing an effective wildland fire management program. |
| 3 | 3.8.3 | To guide adaptive decision-making, continue to evaluate and refine the decision models for fire and natural resource management. Support other studies as described in Section 3.8.3. Refine ways of considering multiple classes of organisms and disturbance processes at a hierarchy of nested ecological scales to estimate the risks and benefits of likely disturbance and management scenarios. Implement long term vegetation monitoring on NBPL lands. The NPS and Navy should be prepared to monitor any sensitive plant populations that experience wildfire in order to develop basic information on fire effects in these species. NBPL and CNM should collect seed from mature plants to use in revegetation of disturbed areas if necessary. |
| 1 | 3.11.3 | Formulate a post burn weed eradication plan that can be implemented after wildfires to prevent major infestations and establishment of noxious weeds, including a timeline. Map weed locations, species, and abundance every two to three years. Develop an Invasive Weed Management Plan that considers whether fire might be a disturbance factor that could promote weed spread. |
| 2 | 3.8.3 | Conduct effects monitoring for fuel hazard reduction for survivable space and roadsides that focuses on invasive weeds, erosion, and habitat loss. |
| 1 | 3.5.6 | Conduct an Annual Preparedness Meeting to include: review of evacuation plans; brief fire personnel on revisions to natural or cultural resources sensitive areas; add an addendum to the Fire Plan on implementation of the NFDRS and fire weather data; evaluate each and every suppression tactic during planning sessions to see that they meet the PLER objectives and Minimum Impact Suppression guidelines; review evacuation plans, mutual aid and other written agreements. |
| 3 | 3.5.6 | A Department of Navy Wildland Fire Coordinating Group should convene annually to ensure everything possible is being done through agreements to share wildland and prescribed fire personnel, equipment and specialized skills, establish Standard Operating Procedures when sharing these resources, and to conduct joint wildland and prescribed fire training exercises. |
| 2 | 3.10 | The Navy and NPS should, at a minimum, post signs asking visitors to prevent all fires. NPS visitor entry points should disseminate a brief fire prevention message. Fire prevention education should be provided to anyone working in or adjacent to the wildland environment, such as construction crews that operate during the fire season. |
| 3 | 3.10 | The public affairs or information officers should develop fire program-related information activities and capabilities in response to escalating fire danger, fire activity, and/or public and media scrutiny. |

*Table 4-2. Task or Project Recommendations Summary. (Continued) Each is assigned a priority ranking from 1 (highest meaning necessary due to human safety or legal compliance concerns) to 3 (necessary for better fire or land management).*

| Priority | Section | Recommendation |
|---|---|---|
| 2 | 3.11.1 | Unoccupied historic buildings on NBPL will not receive special treatment during fire suppression. When warranted by the significance of a historic structure or a museum or collection, adequate fire detection, warning, and suppression systems will be installed. Every attempt will be made to comply with national building and fire codes. When these cannot be met without significantly impairing a structure's integrity and character, a change in the management and use of the structure should be considered to minimize potential hazards, rather than modify the structure itself. |
| 1 | 3.5.6 & 3.11.2 | Designs for any new construction will include fire-resistant materials and the 50-foot fuel management area. NBPL and CNM should limit siting of new structures to areas with safe ingress and egress. In areas with heavy fuel load, avoid mid-slope road locations, and long lengths of access. New structures should not be located so close to habitat areas that regular thinning of native vegetation is necessary to reduce fire threat, or appropriate fire-safe construction will be mandated. |





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http://www.firesafe.com/firescape.html

# Appendices

# Appendix A: Acronyms

## *Acronyms*

| Acronym | Description |
|---|---|
| ACOS | Assistant Chief of Staff |
| ALS | Advanced Life Support |
| ARPA | Archeological Resources Protection Act |
| ASW | Anti-Submarine Warfare Base |
| AVIRIS | Airborne Visible/Infrared Imaging Spectrometer |
| BAER | Burned Area Emergency Response |
| BI | Burning Index |
| BLM | Bureau of Land Management |
| btu | British thermal unit |
| CAA | Clean Air Act |
| CARB | California Air Resources Board |
| CDF | California Department of Forestry |
| CDFG | California Department of Fish and Game |
| CFR | Code of Federal Regulations |
| CH | Change |
| CNF | Cleveland National Forest |
| CNI | Commander Navy Installations |
| CNM | Cabrillo National Monument |
| CNO | Chief of Naval Operations |
| CNPS | California Native Plant Society |
| CNRSW | Commander Navy Region Southwest |
| CO | Commanding Officer |
| COMHELWINGRES | Commander, Helicopter Wing Reserve |
| COMPACFLT | Commander, U.S. Pacific Fleet |
| CSIRO | Commonwealth Scientific and Industrial Research Organization |
| CWA | Clean Water Act |
| DO | Director’s Order |
| DOA | Department of Agriculture |
| DOD | Department of Defense |
| DOI | Department of the Interior |
| DODINST | Department of Defense Instruction |
| DON | Department of the Navy |
| DVA | Department of Veterans Affairs |
| EA | Environmental Assessment |
| EEZ | Exclusive Economic Zone |
| EFH | Essential Fish Habitat |
| EIR | Environmental Impact Report |
| EMI | Electromagnetic Interference |
| EO | Executive Order |
| EPA | Environmental Protection Agency |
| ESA | Endangered Species Act |

## *Acronyms (Continued)*

| Acronym | Description |
|---|---|
| ESQD | Explosive Safety Quantity Distance |
| F&ES | Fire and Emergency Services |
| FCTCPAC | Fleet Combat Training Center, Pacific |
| FDRS | Fire Danger Rating System |
| FEAT | NPS Fire Ecology Assessment Tools |
| FFD | Federal Fire Department |
| FFM | Fine Fuel Moisture |
| FISC | Fleet Industrial Supply Center |
| FITCPAC | Fleet Industrial Training Center Pacific |
| FM | Fire Model |
| FMH | NPS Fire Monitoring Handbook |
| FMEI | Fire Management Effectiveness Index |
| FMO | Fire Management Officer |
| FMP | Fire Management Plan |
| FMU | Fire Management Unit |
| GIS | Geographical Information System |
| GMP | General Management Plan |
| GS | Government Service |
| HEM | Habitat Evaluation Model |
| ICRMP | Integrated Cultural Resource Management Plan |
| INRMP | Integrated Natural Resource Management Plan |
| INST | Instruction |
| IA | Interagency Agreement |
| JHA | Job Hazard Analysis |
| JWFMP | Joint Wildland Fire Management Plan |
| MBTA | Migratory Bird Treaty Act |
| MCAS | Marine Corps Air Station |
| MIST | Minimum Impact Suppression Tactics |
| MLLW | Mean lower low water |
| MOU | Memorandum of Understanding |
| mph | miles per hour |
| MSF | Magnetic Silencing Facility |
| MSFCMA | Magnuson-Stevens Fisheries Conservation and Management Act |
| MWWD | City of San Diego Metropolitan Wastewater Department |
| NASNI | Naval Air Station North Island |
| NFDRS | National Fire Danger Rating System |
| NAVFAC | Naval Facilities |
| NAVSTA | Naval Station Magnetic Silencing Facility |
| NBPL | Naval Base Point Loma |
| NCCOSC | Naval Command, Control and Ocean Surveillance Center |
| NEPA | National Environmental Policy Act |
| NFDRS | National Fire Danger Rating System |
| NFPA | National Fire Protection Association |

### *Acronyms (Continued)*

| Acronym | Description |
|---|---|
| NFPORS | National Fire Program Operating and Reporting System |
| NHPA | National Historic Preservation Act |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic & Atmospheric Administration |
| $NO_2$ | Nitrogen Dioxide |
| NPS | National Park Service |
| NR/CR | Natural Resources/Cultural Resources |
| NRO | Natural Resources Office |
| NRS | Natural Resource Science |
| NWCG | National Wildfire Coordinating Group |
| $O_3$ | Ozone |
| ODUSD(I&E) | Office of the Deputy Undersecretary of Defense for Installations and Environment |
| OES | Office of Emergency Services |
| OPNAVINST | Naval Operations Instruction |
| PA | Programmatic Agreement |
| PFMC | Pacific Fishery Management Council |
| PIF | Partners in Flight |
| PLER | Point Loma Ecological Reserve |
| PL | Point Loma |
| PLWTP | Point Loma Wastewater Treatment Plant |
| PWE | Project Work Elements |
| RAWS | Remote Automated Weather Station |
| RMP | Resource Management Plan |
| RM&VP | Resource Management & Visitor Protection |
| RDT & E | Research, Development, Test and Evaluation |
| SACS | Shared Applications Computer Systems |
| SAIA | Sikes Act Improvement Act |
| SDAB | San Diego Air Basin |
| SMMNRA | Santa Monica Mountains National Recreation Area |
| $SO_2$ | Sulfur Dioxide |
| SPAWARSC | Space and Naval Warfare Systems Center |
| SR-209 | State Route 209 |
| SSC | Space and Naval Warfare Systems Center, San Diego |
| SWDIV | Southwest Division |
| SUBASE | Naval Submarine Base, San Diego |
| TRANSDEC | Transducer Evaluation Center |
| UBC | Uniform Building Code |
| USCOMPAC | Commander, U.S. Pacific Command |
| USC | United States Code |
| USCG | U.S. Coast Guard |
| USDA | U.S. Department of Agriculture |
| USDI | U.S. Department of the Interior |
| USFS | U.S. Forest Service |

## *Acronyms (Continued)*

| Acronym | Description |
|---|---|
| USFSFEIS | U.S. Forest Service Fire Effects Information Systems |
| USFWS | U.S. Fish and Wildlife Service |
| VMP | Vegetation Management Plan |
| W-UI | Wildland - urban interface |
| WFIP | Wildland Fire Implementation Plan |
| WFSA | Wildland Fire Situation Analysis |
| WIMS | Weather Information Management System |

# Appendix B: Photos of Fuel Hazard Conditions

*Photo 1: Typical salt pruned stands of Artemisia and scattered lemonade berry in a light Fuel Model 6 with Astragalus in the foreground in the Western FMU.*

*Photo 2: A Navy Administrative Facility on the ridge top above the slope of the Western FMU. The predominate fuel is salt pruned Artemisia californica.*

*Photo 3: One of several antenna sites on the ridge top above the slope of the Western FMU.*

*Photo 4: Light fuel loading on the west slope below Fort Rosecrans National Cemetery in the Western FMU. The succulents in the foreground will burn under extreme burning conditions.*

*Photo 5: Looking northwest from Fort Rosecrans National Cemetery at the slope in the Western FMU. Note the influence of the prevailing wind off the ocean and the salt pruning on the existing vegetation.*

*Photo 6: The Point Loma Wastewater Treatment Plant below the slope of the Western FMU.*

*Photo 7: Another view of the west slope above the Point Loma Wastewater Treatment Plant in the Western FMU.*

*Photo 8: U.S. Coast Guard Facility on the southern tip of Point Loma. The acacia and lemonade berry growing right next to the structures will result in the total loss of the structures during a wind driven wildfire event. A minimum of 50 feet of survivable space should be maintained between the structure and the native vegetation. The acacia is an invasive exotic that spreads onto NPS lands.*

*Photo 9: A view of the Cabrillo National Monument Visitor Center located above the heavily vegetated slope in the Eastern FMU.*

*Photo 10: A close up of some of the non-native vegetation surrounding the Cabrillo National Monument Visitor Center.*

*Photo 11: An example of the clearing of flammable native vegetation from around the Cabrillo National Monument Visitor Center by NPS personnel.*

*Photo 12: Thinning has also been started around the Cabrillo National Monument Administrative Offices to provide a fuel management zone of 50 feet .*

*Photo 13: The Cabrillo National Monument Visitor Center sits on top of the peak in the background. A Santa Ana wind could drive any wildfire rapidly upslope, showering the Visitor Center with embers and radiant heat. Proper thinning within 50 feet of the Visitor Center is vital for its protection and survival.*

*Photo 14: A view of the east slope in the Eastern FMU taken from the Cabrillo National Monument Visitor Center.*

*Photo 15: A view of the Cabrillo National Monument Maintenance Facility on the ridge top above the slope in the Eastern FMU.*

*Photo 16: A close-up of the same building shown in Photo 15 with brush growing up to the structure. The radiant heat from a fire burning up slope could blow out the windows and the embers rising up the wall could ignite the overhang eave resulting in the loss of the structure.*

*Photo 17: The Federal Fire Station located just north of Fort Rosecrans National cemetery. Fire Facilities should serve as role models for proper survivable space. One pine tree is too close to the structure. The roof and rain gutter is covered with pine needles. The tree must be pruned at least 10 feet away from the structure and the pine needle litter must be cleared from around the structure. Tree branches are actually damaging the roofing material.*

*Photo 18: The combustible wood roof on the bus stop in front of the Fire Station should be replaced with a non-combustible roof covering. In a wind driven wildfire the shingles will readily ignite and blow off as flaming firebrands that will ignite combustible material and start new spot fires.*


*Photo 19: Many of the military buildings on Point Loma were set up as temporary structures. They were built on piers with no foundation. Wind blown embers can lodge beneath these structures resulting in their incineration. This building is northwest of the Fire Station (photo 17). Solid skirting should be installed on all of these structures. National Historic Preservation Act Sec. 106 compliance would be required.*

*Photo 20: This skirting will still permit the passage of wind blown embers. Also note the pine needle litter next to the structure. This structure lacks survivable space which would be very easy to achieve.*

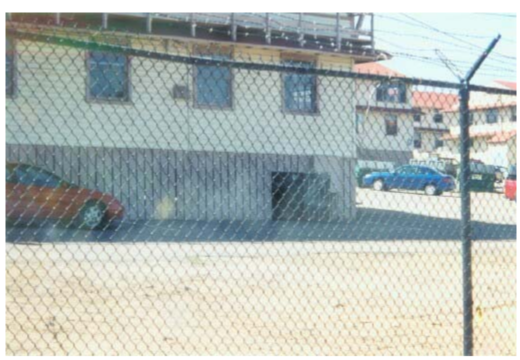

*Photo 21: All of the Historic Barracks facilities are candidates for incineration by wind blown embers getting under the structures. All of these structures lie up hill from the heavily vegetated east slope. A Santa Ana driven fire with ember laden winds would destroy most of these facilities. National Historic Preservation Act Sec. 106 compliance would be required.*


*Photo 22: The Fort Rosecrans Historic District is also very vulnerable to loss because of the eucalyptus trees on the slope above the homes.*

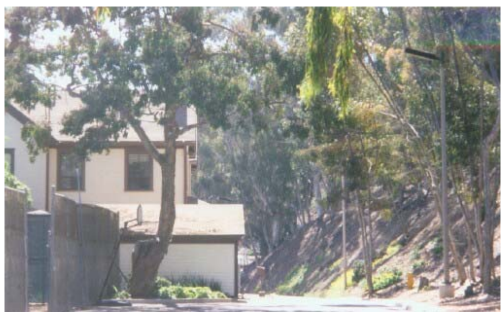

*Photo 23: Some species of eucalyptus trees ignite and shower burning embers down wind, starting new fires. Some species also produce a lot of combustible debris in the form of large branches, foliating bark and leaf litter. These ground fuels produce an abundance of wind blown embers.*

*Photo 24: Combustible debris produced by eucalyptus trees. This debris is notorious for producing an abundance of wind blown embers that will result in structure loss.*

*Photo 25: All of these beautiful homes are built on pilings. The current skirting will allow the passage of wind blown embers from the eucalyptus trees to blow beneath the buildings, potentially causing the loss of the structure. A solid skirting would prevent such a possibility. National Historic Preservation Act Sec.106 compliance would be required.*

*Photo 26: This is the 'Quarters A' building on FISC. The irrigated yard makes the structure appear very survivable. However, wind blown embers can get under the front porch resulting in loss of the structure. Eucalyptus trees behind these homes provide an abundance of material for ember laden winds. These non-native trees should be replaced with alternative species. A solid skirting will prevent embers from igniting the structure from below.*

# Appendix C: Species Detected on Naval Base Point Loma

*Plant Species detected on Naval Base Point Loma.*

| Scientific Name | Common Name | Source | Rarity |
|---|---|---|---|
| *Abronia maritima* S. Watson | red sand-verbena | 1,5 | |
| †**Acacia baileyana* F. Muell. | cootamundra wattle | 1 | |
| †**Acacia longifolia* (Andrews) Willd. | golden wattle | 1 | |
| †**Acacia melonoxylon* R.Br. | blackwood acacia | 1 | |
| †**Acacia verticillata* (L'Her.) Willd. | star acacia | 1 | |
| *Achnatherum coronatum* (Thurber) Barkworth | giant needlegrass | 1,5 | |
| *Achnatherum diegoensis* (Swall.) Barkworth | San Diego County needlegrass | 1,5 | |
| *Achnatherum parishii* (Vasey) Barkworth | needlegrass | 1 | |
| *Adenostoma fasciculatum* Hook. & Arn. | chamise | 1,3,5 | |
| *Adiantum jordani* K.Mull. | California maiden-hair fern | 1,5 | |
| *Adolphia californica* Wats. | California adolphia, spineshrub | 1 | CNPS 2 |
| **Agapanthus africanus* Hoffmgg. | lily-of –the-nile | 1,3,4,5 | |
| **Agave americana* | century plant | 1 | |
| *Agave shawii* Engelm. | Shaw's agave | 1,3,5 | CNPS 2 |
| *Agrostis pallens* Trin. | bent grass | 1,5 | |
| **Agrostis stolonifera* L. | creeping bent | 1,2,4,5 | |
| *Ajuga reptans atropurpurea* | carpet bugle | 3,4 | |
| *Allium haematochiton* S. Watson | wild onion | 1,5 | |
| *Allium praecox* Bdg. | wild onion | 1 | |
| *Amblyopappus pusillus* Hook. & Arn. | pineapple weed | 1,5 | |
| *Ambrosia chamissonis* (Less.) E. Greene | beach-bur | 1,5 | |
| *Ambrosia psilostachya* DC. | western ragweed | 1,5 | |
| *Amsinckia menziesii* (Lehm.) Nelson & J.F. Macbr. var. *menziesii* | Rancher's fireweed | 5 | |
| *Amsinckia menziesii* var. *intermedia* (Fischer and C. Meyers) Ganders | Rancher's fireweed | 1,5 | |
| **Anagallis arvensis* L. | scarlet pimpernel, Poor-man's weatherglass | 1,2,4,5 | |
| *Anthirrhinum nuttallianum* Benth. ssp. *subsessile* (A. Gray) | | 2 | |
| *Anthirrhinum nuttallianum* Benth. ssp. *nuttallianum* | snapdragon | 2 | |
| *Antirrhinum nuttallianum* Benth. in DC. ssp. *nuttallianum* | snapdragon | 1,5 | |
| *Aphanisma blitoides* Moq. | aphanisma | 1 | CNPS 1B |
| *Apiastrum angustifolium* Nutt. in Torrey & A. Gray | wild-celery | 1,5 | |
| **Aptenia cordifolia* | baby sun rose 'red apple' | 6 | |
| **Apium leptophyllum* (Pers.) Britton & E. Wilson | marsh parsnip | 4 | |
| **Araucaria bidwillii* Hook. | bunya-bunya | 1 | |
| **Araucaria excelsa* R. Br. | Norfolk Island pine | 1 | |
| *Arbutus menziesii* Pursh | Pacific madrone | 3 | |
| **Arctotis stoechadifolia* (Thurb. ) Less. | African daisy | 1 | |
| **Arecastrum romanzoffianum* Becc. | queen palm | 1 | |
| *Aristida adscensionis* L. | six-weeks three-awn | 1 | |
| *Artemisia californica* Less. | California sagebrush | 1,2,3,5 | |
| *Artemisia tridentata* Nutt. ssp. *tridentata* | big sagebrush | 1,5 | |
| †**Arundo donax* | giant bamboo | 6 | |
| **Asphodelus fistulosis* | | 6 | |
| *Astragalus trichopodus* (Nutt.) A. Gray | | 2,5 | |
| *Astragalus trichopodus* var. *lonchus* (M.E. Jones) Barneby | California locoweed | 1,5 | |
| *Atriplex californica* Moq. | saltbush | 1 | |
| *Atriplex canescens* (Pursh) Nutt. ssp. *canescens* | fourwing saltbush | 1,5 | |
| *Atriplex canescens* (Pursh) Nutt. var. *canescens* | fourwing saltbush, shade-scale | 5 | |
| *Atriplex coulteri* (Moq.) D. Dietr. | Coulter's saltbush | 1 | |
| *Atriplex lentiformis* (Torrey) S. Watson ssp. *lentiformis* | big saltbush | 1,5 | |
| *Atriplex leucophylla* (Moq.) D. Dietr. | beach saltbush | 1,5 | |
| **Atriplex semibaccata* R.Br. | Australian saltbush | 1,2,4,5 | |
| *Atriplex watsonii* A. Nels. | Watson's saltbush | 1,5 | |
| **Avena barbata* Link | slender wild oat | 1 | |
| **Avena fatua* L. | wild oat | 1,2,4,5 | |
| *Baccharis pilularis* DC. | coyote bush | 1,2,3,5 | |
| *Baccharis salicifolia* (Ruiz Lopez & Pavon) Pers. | mule fat, seep-willow, water-wally | 5 | |
| *Baccharis sarothroides* A. Gray | California broom | 1,5 | |
| **Bassia hyssopifolia* (Pall.) Kuntze | bassia | 1,4,5 | |
| *Bergerocactus emoryi* (Engelm.) Britt. & Rose | golden-spined cereus | 1,3,4,5 | CNPS 2 |
| **Beta macrocarpa* | beet | 6 | |
| **Bidens pilosa* L. var. *pilosa* | common beggar-ticks | 1,5 | |
| *Bothriochloa barbinodis* (Lag.) Herter | cane bluestem | 1,5 | |
| * *Brachypodium distachyon* | purple false broom | 6 | |
| *Brassica geniculata* | short-podded mustard | 4 | |
| †**Brassica nigra* (L.) Koch. | black mustard | 1,4,5 | |
| **Brassica tournefortii* | Sahara mustard | 6 | |
| *Brickellia californica* (Torrey & A. Gray) A. Gray | California brickellbush | 5 | |
| *Bromus carinatus* Hook. & Arn. | California brome | 1,5 | |
| **Bromus diandrus* Roth. | ripgut grass | 1,4,5 | |
| **Bromus hordaceus* L. | smooth brome | 1,5 | |

*Plant Species detected on Naval Base Point Loma. (Continued)*

| Scientific Name | Common Name | Source | Rarity |
|---|---|---|---|
| **Bromus madritensis* L. ssp. *rubens* (L.) Husnot | foxtail chess | 1,2,5 | |
| *Bromus mollis* L. | soft chess | 4 | |
| **Bromus rubens* L. | red brome | 4 | |
| **Caesalpinia* sp. | Cascalote | 6 | |
| *Cakile edentula* (Bigelow) Hook. | sea rocket | 1,4,5 | |
| *Calandrinia breweri* S. Watson | Brewer's calandrinia | 1,5 | |
| *Calandrinia ciliata* (Ruiz Lopez & Pavon) DC. | red maids | 1 | |
| *Calandrinia maritima* Nutt. | seaside calandrinia | 1,5 | CNPS 4 |
| **Callistemon citrinus* | bottlebrush | 1,3,4,5 | |
| *Calochortus splendens* Benth. | lilac mariposa | 1 | |
| *Calochortus weedii* Wood var. *weedii* | weed mariposa | 1,5 | |
| *Calystegia macrostegia* ssp. *intermedia* (Abrams) Brum | chaparral morning-glory | 1,2,5 | |
| *Calystegia macrostegia* ssp. *tenuifolia* (Abrams) Brum | chaparral morning-glory | 1 | |
| **Camellia* sp. L | camellia | 1 | |
| *Camissonia bistorta* (Torrey & A. Gray) Raven | California sun cup | 1,2,5 | |
| *Camissonia californica* (T.&G.) Raven | false mustard; sun cup | 1,5 | |
| *Camissonia cheiranthifolia* (Spreng) Raimann ssp. *suffruticosa* (S.Watson) | beach evening primrose | 1,5 | |
| *Camissonia lewisii* Raven | Lewis' evening primrose | 1 | CNPS 3 |
| *Camissonia robusta* Raven | sun cups | 1 | |
| *Cardamine californica* (Torrey & A. Gray) E. Greene | milk maids, tooth wort | 1,5 | |
| *Cardionema ramosissimum* (Weinm.) Nelson & J.F. Macbr. | tread lightly | 1,5 | |
| *Carex* sp. | sedge | 1,5 | |
| **Carissa grandiflora* A.DC. | natal-plum | 1,3,4,5 | |
| †**Carpobrotus chilensis* (Molina) N.E. Brown | sea fig | 1 | |
| †**Carpobrotus edulis* (L.) Bolus. | hottentot fig | 1,2,3,4,5 | |
| *Castilleja foliolosa* Hook. & Arn. | woolly indian paintbrush | 1,5 | |
| *Ceanothus impressus* Trel. | ceanothus | 1,3 | |
| *Ceanothus tomentosus* C. Parry | coast blue lilac | 1,5 | |
| *Ceanothus verrucosus* Nutt. | wart-stemmed ceanothus | 1,3,5 | CNPS 2 |
| *Cenchrus echinatus* L. | southern sandbur | 1 | |
| **Centaurea melitensis* L. | tocolote, star-thistle | 1,2,4,5 | |
| **Centaurea solstitialis* L. | yellow star-thistle | 1,4,5 | |
| *Centaurium venustum* (A. Gray) Rob. | canchalagua | 1,2,5 | |
| **Ceratonia siliqua* L. | carob | 1 | |
| *Cercocarpus betuloides* Torrey & A. Gray var. *betuloides* | birch-leaf mountain-mahogany | 1 | |
| *Cercocarpus minutiflorus* Abrams | mountain-mahogany | 5 | |
| *Chaenactis glabriuscula* DC. var. *glabriuscula* | yellow pincushion | 5 | |
| *Chaenactis glabriuscula* var. *orcuttiana* | yellow pincushion | 1,5 | |
| *Chamaesyce albomarginata* (Torrey & A. Gray) Small | rattlesnake weed | 1,2,5 | |
| *Chamaesyce maculata* (L.) Small | spotted spurge | 1 | |
| *Chamaesyce polycarpa* (Benth.) Millsp. | spurge | 1 | |
| **Chenopodium album* L. | Lamb's quarters, pigweed | 1,4,5 | |
| **Chenopodium ambrosioides* L. | Mexican tea | 1,2,5 | |
| *Chenopodium californicum* (S. Watson) S. Watson | California goosefoot | 5 | |
| **Chenopodium murale* L. | nettle-leaved goosefoot | 1 | |
| *Chlorogalum parviflorum* Wats. | soap plant, amole | 1 | |
| *Chlorogalum pomeridianum* (DC.) Kunth var. *pomeridianum* | soap plant | 1 | |
| **Chorisia speciosa* | floss silk tree | 1 | |
| *Chorizanthe fimbriata* Nutt. | fringed spineflower | 1,5 | |
| *Chorizanthe orcuttiana* Parry. | Orcutt's spineflower | 1,4,5 | CNPS 1B |
| *Chorizanthe procumbens* Nutt. | prostrate spineflower | 1,5 | |
| *Chorizanthe procumbens* Nutt. var. *albiflora* Goodman | Fallbrook spinflower | 1 | CNPS 4 |
| *Chorizanthe staticoides* Benth. | turkish rugging | 1,5 | |
| **Chrysanthemum coronarium* L. | garland, crown daisy | 1,4,5 | |
| **Ciclospermum leptophyllum* (Pers.) | ciclospermum | 1 | |
| **Cirsium* sp. | thistle | 1,5 | |
| **Cissus rhombifolia* | grape ivy | 1,3,4 | |
| **Cistus creticus* L. | rock-rose | 1,5 | |
| *Claytonia perfoliata* Willd. ssp. *mexicana* (Rydb.) John M. Miller & Chambers | | 5 | |
| *Claytonia perfoliata* Willd. ssp. *perfoliata* | Miner's lettuce | 1,5 | |
| *Clematis pauciflora* Nutt. | ropevine | 1,5 | |
| *Clematis* sp. | Virgin's bower | 1 | |
| *Cleome arborea* | bladderpod | 3 | |
| *Cneoridium dumosum* (Nutt.) Baillon | bushrue | 1,3,5 | |
| **Convolvulus arvensis* L. | bindweed | 1,4,5 | |
| **Conyza bonariensis* (L.) Cronq. | flax-leaf fleabane | 1,2,4,5 | |
| *Conyza canadensis* (L.) Cronq. | horseweed | 1,2,5 | |
| *Conyza coulteri* A. Gray | fleabane | 1,2,5 | |
| *Cordylanthus rigidus* (Benth) Jepson ssp *setigerus* Chuang & Heckard | thread-leaved bird's-beak | 1 | |
| *Coreopsis maritima* (Nutt.) Hook.f. | sea-dahlia | 1,5 | CNPS 2 |
| †**Cortaderia atacamensis* | pampas grass | 4 | |

*Plant Species detected on Naval Base Point Loma. (Continued)*

| Scientific Name | Common Name | Source | Rarity |
|---|---|---|---|
| †**Cortaderia jubata* (Lemoine) Stapf | pampas grass | 1 | |
| †**Cortaderia selloana* (Schultes) Asch. & Graebner | pampas grass | 1 | |
| *Cortaderia* ssp. | pampas grass | 5 | |
| **Cotoneaster* sp. | cotoneaster | 1 | |
| **Cotula coronopifolia* L. | brass-buttons | 1,4,5 | |
| **Crassula argentea* | jade plant | 1,3,4 | |
| *Crassula connata* (Ruiz Lopez & Pavon) A. Berger | pygmy-weed | 1,2,5 | |
| *Cressa truxillensis* Kunth | alkali weed | 1,5 | |
| *Croton californicus* Muell.-Arg. | California croton | 1,5 | |
| *Cryptantha intermedia* (A. Gray) E. Greene | nievita | 1,5 | |
| *Cryptantha* sp. | cryptantha | 1 | |
| **Cupaniopsis anacardioides* | carrot wood | 1 | |
| *Cupressus forbesii* Jepson | tecate cypress | 1,3,4,5 | |
| **Cupressus macrocarpa* Gordon | Monterey cypress | 1,3,4,5 | |
| **Cupressus sempervirens* L. | Italian cypress | 1 | |
| *Cuscuta californica* Hook. & Arn. | dodder | 1,5 | |
| **Cycas revoluta* Thunb. | sago palm | 1 | |
| **Cynodon dactylon* (L.) Pers. | Bermuda grass | 1,4,5 | |
| **Cyperus alternifolius* L. | umbrella-palm | 1 | |
| *Cyperus esculentus* L. | nut-grass | 1 | |
| *Daucus pusillus* Michx | rattlesnake weed | 1,5 | |
| *Descurainia pinnata* (Walter) Britton | tansy mustard | 1,5 | |
| *Descurainia sophia* (L.) Webb | fine-leaf tansy mustard | 1,4,5 | |
| *Dichelostemma capitatum* Alph. Wood ssp. *capitatum* | blue dicks | 1,2,5 | |
| *Dichelostemma congestum* (Sm.) Kunth | ookow | 1 | |
| *Dichelostemma pulchellum* | wild hyacinth | 3 | |
| *Dichondra occidentalis* House | western dichondra | 1,2,5 | CNPS 4 |
| **Digitaria sanguinalis* (L.) Scop. | crabgrass | 1,4,5 | |
| **Dimorphotheca ecklonis* DC. | cape-marigold | 4 | |
| **Dimorphotheca sinuata* DC. | blue-eye cape-marigold | 1,5 | |
| *Distichlis spicata* (L.) E. Greene | saltgrass | 1,5 | |
| *Dodecatheon clevelandii* E. Greene ssp. *clevelandii* | shooting star | 1 | |
| **Dodonaea viscosa* | hop bush | 1,3 | |
| *Dodonea visooa* | dodonea | 4 | |
| *Dudleya caespitosa* (Haw.) Britton & Rose | dudleya | 1,5 | |
| *Dudleya edulis* (Nutt.) Moran | lady fingers | 1,5 | |
| *Dudleya lanceolata* (Nutt.) Britt. & Rose | live-for-ever | 1,5 | |
| *Dudleya pulverulenta* (Nutt.) Britt. & Rose ssp. *pulverulenta* | chalk lettuce | 1,5 | |
| *Dudleya* sp. | dudleya | 3 | |
| †**Elaeagnus angustifolius* L. | Russian olive | 1,4,5 | |
| *Elymus condensatus* | giant ryegrass | 3 | |
| *Elymus glaucus* Buckley | blue wildrye | 1 | |
| *Encelia californica* Nutt. | common encelia | 1,2,3,5 | |
| *Encelia farinosa* Torrey & A. Gray | brittlebush, incienso | 1 | |
| *Eremocarpus setigerus* (Hook.) Benth. | dove weed | 1,5 | |
| *Ericameria pinifolia* (A. Gray) H.M. Hall | pine-bush | 1,5 | |
| *Eriodictyon crassifolium* Benth. | felt-leaved yerba santa | 1,5 | |
| *Eriogonum arborescens* E. Greene | Santa Cruz Island buckwheat | 3 | |
| *Eriogonum fasciculatum* Benth. var. *fasciculatum* | California buckwheat | 1,2,3,5 | |
| *Eriogonum giganteum* S. Watson var. *giganteum* | Santa Catalina Island buckwheat | 1 | |
| *Eriophyllum confertiflorum* (DC.) A. Gray var. *confertiflorum* | golden-yarrow | 1,2,5 | |
| **Erodium botrys* (Cav.) Bertol. | storksbill, filaree | 1 | |
| **Erodium cicutarium* (L.) L. Her. | white-stemmed filaree | 1,5 | |
| **Erodium moschatum* (L.) L. Her. | green-stemmed filaree | 1,5 | |
| *Erysimum ammophilum* A.A. Heller | coast wallflower | 1,5 | |
| **Erythrina caffra* Thunb. | coral-tree | 1 | |
| *Eschscholzia californica* Cham. | California poppy | 1,5 | |
| **Eucalyptus camaldulensis* Denhardt. | red gum | 1,4,5 | |
| **Eucalyptus ficifolia* F. Muell | scarlet-flowering gum | 1,4,5 | |
| **Eucalyptus polyanthemis* Schaun. | red-box | 1 | |
| **Eucalyptus* sp. | gum tree | 3 | |
| *Eucrypta chrysanthemifolia* (Benth.) E. Greene | eucrypta | 1,5 | |
| **Euphorbia maculata* (L.) Small | spotted spurge | 1 | |
| *Euphorbia misera* Benth. | cliff spurge | 1,3,4,5 | CNPS 2 |
| **Euphorbia peplus* L. | petty spurge | 1,4,5 | |
| *Euphorbia* sp. | spurge | 1 | |
| **Feijoa sellowiana* Berg. | pineapple guava | 1 | |
| *Ferocactus viridescens* (Torrey & A. Gray) Britt. & Rose | coast barrel cactus | 1,3,4,5 | CNPS 2 |
| *Festuca* sp. | fescue | 1,5 | |
| **Ficus benjamina* L. | benjamin fig | 1 | |
| **Ficus rubiginosa* | rusty fig | 1 | |
| *Filago californica* Nutt. | California herba impia, fluffweed | 1,5 | |

*Plant Species detected on Naval Base Point Loma. (Continued)*

| Scientific Name | Common Name | Source | Rarity |
|---|---|---|---|
| †**Foeniculum vulgare* Mill. | fennel | 1,3,4,5 | |
| *Frankenia palmeri* Wats. | Palmer's frankenia | 1,5 | |
| *Frankenia salina* (Molina) I.M. Johnston | alkali heath | 1,5 | |
| *Fritillaria biflora* Lindley | chocolate lily, mission bells | 1,5 | |
| *Galium angustifolium* Nutt. *angustifolium* | narrow-leaf bedstraw | 1,5 | |
| *Galium aparine* | goose grass | 1 | |
| *Galium nuttallii* A. Gray | San Diego bedstraw | 1,5 | |
| **Gasoul crystallinium* | annual ice plant | 3 | |
| *Gastridium ventricosum* (Gouan) Schinz & Thell. | nit grass | 1 | |
| **Gazania linearis* | treasure flower | 1,5 | |
| **Gazania longiscapa* | treasure flower | 1,4 | |
| **Gazania pavonia* | treasure flower | 1,3,4 | |
| **Geranium* sp. | cranesbill | 1,4,5 | |
| *Gnaphalium bicolor* Bioletti | bicolored cudweed | 1,2,5 | |
| *Gnaphalium californicum* DC. | green everlasting | 1,2,5 | |
| *Gnaphalium canescens* DC. ssp. *microcephalum* (Nutt.) Stebb. & Keil | white everlasting | 1 | |
| **Gnaphalium luteo-album* L. | everlasting | 1,2,4,5 | |
| *Gnaphalium palustre* Nutt. | lowland cudweed | 1 | |
| !*Gnaphalium purpureum* L. | | 2 | |
| *Gnaphalium ramosissimum* Nutt. | cudweed | 1,5 | |
| *Gnaphalium stramineum* | cudweed | 1,5 | |
| **Hakea suaveolens* | pincushion tree | 1,3,4 | |
| *Haplopappus squarrosus* Hook. & Arn. | saw-toothed goldenbush | 3 | |
| *Hazardia squarrosa* (Hook. & Arn.) E. Greene | sawtoothed goldenbush | 1,5 | |
| **Hebe elliptica* (Forster f.) Pennell | hebe | 1,3,4 | |
| **Hedera helix* L. | English ivy | 1,3,4,5 | |
| **Hedypnois cretica* (L.) Dunn. – Cours. | hedypnois | 1,4,5 | |
| *Helianthemum scoparium* Nutt. | peak rush-rose | 1,2,5 | |
| *Heliotropium curassavicum* L. | Chinese pusley | 1,2,5 | |
| *Hemizonia fasciculata* (DC.) Torrey & A. Gray | golden tarplant | 1,2,5 | |
| *Hesperocnide tenella* Torrey | western nettle | 1,5 | |
| *Heteromeles arbutifolia* (Lindley) Roemer | toyon, christmas berry | 1,3,5 | |
| *Heterotheca grandiflora* Nutt. | telegraph weed | 1,2,5 | |
| *Hibiscus denudatus* Benth. | pale face | 1,5 | |
| †**Hirschfeldia incana* (L.) Lagr.-Fossat | short-pod mustard | 1,2,5,6 | |
| *Hordeum intercedems* Nevski | | 5 | |
| **Hordeum murinum* L. ssp. *leporinum* (Link) Arcang | wild barley | 1,5 | |
| **Hordeum* sp. | wild barley | 1 | |
| **Hypericum canariense* | Canary Island hypericum | 1,4,5 | |
| **Hypericum perforatum* L. | klamathweed | 4 | |
| **Hypericum* sp. | St. John’s wort | 1,3 | |
| **Hypochaeris glabra* L. | smooth cat’s-ear | 1 | |
| **Iris* sp. | iris | 1 | |
| *Isocoma menziesii* (Hook. & Arn.) G. Nesom var. *menziesii* | coast goldenbush | 1,5 | |
| *Isocoma menziesii* (Hook. & Arn.) G. Nesom var. *sedoides* | coast goldenbush | 1,5 | |
| *Isomeris arborea* Nutt. | bladderpod | 1,5 | |
| *Jepsonia parryi* (Torrey) Small | mesa saxifrage | 1,5 | |
| *Juncus bufonius* L. var. *bufonius* | toad rush | 1,2,5 | |
| **Juniperus conferta* | juniper | 1,3,4 | |
| **Lactuca serriola* L. | prickly lettuce | 1 | |
| **Lamarckia aurea* (L.) Moench. | goldentop | 1,4,5 | |
| *Lastarriaea coriacea* (Goodman) Hoover | lastarriaea | 1,5 | |
| *Lasthenia californica* Lindley | goldfields | 1,5 | |
| *Lasthenia coronaria* (Nutt.) Ornd. | goldfields | 1,5 | |
| *Lepidium lasiocarpum* Torrey & A. Gray var. *lasiocarpum* | sand peppergrass | 1 | |
| *Lepidium nitidum* Torrey & A. Gray | pepperweed | 5 | |
| *Lepidium* sp | peppergrass, pepperwort | 4,5 | |
| *Lepidium virginicum* L. var. *robinsonii* (Thell.) C. Hitchc. | Robinson’s pepper grass | 1 | CNPS 1B |
| **Leptospermum laevigatum* (Gaertner) F. Muell. | Australian tea tree | 1,3,4 | |
| *Lessingia filaginifolia* (Hook. & Arn.) M.A. Lane var. *filaginifolia* | California-aster | 1,5 | CNPS 1B |
| *Leymus condensatus* (C. Presl) A. Love | giant ryegrass | 1,5 | |
| **Limonium sinuatum* (L.) Mill. | notchleaf marsh-rosemary | 1,2,4,5 | |
| *Linanthus dianthiflorus* (Benth.) E. Greene | ground-pink | 1,5 | |
| *Linaria canadensis* (L.) Dum.-Cours. | blue toadflax | 1,2,5 | |
| **Liquidamber styraciflua* L. | sweet-gum | 1 | |
| **Lolium multiflorum* Lam. | Italian ryegrass | 1 | |
| *Lomatium lucidum* (Torrey & A. Gray) Jepson | hog fennel | 1,5 | |
| *Lonicera subspicata* Hook. & Arn. | southern honeysuckle | 5 | |
| !*Lotus hamatus* E. Greene | | 2 | |
| *Lotus nuttallianus* | Nuttall’s lotus | 1,5 | CNPS 1B |
| !*Lotus salsuginosus* E. Greene var. *salsuginosus* | alkali lotus | 1,2 | |
| *Lotus scoparius* (Nutt. in Torrey & A. Gray) Ottley var. *scoparius* | deerweed | 1,2,5 | |

*Plant Species detected on Naval Base Point Loma. (Continued)*

| Scientific Name | Common Name | Source | Rarity |
|---|---|---|---|
| *Lotus strigosus* (Nutt.) E. Greene | Bishop's lotus | 1,2,5 | |
| *Lupinus bicolor* Lindl. | miniature lupine | 1,2,5 | |
| *Lupinus succulentus* Koch. | arroyo lupine | 1 | |
| *Lupinus truncatus* Hook. & Arn. | chaparral lupine | 1,5 | |
| *Lycium californicum* Nutt. | California box thorn | 1,5 | |
| *Lythrum hyssopifolium* L. | grass poly | 1 | |
| *Malacothamnus fasciculatus* (Torrey & A. Gray) E. Greene | chaparral mallow | 1,2,5 | |
| †**Malephora crocea* | iceplant | 1,4,5 | |
| *Malosma laurina* (Nutt.) Abrams | laurel sumac | 1,5 | |
| **Malva neglecta* Wallr. | common mallow | 1,4,5 | |
| **Malva parviflora* L. | cheeseweed, little mallow | 1,5 | |
| *Mammillaria dioica* K. Bdg. | fish-hook cactus | 1,3,5 | |
| *Marah macrocarpus* (E. Greene) E. Greene | wild cucumber | 1,5 | |
| **Marrubium vulgare* L. | horehound | 1,4,5 | |
| **Medicago polymorpha* L. | California bur clover | 1,4,5 | |
| **Medicago sativa* L. | alfalfa, lucerne | 5 | |
| **Melaleuca leucandendra* L. | cajeput tree | 1 | |
| *Melaleuca nesophila* | western tea myrtle | 5 | |
| **Melaleuca quinquinervia* | cajeput tree | 1,4,5 | |
| **Melaleuca* sp. | melaleuca | 3 | |
| *Melica imperfecta* Trin. | oniongrass | 1,5 | |
| **Melilotus alba* Medikus | white sweet clover | 1,4,5 | |
| **Melilotus indica* (L.) All. | sourclover | 1,2,4,5 | |
| **Mesembryanthemum crystallinum* L. | crystalline ice plant | 1,2,4,5 | |
| **Mesembryanthemum nodiflorum* L. | slender-leaved ice plant | 1,2,4,5 | |
| *Microseris douglassii* ssp. *platycarpha* (A. Gray) Chambers | small-flowered microseris | 1 | CNPS 4 |
| *Mimulus aurantiacus* Curtis | bush monkeyflower | 1,5 | |
| *Mirabilis californica* A. Gray | wishbone bush | 1,5 | |
| *Mucronea californica* Benth | California spineflower | 1 | |
| *Muhlenbergia microsperma* (DC.) Kunth | small-seeded grass | 1,2,5 | |
| †**Myoporum laetum* Forst. | myoporum | 1,2,3,4,5,6 | |
| **Narcissus tazetta* L. | paper-white | 1 | |
| *Nassella lepida* (A. Hitchc.) Barkworth | foothill needlegrass | 1,2,5 | |
| *Nassella pulchra* | bunchgrass | 3 | |
| *Navarretia hamata* E. Greene | hooked navarretia | 1,5 | |
| *Navarretia hamata* E. Greene ssp. *leptantha* (E. Greene) H. Mason | | 5 | |
| *Nemacaulis denudata* Nutt. var. *denudata* | coast woolly-heads | 1 | CNPS 1B |
| **Nerium oleander* L. | oleander | 1,3,4 | |
| *Nicotiana clevelandii* A. Gray | Cleveland tobacco | 1,2,5 | |
| †**Nicotiana glauca* Grah. | tree tobacco | 1,2,3,4,5 | |
| *Oligomeris linifolia* (Vahl) J.F. Macbr. | narrowleaf oligomeris | 1,5 | |
| *Opuntia californica* var. *california* Engelm. | cane cholla, snake cholla | 1,5 | CNPS 1B |
| *Opuntia littoralis* (Engelm.) Cockerell. | shore cactus | 1,5 | |
| *Opuntia parryi* Engelm. var. *serpentina* (Engelm.) L. Benson | snake cholla | 1,3,4,5 | CNPS 1B |
| *Opuntia prolifera* Engelm. | cholla | 1,5 | |
| *Orobanche parishii* ssp. *brachyloba* Heckard | short lobed broomrape | 1,5 | CNPS 4 |
| *Osmorhiza* sp. | osmorhiza | 1 | |
| **Osteospermum ecklonis* (DC.) Norlindh | African daisy | 1,5 | |
| **Oxalis corniculata* L. | yellow sorrel | 1,2,4,5 | |
| **Oxalis pes-caprae* L. | Bermuda buttercup | 1,5 | |
| !*Papaver californicum* A. Gray | fire poppy | 1,2 | |
| **Parapholis incurva* (L.) C.E. Hubb. | sickle grass | 1,5 | |
| *Parietaria hespera* Hinton var. *californica* Hinton | pellitory | 1,5 | |
| **Pelargonium* sp. | geranium | 1,3,4,5 | |
| *Pellaea andromedifolia* (Kaulf.) Fee | coffee fern | 1,5 | |
| *Pellaea mucronata* (D. Eaton) D. Eaton | bird's-foot fern | 1 | |
| **Pennisetum clandestinum* Chiov | kikuyu grass | 1 | |
| †**Pennisetum setaceum* Forsskal | fountain grass | 1,4,5,6 | |
| *Penstemon spectabilis* Thurber | beardtongue | 1 | |
| *Pentagramma triangularis* (Kaulf.) G. Yatskievych, M.D. Windham & E. Wollenweber ssp. *triangularis* | goldenback fern | 1 | |
| *Pentagramma triangularis* ssp. *viscosa* (D. Eaton) G. Yatskievych, M.D. Windham & E. Wollenweber | silverback fern | 1,5 | |
| *Perityle emoryi* Torrey | emory rock-daisy | 1,5 | |
| *Phacelia distans* Benth. | common phacelia | 1 | |
| *Phalaris* sp. | canary grass | 1,5 | |
| †**Phoenix canariensis* Chabaud. | Canary Island date palm | 1,4,5 | |
| *Pholisma arenarium* Hook. | sand plant | 1,5 | |
| *Pholistoma racemosum* (Nutt.) Const. | pholistoma | 1,2,5 | |
| **Pinus halepensis* | aleppo pine | 3 | |
| *Pinus muricata* D. Don | bishop pine | 4,5 | |
| **Pinus pinea* L. | Canary Island pine | 1 | |

*Plant Species detected on Naval Base Point Loma. (Continued)*

| Scientific Name | Common Name | Source | Rarity |
|---|---|---|---|
| **Pinus thunbergii* | Japanese black pine | 3,4,5 | |
| *Pinus torreyana* Carriere | torrey pine | 1,3,4,5 | CNPS 1B |
| *Piperia cooperii* (S. Watson) | Cooper's rein orchid | 1,5 | CNPS 4 |
| *Piperia elegans* (Lindley) Rydb. | piperia | 1,5 | |
| *Piperia unalascensis* (Sprengel) Rydb. | piperia | 1,5 | |
| †**Piptatherum miliaceum* (L.) Cosson | smilo grass | 1,6 | |
| **Pittosporum crassifolium* Cunn. | karo | 1,3,4,5 | |
| **Pittosporum tobira* Ait. | Japanese pittosporum | 1,3,4,5 | |
| **Pittosporum undulatum* Vent. | victorian-box | 1 | |
| *Plantago erecta* Morris | dot-seed plantain | 1,5 | |
| **Plantago lanceolata* | narrowleaf plantain | 6 | |
| *Platanus racemosa* Nutt. | western sycamore | 1,5 | |
| **Poa annua* L. | annual bluegrass | 1 | |
| **Podocarpus gracilior* | pilger | 1 | |
| !*Polycarpon depressum* Nutt. | | 2 | |
| **Polycarpon tetraphyllum* | | 6 | |
| **Polygonum arenastrum* Boreau | common knotweed | 1,5 | |
| **Polygonum aviculare* L. | common knotweed | 4 | |
| *Polypodium californicum* Kaulf. | California polypody | 1,5 | |
| **Polypogon monspeliensis* (L.) Desf. | annual beard grass | 1,4,5 | |
| *Prunus illicifolia* ssp. *ilicifolia* | holly-leafed cherry | 1,5 | |
| *Prunus illicifolia* ssp. *lyonii* (Eastw.)Raven | Catalina cherry | 1 | |
| *Prunus laurocerasus* | cherry laurel | 5 | |
| *Pterostegia drymarioides* Fischer & C. Meyer | California thread-stem | 1,2,5 | |
| *Quercus dumosa* Nutt. | Nuttall's scrub oak | 1,3,5 | CNPS 1B |
| **Raphanus sativus* L. | radish | 1,4,5 | |
| *Rhamnus crocea* Nutt. | spiny redberry | 1,5 | |
| **Rhaphiolepis indica* Lindl. | India-hawthorn | 1 | |
| *Rhus integrifolia* (Nutt.) Brewer & Watson | lemonadeberry | 1,2,3,5 | |
| *Rhus ovata* S. Watson | sugar bush | 5 | |
| **Rhynchelytrum repens* | ruby grass | 6 | |
| †**Ricinus communis* L. | castor bean | 1,2,3,4,5 | |
| *Rosa pisocarpa* A. Gray | cluster rose | 5 | |
| **Rosa* sp. | rose | 1 | |
| **Rumex crispus* L. | curly dock | 1,2,5 | |
| !*Sagina procumbens* L. | arctic pearlwort | 2 | |
| *Salicornia subterminalis* Parish | glasswort | 1,5 | |
| *Salicornia virginica* L. | pickleweed | 1,5 | |
| **Salpichroa origanifolia* (Lam.) | salpichroa | 1,5 | |
| **Salsola iberica* Senne & Pau | Russian-thistle | 4 | |
| **Salsola tragus* L. | Russian thistle, tumbleweed | 1,5 | |
| *Salvia columbariae* Benth. | chia | 1,5 | |
| *Salvia mellifera* E. Greene | black sage | 1,2,3,5 | |
| *Sanicula* sp. | sanicle | 1,5 | |
| *Satureja douglasii* (Benth.) Briq. | yerba buena | 3 | |
| †**Schinus molle* L. | Peruvian pepper tree | 1,4 | |
| †**Schinus terebinthifolius* Raddi | Brazilian pepper tree | 1 | |
| **Schismus barbatus* (L.) Thell | Mediterranean grass | 1,2,5 | |
| *Selaginella cinerascens* Maxon | ashy spike-moss | 1,5 | |
| *Senecio californicus* DC. | California groundsel | 1,5 | |
| **Senecio vulgaris* L. | common groundsel | 1,4,5 | |
| **Silene gallica* L. | windmill pink | 1,4,5 | |
| *Silene lacinata* Cav. ssp. *major* C.L. Hitchc. & Maquire | Indian pink | 1,5 | |
| *Simmondsia chinensis* (Link.) C.K. Schneid. | jojoba | 1,5 | |
| **Sisymbrium irio* | London rocket | 6 | |
| **Sisymbrium orientale* | Oriental rocket | 6 | |
| *Sisyrinchium bellum* Wats. | blue-eyed-grass | 1 | |
| *Smilax jamesii* G.A. Wallace | English peak Greenbriar | 5 | |
| **Smilax* sp. | smilax | 1 | |
| *Solanum douglasii* Dunal | white nightshade | 1 | |
| **Solanum nigrum* L. | black nightshade | 1,2,5 | |
| *Solanum parishii* A.A. Heller | Parish's nightshade | 1,2,5 | |
| *Solanum xanti* A. Gray | purple nightshade | 1,5 | |
| **Sonchus asper* (L.) Hill ssp. *asper* | prickly sow thistle | 1 | |
| **Sonchus oleraceus* L. | common sow thistle | 1,2,5 | |
| **Spergularia villosa* (Pers.) Cambess. | Cleveland sand spurrey | 1,5 | |
| **Sporobolus indicus* (L.) R. Br. | smutgrass | 1 | |
| **Stellaria media* (L.) Villars | common chickweed | 5 | |
| **Stellaria* sp. | chickweed | 1 | |
| *Stephanomeria diegensis* Gottlieb | stephanomeria | 1,2,5 | |
| *Stephanomeria virgata* (Benth.) ssp. *virgata* | slender stephanomeria | 1 | |
| !*Stylocline gnaphaloides* Nutt. | everlasting nest straw | 1,2 | |

*Plant Species detected on Naval Base Point Loma. (Continued)*

| Scientific Name | Common Name | Source | Rarity |
|---|---|---|---|
| *Suaeda californica* Wats. | California sea-blite | 1,5 | |
| *Suaeda esteroa* W. Ferren & S. Whitmore | estuary sea-blite | 1,5 | |
| *Suaeda taxifolia* (Standley) Standley | woolly sea-blite | 1 | |
| †**Tamarix ramosissima* | tamarix | 6 | |
| **Taraxacum officinale* Weber in Wiggers | common dandelion | 1 | |
| **Tradescantia fluminensis* Vell. | wandering jew | 1 | |
| **Tragopogon porrifolius* L. | salsify, oyster plant | 1 | |
| **Tribulus terrestris* L. | puncture vine | 1 | |
| !*Triodanis perfoliata* (L.) Nieuwl. | | 2 | |
| **Ulmus parvifolia* Jacq. | Chinese elm | 1 | |
| *Vicia ludoviciana* Nutt. var. *ludoviciana* | deerpea vetch | 1,5 | |
| *Viguiera laciniata* A. Gray | San Diego County viguiera | 1,5 | CNPS 4 |
| *Viola pedunculata* Torrey & A. Gray | Johnny-jump-up | 1,5 | |
| **Vulpia myuros* (L.) C. Gmelin var. *hirsuta* Hack. | | 5 | |
| **Vulpia myuros* (L.) C. Gmelin var. *myuros* | vulpia | 1,2,5 | |
| *Vulpia octoflora* (Walter) Rydb. var. *hirtella* (Piper) Henrard | vulpia | 1,2,5 | |
| **Washingtonia robusta* Wendl. | Washington palm | 1 | |
| *Xanthium spinosum* L. | spiny cocklebur | 1,4,5 | |
| *Xylococcus bicolor* Nutt. | mission manzanita | 1,3,5 | |
| **Xylosma congestum* (Lour.) Merrill | xylosma | 1,3,4 | |
| *Yucca schidigera* K.E. Ortgies | mohave yucca | 1,3,5 | |
| *Zigadenus fremontii* (Torrey) S. Watson | star-lily | 1,5 | |

| | |
|---|---|
| ***** | Indicates plants that are exotic. |
| † | Noxious weeds that are targeted for control by Navy or Cabrillo National Monument |
| **!** | Indicates species only found in the seed bank on Cabrillo National Monument |

| | | |
|---|---|---|
| **1B** | = | Species rare, threatened, or endangered in California and elsewhere. These species are eligible for state listing. |
| **2** | = | Species rare, threatened, or endangered in California but which are more common elsewhere. These species eligible for state listing. |
| **3** | = | Speces for which more information is needed. Distribution, endangerment, and/or taxonomic information is needed. |
| **4** | = | A watch list of species of limited distribution. These species need to be monitored for changes in the status of their populations. |

| | |
|---|---|
| **1** | Naval Base Point Loma Integrated Natural Resources Management Plan July 2002. |
| **2** | Cummins, Kevin Draft 2003 Report. |
| **3** | Cabrillo National Monument Vegetation Management Plan revised February 1995. |
| **4** | Resouces Management Plan Cabrillo National Monument 1998. |
| **5** | Chief Scientist of Cabrillo National Monument 2003. |
| **6** | Weed List 2003 of Steve Junak, Santa Barbara Botanic Garden |

*Wildlife species detected or possibly occurring on Naval Base Point Loma.*

| Common Name | *Scientific Name* | Status | Source |
|---|---|---|---|
| **Amphibians** | | | |
| Pacific treefrog | *Hyla regilla* | | 1 |
| western spadefoot toad | *Spea hammondii* | FSC,CSC,P,BLM | 1 |
| California toad | *Bufo boreas halophilus* | | 1 |
| Pacific slender salamander | *Batrachoseps pacificus major* | | 1,2,3 |
| **Reptiles** | | | |
| San Diego horned lizard | *Phrynosoma coronatum blainvillii* | FSC,CSC,MSCP,P,FS | 1 |
| western fence lizard | *Sceloporus occidentalis* | | 1,2 |
| side-blotched lizard | *Uta stansburiana* | | 1,2,3 |
| Belding's orangethroat whiptail | *Cnemidophorus hyperythrus beldingi* | FSC,CSC,MSCP,P | 1,2,3 |
| coastal whiptail | *Cnemidophorus tigris multiscutatus* | | 1 |
| silvery legless lizard | *Anniella pulchra pulchra* | CSC,P,FS | 1,2,3 |
| Coronado skink | *Eumeces skiltonianus interparietalis* | FSC,CSC,FS | 1 |
| San Diego alligator lizard | *Elgaria multicarinata webbi* | | 1,2,3 |
| coastal rosy boa | *Lichanura trivirgata roseofusca* | | 1 |
| San Diego gopher snake | *Pituophis catenifer annectens* | | 1,3 |
| gopher snake, pine snake | *Pituophis melanoleucus* | | 2 |
| California kingsnake | *Lampropeltis getulus (= getula) californiae* | | 1,2 |
| southern Pacific rattlesnake | *Crotalus viridis helleri* | | 1,2,3 |
| red diamond rattlesnake | *Crotalus exsul (= C. ruber ruber)* | FSC,CSC | 1,2 |
| California black-headed snake | *Tantilla planiceps* | | 1 |
| night snake | *Hypsiglena torquata* | | 1,2,3 |
| red coach whipsnake | *Masticophis flagellum piceus* | | 1 |
| chaparral whipsnake (= California striped racer) | *Masticophis lateralis lateralis* | | 1,2,3 |
| San Diego ringneck snake | *Diadophis punctatus similis* | | 1,2,3 |
| coast patch-nosed snake | *Salvadora hexalepis virgultea* | FSC,CSC | 1 |
| western long-nosed snake | *Rhinocheilus lecontei lecontei* | | 1 |
| western blind snake | *Leptotyphlops humilis* | | 1 |
| **Birds** | | | |
| northern fulmar | *Fulmarus glacialis* | | 1,2 |
| pink-footed shearwater | *Puffinus creatopus* | | 1,2 |
| sooty shearwater | *Puffinus griseus* | | 1,2 |
| short-tailed shearwater | *Puffinus tenuirostris* | | 1,2 |
| black-vented shearwater | *Puffinus opisthomelas* | | 1,2 |
| least storm-petrel | *Oceanodroma microsoma* | | 1,2 |
| black storm-petrel | *Oceanodroma melania* | FSC,CSC,PIF | 1,2 |
| ashy storm-petrel | *Oceanodroma homochroa* | FSC,CSC,PIF | 1,2 |
| red-throated loon | *Gavia stellata* | | 1,2 |
| Pacific loon | *Gavia pacifica* | | 1,2 |
| common loon | *Gavia immer* | CSC | 1,2 |
| pied-billed grebe | *Podilymbus podiceps podiceps* | | 1,2 |
| horned grebe | *Podceps auritus* | | 1,2 |
| Clark's grebe | *Aechmophorus clarkii* | | 1,2 |
| eared grebe | *Podiceps nigricollis californicus* | | 1,2 |
| western grebe | *Aechmophorus occidentalis* | * | 1,2,3 |
| magnificent frigatebird | *Fregata magnificens* | | 1,2 |
| double-crested cormorant | *Phalacrocorax auritus albociliatus* | CSC | 1,2,3 |
| Brandt's cormorant | *Phalacrocorax penicillatus* | | 1,2 |
| pelagic cormorant | *Phalacrocorax pelagicus resplendens* | | 1,2 |
| brown booby | *Sula leucogaster* | | 1,2 |
| American white pelican | *Pelecanus erythrorhynchos* | CSC | 1,2 |
| California brown pelican | *Pelecanus occidentalis californicus* | FE,SE,CFP,CSC,MSCP | 1,2,3 |
| great blue heron | *Ardea herodias herodias* | * | 1,2,3 |
| great egret | *Ardea alba egretta* | *,MSCP | 1,2,3 |
| snowy egret | *Egretta thula thula* | * | 1,2,3 |
| cattle egret | *Bubulcus ibis* | | 1,2 |
| green heron | *Butorides virescens* | | 1,2 |
| yellow-crowned night heron | *Nyctanassa violacea* | | 1 |
| black-crowned night heron | *Nycticorax nycticorax hoactli* | * | 1,2,3 |
| white ibis | *Eudocimus albus* | | 1,2 |
| turkey vulture | *Cathartes aura* | | 1,2 |
| Mississippi kite | *Ictinis mississippiensis* | | 1,2 |
| osprey | *Pandion haliaetus carolinensis* | CSC | 1,2 |
| white-tailed kite | *Elanus leucurus* | CFP,* | 1,2 |
| bald eagle | *Haliaeetus leucocephalus* | FT,SE,CFP,BEPA,MSCP | 1,2 |
| northern harrier | *Circus cyaneus hudsonius* | CSC,MSCP | 1,2 |
| sharp-shinned hawk | *Accipiter striatus velox* | CSC | 1,2 |
| Cooper's hawk | *Accipiter cooperii* | CSC,MSCP | 1,2 |
| red-shouldered hawk | *Buteo lineatus elegans* | | 1,2 |
| broad-winged hawk | *Buteo platypterus platypterus* | | 1,2 |
| Swainson's hawk | *Buteo swainsoni* | ST,MSCP | 1,2 |

*Wildlife species detected or possibly occurring on Naval Base Point Loma. (Continued)*

| Common Name | *Scientific Name* | Status | Source |
|---|---|---|---|
| zone-tailed hawk | *Buteo albonotatus* | | 1,2 |
| red-tailed hawk | *Buteo jamaicensis* | | 1,2 |
| ferruginous hawk | *Buteo regalis* | FSC,CSC,MSCP | 1,2 |
| rough-legged hawk | *Buteo regalis* | | 2 |
| golden eagle | *Aquila chrysaetos canadensis* | BEPA,CSC,CFP,MSCP | 1,2 |
| American kestrel | *Falco sparverius* | | 1,2 |
| merlin | *Falco columbarius* | CSC | 1,2 |
| prairie falcon | *Falco mexicanus* | CSC | 1,2 |
| peregrine falcon | *Falco peregrinus anatum* | SE,CFP,MSCP | 1,2,3 |
| white-fronted goose | *Anser albifrons frontalis* | | 1,2 |
| snow goose | *Chen caerulescens* | | 1,2 |
| Ross' goose | *Chen rossii* | | 1 |
| Canada goose | *Branta canadensis* | | 1,2 |
| black brant | *Branta bernicla nigricans* | | 1,2 |
| green-winged teal | *Anas crecca* | | 1,2 |
| mallard | *Anas platyrhynchos platyrhynchos* | | 1,2 |
| northern pintail | *Anas acuta acuta* | | 1,2 |
| blue-winged teal | *Anas discors* | | 1,2 |
| cinnamon teal | *Anas cyanoptera septentrionalium* | | 1,2 |
| northern shoveler | *Anas clypeata* | | 1,2 |
| gadwall | *Anas strepera* | | 2 |
| American wigeon | *Anas americana* | | 2 |
| canvasback | *Aythya valisineria* | | 2 |
| redhead | *Aythya americana* | | 2 |
| greater scaup | *Aythya marila* | | 2 |
| lesser scaup | *Aythya affinis* | | 1,2 |
| oldsquaw | *Clangula hyemalis* | | 1 |
| black scoter | *Melanitta nigra* | | 1,2 |
| surf scoter | *Melanitta perspicillata* | | 1,2 |
| white-winged scoter | *Melanitta fusca* | | 1,2 |
| common goldeneye | *Bucephala clangula americana* | | 1,2 |
| bufflehead | *Bucephala albeola* | | 1,2 |
| common merganser | *Mergus merganser* | | 2 |
| red-breasted merganser | *Mergus serrator* | | 1,2 |
| ruddy duck | *Oxyura jamaicensis rubida* | | 1,2 |
| California quail | *Callipepla californica* | | 1,2 |
| California black rail | *Laterallus jamaicensis* | FSC,ST,CFP,PIF | 1,2 |
| sora | *Porzana carolina* | | 1,2 |
| American coot | *Fulica americana americana* | | 1,2 |
| American oystercatcher | *Haematopus palliatus frazari* | | 1,2 |
| black oystercatcher | *Haematopus bachmani* | PIF | 1,2 |
| black-necked stilt | *Himantopus mexicanus* | | 1 |
| American avocet | *Recurvirostra americana* | | 1 |
| lesser golden plover | *Pluvialis dominica* | | 1 |
| black-bellied plover | *Pluvialis squatarola* | | 1,2 |
| killdeer | *Charadrius vociferus vociferus* | | 1,2 |
| semipalmated plover | *Charadrius semipalmatus* | | 1,2 |
| western snowy plover (coastal pop.) | *Charadrius alexandrinus nivosus* | FT,CSC,PIF,MSCP | 1,2,3 |
| ruddy turnstone | *Arenaria interpres* | | 1,2 |
| black turnstone | *Arenaria melanocephala* | | 1,2 |
| surfbird | *Aphiriza virgata* | | 1,2 |
| red knot | *Calidris canutus* | | 1,2 |
| western sandpiper | *Calidris mauri* | | 1,2 |
| least sandpiper | *Calidris minutilla* | | 1,2 |
| dunlin | *Calidris alpina pacifica* | | 1,2 |
| sanderling | *Calidris alba* | | 1,2 |
| red-necked phalarope | *Phalaropus lobatus* | | 1,2 |
| red phalarope | *Phalaropus fulicaria* | | 1,2 |
| willet | *Catoptrophorus semipalmatus inornatus* | | 1,2 |
| greater yellowlegs | *Tringa melanoleuca* | | 1,2 |
| lesser yellowlegs | *Tringa flavipes* | | 2 |
| solitary sandpiper | *Tringa solitaria cinnamomea* | | 1,2 |
| wandering tattler | *Heteroscelus incanus* | | 1,2 |
| spotted sandpiper | *Actitis macularia* | | 1,2 |
| whimbrel | *Numenius phaeopus hudsonicus* | | 1,2 |
| long-billed curlew | *Numenius americanus* | CSC,PIF,MSCP | 1,2 |
| marbled godwit | *Limosa fedoa* | | 1,2 |
| pectoral sandpiper | *Calidris melanotos* | | 2 |
| long-billed dowitcher | *Limnodromus scolopaceus* | | 1,2 |
| short-billed dowitcher | *Limnodromus griseus* | | 1,2 |
| common snipe | *Gallinago gallinago* | | 2 |
| Wilson's phalarope | *Phalaropus tricolor* | | 2 |

*Wildlife species detected or possibly occurring on Naval Base Point Loma. (Continued)*

| Common Name | *Scientific Name* | Status | Source |
|---|---|---|---|
| pomarine jaeger | *Stercorarius pomarinus* | | 1,2 |
| parasitic jaeger | *Stercorarius parasiticus* | | 1,2 |
| laughing gull | *Larus atricilla* | CSC | 1,2 |
| Franklin's gull | *Larus pipixcan* | | 2 |
| Sabine's gull | *Larus sabini* | | 1,2 |
| gull-billed tern | *Sterna nilotica vanrossemi* | CSC | 1 |
| Bonaparte's gull | *Larus philadelphia* | | 1,2 |
| Heermann's gull | *Larus heermanni* | | 1,2 |
| ring-billed gull | *Larus delawarensis* | | 1,2 |
| mew gull | *Larus canus brachyrhynchus* | | 1,2 |
| California gull | *Larus californicus* | CSC | 1,2 |
| herring gull | *Larus argentatus smithsonianus* | | 1,2 |
| glaucous-winged gull | *Larus glaucescens* | | 1,2 |
| western gull | *Larus occidentalis* | | 1,2 |
| Thayer's gull | *Larus thayeri* | | 1,2 |
| glaucous gull | *Larus hyperboreus barrovianus* | | 1,2 |
| black-legged kittiwake | *Rissa tridactyla pollicaris* | | 1,2 |
| black skimmer | *Rynchops niger niger* | CSC | 1,2 |
| caspian tern | *Sterna caspia* | CFP,* | 1,2,3 |
| royal tern | *Sterna maxima maxima* | | 1,2 |
| elegant tern | *Sterna elegans* | FSC,CSC,MSCP | 1,2 |
| common tern | *Sterna hirundo hirundo* | | 1,2 |
| Forster's tern | *Sterna forsteri* | * | 1,2 |
| California least tern | *Sterna antillarum browni* | FE,SE,FSC,CFP,MSCP | 1,2,3 |
| black tern | *Chlidonias niger surinamensis* | FSC,CSC | 1,2 |
| common murre | *Uria aalge californica* | | 1,2 |
| northern Xantus' murrelet | *Synthliboramphus (Endomychura) hypoleuca scrippsi* | FSC,CSC,PIF | 1,2 |
| Craveri's murrelet | *Synthliboramphus craveri* | | 2 |
| ancient murrelet | *Synthliboramphus antiquus* | | 2 |
| Cassin's auklet | *Ptychoramphus aleuticus* | | 2 |
| rhinoceros auklet | *Cerorhinca monocerata* | CSC | 1,2 |
| band-tailed pigeon | *Columba fasciata monilis* | | 1,2 |
| mourning dove | *Zenaida macroura marginella* | | 1,2 |
| white-winged dove | *Zenaida asiatica mearnsi* | | 1,2 |
| common ground dove | *Columbina passerina pallescens* | | 1,2 |
| rock dove | *Columbina livia* | | 1 |
| common barn owl | *Tyto alba pratincola* | | 1,2 |
| flammulated owl | *Otus flammeolus* | | 2 |
| western screech owl | *Otus kennicottii* | | 1 |
| great horned owl | *Bubo virginianus* | | 1,2 |
| western burrowing owl | *Athene cunicularia hypugaea* | FSC,CSC,MSCP | 1,2 |
| long-eared owl | *Asio otus* | CSC | 1,2 |
| short-eared owl | *Asio flammeus* | CSC | 1,2 |
| lesser nighthawk | *Chordeiles acutipennis texensis* | | 1,2 |
| common nighthawk | *Chordeiles minor* | | 2 |
| poor-will | *Phalaenoptilus nuttallii* | | 1,2 |
| whip-poor-will | *Caprimulgus vociferus* | | 1,2 |
| black swift | *Cypseloides niger* | CSC,PIF | 1,2 |
| chimney swift | *Chaetura pelagica* | | 1,2 |
| Vaux's swift | *Chaetura vauxi* | CSC | 1,2 |
| white-throated swift | *Aeronautes saxatalis* | | 1,2 |
| black-chinned hummingbird | *Archilochus alexandri* | | 1,2 |
| Costa's hummingbird | *Calyptes costae* | | 1,2 |
| Anna's hummingbird | *Calypte anna* | | 1,2 |
| calliope hummingbird | *Stellula calliope* | | 1,2 |
| broad-tailed hummingbird | *Selasphorus platycercus* | | 1,2 |
| rufous hummingbird | *Selasphorus rufus* | PIF | 1,2 |
| Allen's hummingbird | *Selasphorus sasin* | | 1,2 |
| belted kingfisher | *Ceryle alcyon* | | 1,2 |
| Lewis' woodpecker | *Melanerpes lewis* | | 1,2 |
| acorn woodpecker | *Melanerpes formicivorus bairdi* | | 1,2 |
| yellow-bellied sapsucker | *Sphyrapicus varius* | | 1,2 |
| red-naped sapsucker | *Sphyrapicus nuchalis* | | 1,2 |
| red-breasted sapsucker | *Sphyrapicus ruber* | | 1,2 |
| Williamson's sapsucker | *Sphyrapicus thyroideus* | | 2 |
| Nuttall's woodpecker | *Picoides nuttallii* | | 1,2 |
| downy woodpecker | *Picoides pubescens turati* | | 1,2 |
| hairy woodpecker | *Picoides villosus hyloscopus* | | 1,2 |
| northern flicker | *Colaptes auratus* | | 1,2 |
| olive-sided flycatcher | *Contopus cooperi* | | 1,2 |
| greater pewee | *Contopus pertinax* | | 1,2 |
| western wood pewee | *Contopus sordidulus* | | 1,2 |

*Wildlife species detected or possibly occurring on Naval Base Point Loma. (Continued)*

| Common Name | *Scientific Name* | Status | Source |
|---|---|---|---|
| willow flycatcher | *Empidonax traillii* | | 1,2 |
| southwestern willow flycatcher | *Empidonax traillii extimus* | FE,SE | 1 |
| least flycatcher | *Empidonax minimus* | | 1,2 |
| Hammond's flycatcher | *Empidonax hammondii* | | 1,2 |
| dusky flycatcher | *Empidonax oberholseri* | | 1,2 |
| gray flycatcher | *Empidonax wrightii* | | 1,2 |
| Pacific slope flycatcher | *Empidonax difficilis* | | 1,2 |
| eastern phoebe | *Sayornis phoebe* | | 1,2 |
| black phoebe | *Sayornis nigricans semiatra* | | 1,2 |
| Say's phoebe | *Sayornis saya* | | 1,2 |
| vermilion flycatcher | *Pyrocephalus rubinus flammeus* | CSC | 1,2 |
| Dusky-capped flycatcher | *Myiarchus tuberculifer* | | 2 |
| ash-throated flycatcher | *Myiarchus cinerascens cinerascens* | | 1,2 |
| great crested flycatcher | *Myiarchus crinitus* | | 1,2 |
| brown-crested flycatcher | *Myiarchus tyrannulus* | | 1 |
| sulphur-bellied flycatcher | *Myiodynastes luteiventris* | | 1,2 |
| tropical kingbird | *Tyrannus melancholicus satrapa* | | 1,2 |
| Cassin's kingbird | *Tyrannus vociferans vociferans* | | 1,2 |
| thick-billed kingbird | *Tyrannus crassirostris* | | 1,2 |
| western kingbird | *Tyrannus verticalis* | | 1,2 |
| eastern kingbird | *Tyrannus tyrannus* | | 1,2 |
| scissor-tailed flycatcher | *Tyrannus forficatus* | | 1,2 |
| California horned lark | *Eremophila alpestris actia* | CSC | 1,2 |
| tree swallow | *Tachycineta bicolor* | | 1,2 |
| violet-green swallow | *Tachycineta thalassina lepida* | | 1,2 |
| purple martin | *Progne subis* | CSC | 1,2 |
| northern rough-winged swallow | *Stelgidopteryx serripennis* | | 1,2 |
| bank swallow (nesting colony) | *Riparia riparia* | ST | 1,2 |
| barn swallow | *Hirundo rustica erythrogaster* | | 1,2 |
| cliff swallow | *Petrochelidon pyrrhonota* | | 1,2 |
| Steller's jay | *Cyanocitta stelleri frontalis* | | 1,2 |
| western scrub-jay | *Aphelocoma californica* | | 1,2 |
| Clark's nutcracker | *Nucifraga columbiana* | | 1,2 |
| American crow | *Corvus brachyrhynchos hesperis* | | 1,2 |
| common raven | *Corvus corax* | | 1,2 |
| black-throated magpie jay | *Calocitta colliei* | | 1 |
| loggerhead shrike | *Lanius ludovicianus* | FSC,CSC | 1,2 |
| yellow-throated vireo | *Vireo flavifroms* | | 2 |
| Hutton's vireo | *Vireo huttoni huttoni* | | 1,2 |
| Least Bell's vireo | *Vireo bellii pusillus* | FE,SE,PIF,MSCP | 1,2 |
| plumbeous vireo | *Vireo plumbeus* | | 1,2 |
| blue-headed vireo | *Vireo solitarius* | | 1,2 |
| Cassin's vireo | *Vireo cassinii* | | 1,2 |
| white-eyed vireo | *Vireo griseus* | | 1,2 |
| warbling vireo | *Vireo gilvus swainsonii* | | 1,2 |
| Philadelphia vireo | *Vireo philadelphicus* | | 1,2 |
| red-eyed vireo | *Vireo olivaceus* | | 1,2 |
| yellow-green vireo | *Vireo flavoviridis* | | 1,2 |
| mountain chickadee | *Poecile gambeli* | | 1,2 |
| plain (oak) titmouse | *Baeolophus inornatus* | | 1,2 |
| bushtit | *Psaltriparus minimus minimus* | | 1,2 |
| pygmy nuthatch | *Sitta pygmaea* | | 1,2 |
| red-breasted nuthatch | *Sitta canadensis* | | 1,2 |
| white-breasted nuthatch | *Sitta carolinensis aculeata* | | 1,2 |
| brown creeper | *Certhia americana* | | 1,2 |
| coastal cactus wren | *Campylorhynchus brunneicapillus couesi* | *,CSC,MSCP | 1,2 |
| rock wren | *Salpinctes obsoletus obsoletus* | | 1,2 |
| marsh wren | *Cistothorus palustris* | | 1,2 |
| Bewick's wren | *Thyromanes bewickii* | | 1,2 |
| winter wren | *Troglodytes troglodytes* | | 1,2 |
| house wren | *Troglodytes aedon parkmanii* | | 1,2 |
| gray catbird | *Dumetella carolinensis* | | 1,2 |
| northern mockingbird | *Mimus polyglottos* | | 1,2 |
| sage thrasher | *Oreoscoptes montanus* | | 1,2 |
| brown thrasher | *Toxostoma rufum* | | 1,2 |
| Bendire's thrasher | *Toxostoma bendirei* | CSC,PIF | 1,2 |
| California thrasher | *Toxostoma redivivum redivivum* | | 1,2 |
| western bluebird | *Sialia mexicana occidentalis* | MSCP | 1,2 |
| mountain bluebird | *Sialia currucoides* | | 1,2 |
| Townsend's solitaire | *Myadestes townsendi townsendi* | | 1,2 |
| Swainson's thrush | *Catharus ustulata* | | 1,2 |
| hermit thrush | *Catharus guttatus* | | 1,2 |

*Wildlife species detected or possibly occurring on Naval Base Point Loma. (Continued)*

| Common Name | *Scientific Name* | Status | Source |
|---|---|---|---|
| wood thrush | *Hylocichla mustelina* | | 1,2 |
| varied thrush | *Ixoreus naevius* | | 1,2 |
| gray-cheeked thrush | *Catharus minimus* | | 1,2 |
| American robin | *Turdus migratorius propinquus* | | 1,2 |
| wrentit | *Chamaea fasciata henshawi* | | 1,2 |
| golden-crowned kinglet | *Regulus satrapa* | | 1,2 |
| ruby-crowned kinglet | *Regulus calendula* | | 1,2 |
| blue-gray gnatcatcher | *Polioptila caerulea* | | 1,2 |
| coastal California gnatcatcher | *Polioptila californica californica* | FT,CSC,MSCP | 1,2,3 |
| American pipit | *Anthus rubescens* | | 1,2 |
| red-throated pipit | *Anthus cervinus* | | 1,2 |
| cedar waxwing | *Bombycilla cedrorum* | | 1,2 |
| phainopepla | *Phainopepla nitens lepida* | | 1,2 |
| pine siskin | *Carduelis pinus pinus* | | 1,2 |
| American goldfinch | *Carduelis tristis salicamans* | | 1,2 |
| lesser goldfinch | *Carduelis psaltria* | | 1,2 |
| Lawrence’s goldfinch | *Carduelis lawrencei* | PIF | 1,2 |
| purple finch | *Carpodacus purpureus californicus* | | 1,2 |
| Cassin’s finch | *Carpodacus cassinii* | | 1,2 |
| house finch | *Carpodacus mexicanus frontalis* | | 1,2 |
| red crossbill | *Loxia curvirostra* | | 1,2 |
| evening grosbeak | *Coccothraustes vespertinus* | | 1,2 |
| black-and-white warbler | *Mniotilta varia* | | 1,2 |
| blue-winged warbler | *Vermivora pinus* | | 1,2 |
| golden-winged warbler | *Vermivora chrysoptera* | | 1,2 |
| Tennessee warbler | *Vermivora peregrina* | | 1,2 |
| orange-crowned warbler | *Vermivora celata* | | 1,2 |
| Nashville warbler | *Vermivora ruficapilla* | | 1,2 |
| Virginia’s warbler | *Vermivora virginiae* | CSC,PIF | 1,2 |
| Lucy’s warbler | *Vermivora luciae* | PIF | 1,2 |
| parula warbler | *Parula americana* | | 1,2 |
| yellow warbler | *Dendroica petechia* | CSC | 1,2 |
| chestnut-sided warbler | *Dendroica pensylvanica* | | 1 |
| cerulean warbler | *Dendroica cerulea* | | 1,2 |
| black-throated blue warbler | *Dendroica caerulescens* | | 1,2 |
| pine warbler | *Dendroica pinus pinus* | | 1,2 |
| Grace’s warbler | *Dendroica graciae graciae* | | 1,2 |
| yellow-throated warbler | *Dendroica dominica* | | 1,2 |
| black-throated gray warbler | *Dendroica nigrescens* | | 1 |
| Townsend’s warbler | *Dendroica townsendi* | | 1,2 |
| hermit warbler | *Dendroica occidentalis* | PIF | 1,2 |
| black-throated green warbler | *Dendroica virens virens* | | 1,2 |
| prairie warbler | *Dendroica discolor discolor* | | 1,2 |
| Cape May warbler | *Dendroica tigrina* | | 1 |
| blackburnian warbler | *Dendroica fusca* | | 1,2 |
| magnolia warbler | *Dendroica magnolia* | | 1 |
| yellow-rumped warbler | *Dendroica coronata* | | 1 |
| palm warbler | *Dendroica palmarum* | | 1,2 |
| blackpoll warbler | *Dendroica striata* | | 1,2 |
| bay-breasted warbler | *Dendroica castanea* | | 1,2 |
| American redstart | *Setophaga ruticilla* | | 1,2 |
| ovenbird | *Seiurus aurocapillus* | | 1,2 |
| northern waterthrush | *Seiurus noveboracensis* | | 1,2 |
| worm-eating warbler | *Helmitheros vermivorus* | | 1,2 |
| prothonotary warbler | *Protonotaria citrea* | | 1,2 |
| common yellowthroat | *Geothlypis trichas* | | 1,2 |
| Kentucky warbler | *Oporornis formosa* | | 1,2 |
| Connecticut warbler | *Oporornis agilis* | | 1,2 |
| mourning warbler | *Oporornis philadelphia* | | 1,2 |
| Macgillivray’s warbler | *Oporornis tolmiei* | | 1,2 |
| hooded warbler | *Wilsonia citrina* | | 1,2 |
| Wilson’s warbler | *Wilsonia pusilla* | | 1,2 |
| Canada warbler | *Wilsonia canadensis* | | 1,2 |
| red-faced warbler | *Cardellina rubrifrons* | | 1,2 |
| painted redstart | *Myioborus pictus pictus* | | 1,2 |
| yellow-breasted chat | *Icteria virens auricollis* | CSC | 1,2 |
| hepatic tanager | *Piranga flava hepatica* | CSC | 1,2 |
| summer tanager | *Piranga rubra rubra* | CSC | 1,2 |
| scarlet tanager | *Piranga olivacea* | | 1,2 |
| western tanager | *Piranga ludoviciana* | | 1,2 |
| rose-breasted grosbeak | *Pheucticus ludovicianus* | | 1,2 |
| black-headed grosbeak | *Pheucticus melanocephalus maculatus* | | 1,2 |

*Wildlife species detected or possibly occurring on Naval Base Point Loma. (Continued)*

| **Common Name** | ***Scientific Name*** | **Status** | **Source** |
|---|---|---|---|
| northern cardinal | *Cardinalis cardinalis* | | 1 |
| blue grosbeak | *Guiraca caerulea salicaria* | | 1,2 |
| indigo bunting | *Passerina cyanea* | | 1,2 |
| lazuli bunting | *Passerina amoena* | | 1,2 |
| painted bunting | *Passerina ciris* | | 1,2 |
| dickcissel | *Spiza americana* | | 1,2 |
| green-tailed towhee | *Pipilo chlorurus* | | 1,2 |
| spotted towhee | *Pipilo erythrophthalmus* | | 1,2 |
| California towhee | *Pipilo crissalis* | | 1,2 |
| black-throated sparrow | *Amphispiza bilineata deserticola* | | 1,2 |
| Bell's sage sparrow | *Amphispiza belli belli* | FSC,CSC,PIF | 1,2 |
| southern California rufous-crowned sparrow | *Aimophila ruficeps canescens* | FSC,CSC,MSCP | 1,2 |
| tree sparrow | *Spizella arborea* | | 1,2 |
| chipping sparrow | *Spizella passerina* | PIF | 1,2 |
| clay-colored sparrow | *Spizella pallida* | | 1,2 |
| Brewer's sparrow | *Spizella breweri* | PIF | 1,2 |
| black-chinned sparrow | *Spizella atrogularis cana* | PIF | 1,2 |
| lark sparrow | *Chondestes grammacus strigatus* | | 1,2 |
| vesper sparrow | *Pooecetes gramineus* | | 1,2 |
| savannah sparrow | *Passerculus sandwichensis* | | 1,2 |
| Baird's sparrow | *Ammodramus bairdii* | | 1,2 |
| grasshopper sparrow | *Ammodramus savannarum perpallidus* | * | 1,2 |
| fox sparrow | *Passerella iliaca* | | 1,2 |
| song sparrow | *Melospiza melodia* | | 1,2 |
| Lincoln's sparrow | *Melospiza lincolnii* | | 1,2 |
| swamp sparrow | *Melospiza georgiana* | | 1,2 |
| Harris' sparrow | *Zonotrichia querula* | | 1,2 |
| white-crowned sparrow | *Zonotrichia leucophrys* | | 1,2 |
| white-throated sparrow | *Zonotrichia albicollis* | | 1,2 |
| golden-crowned sparrow | *Zonotrichia atricapilla* | | 1,2 |
| lark bunting | *Calamospiza melanocorys* | | 1,2 |
| dark-eyed junco | *Junco hyemalis* | | 1,2 |
| lapland longspur | *Calcarius lapponicus alascensis* | | 1,2 |
| chestnut-collared longspur | *Calcarius ornatus* | | 1,2 |
| bobolink | *Dolichonyx oryzivorus* | | 1,2 |
| western meadowlark | *Sturnella neglecta* | | 1,2 |
| red-winged blackbird | *Agelaius phoeniceus* | | 1,2 |
| tricolored blackbird | *Agelaius tricolor* | FSC,CSC,MSCP | 1,2 |
| yellow-headed blackbird | *Xanthocephalus xanthocephalus* | | 1,2 |
| rusty blackbird | *Euphagus carolinus carolinus* | | 1,2 |
| Brewer's blackbird | *Euphagus cyanocephalus* | | 1,2 |
| great-tailed grackle | *Quiscalus mexicanus* | | 2 |
| common grackle | *Quiscalus quiscula* | | 2 |
| brown-headed cowbird | *Molothrus ater* | | 1,2 |
| Scott's oriole | *Icterus parisorum* | | 1,2 |
| hooded oriole | *Icterus cucullatus* | | 1,2 |
| northern oriole | *Icterus galbula* | | 1 |
| orchard oriole | *Icterus spurius* | | 1,2 |
| **Introduced Bird Species** | | | |
| spotted dove | *Streptopelia chinensis* | | 1,2 |
| European starling | *Sturnus vulgaris* | | 1,2 |
| house sparrow | *Passer domesticus* | | 1 |
| parrot | *Amazona* sp. | | 1 |
| macaw | *Ara* sp. | | 1 |
| Mexican green parrots | *Amazona* sp. | | 1 |
| green parakeet | *Aratinga holochlora* | | 1 |
| mitred parakeet | *Aratinga mitrata* | | 1 |
| blue-crowned parakeet | *Aratinga acuticaudata* | | 1 |
| **Mammals** | | | |
| desert gray shrew | *Notiosorex crawfordi crawfordi* | | 1,2 |
| western mastiff bat | *Eumops perotis californicus* | FSC,CSC,MSCP | 1,2,3 |
| Mexican free-tailed bat | *Tadarida brasiliensis* | | 1,2 |
| red bat | *Lasiurus borealis teliotus* | | 1 |
| Mexican long-tongued bat | *Choeronycteris mexicana* | CSC | 1 |
| myotis | *Myotis spp.* | | 1 |
| desert cottontail rabbit | *Sylvilagus audubonii* | | 1,2,3 |
| raccoon | *Procyon lotor* | | 1,2,3 |
| California ground squirrel | *Spermophilus beecheyi* | | 1,2,3 |
| southwestern pocket gopher | *Thomomys bottae* | | 1 |
| San Diego pocket mouse | *Chaetodipus fallax* | FSC,CSC | 1,2,3 |
| Pacific kangaroo rat | *Dipodomys agilis* | | 1 |
| dusky-footed woodrat | *Neotoma fuscipes* | | 1,2 |

*Wildlife species detected or possibly occurring on Naval Base Point Loma. (Continued)*

| Common Name | *Scientific Name* | Status | Source |
|---|---|---|---|
| brush mouse | *Peromyscus boylii* | | 1,2 |
| California mouse | *Peromyscus californicus* | | 1,2 |
| cactus mouse | *Peromyscus eremicus* | | 1,2 |
| deer mouse | *Peromyscus maniculatus* | | 1,2 |
| western harvest mouse | *Reithrodontomys megalotis* | | 1,2 |
| California vole | *Microtus californicus* | | 1,2 |
| coyote | *Canis latrans* | | 1,2,3 |
| gray fox | *Urocyon cinereoargenteus* | | 1,2,3 |
| striped skunk | *Mephitis mephitis* | | 1,2,3 |
| western spotted skunk | *Spilogale gracilis* | | 1 |
| bobcat | *Felis rufus* | | 1 |
| California sea lion | *Zalophus califorinianus* | MMPA | 1,2 |
| harbor seal | *Phoca vitulina* | MMPA | 1,2 |
| **Introduced Mammal Species** | | | |
| opossum | *Didelphis virginiana* | | 1 |
| feral cat | *Felis catus* | | 1,3 |
| black (= roof) rat | *Rattus rattus* | | 1,3 |
| house mouse | *Mus musculus* | | 1,2,3 |

*Terrestrial invertebrate species detected on Naval Base Point Loma.*

| Common Name | *Scientific Name* | Source |
|---|---|---|
| **Order Collembola–Springtails** | | |
| Springtails | *Isotoma* sp. | 1 |
| **Order Microcoryphia–Jumping Bristletails** | | |
| Bristletails | *Machilinus* sp. | 1 |
| **Order Thysanoptera–Thrips** | | |
| Western flower thrips | *Frankliniella* sp. | 1 |
| **Order Ephemeroptera** | | |
| Mayflies | *Family Baetidae* | 1 |
| **Order Odonata–Dragonflies and Damselflies** | | |
| Big red skimmer | *Libellula saturata* | 1 |
| Common green darner | *Aeshna multicolor* | 1 |
| Dancer | *Argia* sp. | 1 |
| Dancer | *Enallagma* sp. | 1 |
| Dancer | *Ischnura* sp. | 1 |
| Multicolored darner | *Anax junius* | 1 |
| Pastel skimmer | *Sympetrum coruptum* | 1 |
| Skimmer | *Libellula croceipennis* | 1 |
| Skimmer | *Pachydiplax* | 1 |
| Skimmer | *Tramea lascerata* | 1 |
| **Order Orthoptera–Grasshoppers and Crickets** | | |
| European house cricket | *Acheta domesticus* | 1 |
| Field crickets | *Gryllus* sp. | 1 |
| Fork-tailed bush katydid | *Scudderia mexicana* | 1 |
| Grasshopper | *Melaoplus* sp. | 1 |
| Grasshopper | *Trimarotropis* sp. | 1 |
| Gray bird grasshopper | *Schistocerca nitens* | 1 |
| Tree crickets | *Oecanthus* sp. | 1 |
| Western tailed blue | *Everes amyntula* | 1 |
| Western Tussock moth | *Orgyia cana* | 1 |
| White-lined sphinx | *Hyles lineatas* | 1 |
| Yellow-striped armyworm | *Spodoptera* | 1 |
| **Order Mantodea–Mantids** | | |
| California mantis | *Stagmomantis* sp. | 1 |
| European mantis | *Iris oratoria* | 1 |
| **Order Blattodea–Cockroaches** | | |
| American cockroach | *Periplaneta americana* | 1 |
| Field roach | *Blattella vaga* | 1 |
| German cockroach | *Blattella germanica* | 1 |
| Oriental cockroach | *Blatta orientalis* | 1 |
| **Order Isoptera–Termites** | | |
| Termites | *Amitermes wheeleri* | 1 |
| Western drywood termite | *Incistermes minor* | 1 |
| Western subterranean termite | *Reticulitermes* | 1 |
| **Order Dermaptera** | | |
| Earwig | *Eristalis tenax* | 1 |
| European earwig | *Forficula auricularia* | 1 |
| Ring-legged earwig | *Euborellia annulipes* | 1 |

*Terrestrial invertebrate species detected on Naval Base Point Loma.*

| Common Name | *Scientific Name* | Source |
|---|---|---|
| **Order Embiidina–Webspinners** | | |
| Webspinners | *Oligotomidae* sp. | 1 |
| **Order Psocoptera—Psocids** | | |
| Psocids | *Family Liposcelidae* | 1 |
| **Hemiptera–True Bugs** | | |
| Assassin bug | *Zelus* sp. | 1 |
| Bee assassin | *Apiomerus crassipes* | 1 |
| Big-headed bug | *Geocoris* sp. | 1 |
| Bordered plant bug | *Largus cinctus* | 1 |
| Burrower bug | *Pangaeus* sp. | 1 |
| False chinch bug | *Nyssius raphanus* | 1 |
| Harlequin bug | *Murgantia histrionica* | 1 |
| Harlequin bug | *Thyanta* sp. | 1 |
| Lace bug | *Family Tingidae* | 1 |
| Leaf-legged bug | *Leptoglossus* sp. | 1 |
| **Hemiptera–True Bugs** | | |
| Milkweed bug | *Lygaeus kalmii* | 1 |
| Minute pirate bug | *Family Anthocoridae* | 1 |
| Negro bug | *Corimelaena* sp. | 1 |
| Plant bug | *Lygus* sp. | 1 |
| Plant bug | *Rhinacloa* sp. | 1 |
| Say's stink bug | *Chlorochroa sayi* | 1 |
| Scentless plant bug | *Arhyssus* sp. | 1 |
| Squash bug | *Anasa tristis* | 1 |
| Stink bug | *Brochymena* sp. | 1 |
| **Order Homoptera–Cicadas, Hoppers, Whiteflies, Aphids, Scale Insects** | | |
| Cottony-cushion scale | *Icerya purchasi* | 1 |
| Flat planthoppers | *Flatidae* | 1 |
| Froghoppers | *Cercopidae* | 1 |
| Jumping plant lice | *Psyllidae* | 1 |
| Mealybugs | *Pseudococcus* sp. | 1 |
| Rose aphid | *Microsiphum rosae* | 1 |
| Smoke tree leafhopper | *Homalodisca lacerta* | 1 |
| Soft scales | *Coccidae* | 1 |
| Spittlebugs | *Aphrophora* sp. | 1 |
| California red scale | *Aonidiella aurantii* | 1 |
| Treehoppers | *Membracidae* | 1 |
| Van Duzee's cicada | *Okanogana vanduzeei* | 1 |
| Whiteflies | *Aleyrodidae* | 1 |
| **Order Thysanptera–Silverfish** | | |
| Silverfish | *Lepisma saccharia* | 1 |
| **Order Neuroptera–Lacewings, Antlions, and Dobsonflies** | | |
| Ant lions | *Brachynemurus* sp. | 1 |
| Brown lacewings | *Hemerobius* sp. | 1 |
| Brown lacewings | *Micromus* sp. | 1 |
| Green lacewings | *Chrysoperla* sp. | 1 |
| **Order Coleoptera–Beetles** | | |
| Ashy gray ladybird | *Olla v-nigrum* | 1 |
| California ladybird | *Coccinella californica* | 1 |
| Carpet beetle | *Anthrenus* | 1 |
| Click beetles | *Conoderus exsul* | 1 |
| Convergent ladybird | *Hippodamia* | 1 |
| Darkling beetle | *Cratidus osculans* | 1 |
| Darkling beetle | *Eleodes nigropilosis* | 1 |
| Darkling beetle | *Eleodes omissus* | 1 |
| Darkling beetle | *Eleodes* sp. | 1 |
| Darkling beetle | *Helops confluens* | 1 |
| Eucalyptus longhorn | *Phoracantha* | 1 |
| Fuller's rose weevil | *Asynonychus* | 1 |
| Green june beetle | *Continus mutibilis* | 1 |
| Ground beetle | *Calosoma semilaeve* | 1 |
| Ground beetle | *Calathus ruficollis* | 1 |
| Ground beetle | *Tanystoma maculicolle* | 1 |
| Ironclad beetle | *Phloeodes pustulosus* | 1 |
| Ladybird beetle | *Cycloneda munda* | 1 |
| Leaf beetle | *Altica foliacea* | 1 |
| Leaf beetle | *Coscinoptera* sp. | 1 |
| Leaf beetle | *Diabrotica balteata* | 1 |
| Leaf beetle | *Diachus auratus* | 1 |
| Leaf beetle | *Lema trilineata* | 1 |
| Leaf beetle | *Microrhopala* | 1 |
| Leaf beetle | *Saxinus saucia* | 1 |

*Terrestrial invertebrate species detected on Naval Base Point Loma.*

| Common Name | *Scientific Name* | Source |
|---|---|---|
| Leaf beetle | *Trihabda* sp. | 1 |
| Longhorn beetle | *Ipochus fasciculatus* | 1 |
| Longhorn beetle | *Lepturinae* sp. | 1 |
| May beetles | *Cyclocephala* sp. | 1 |
| Powder-post beetle | *Lyctidae* | 1 |
| Rove beetles | *Cafius* sp. | 1 |
| Scarab beetle | *Diplotaxis* sp. | 1 |
| Scarab beetle | *Serica* sp. | 1 |
| Seed beetle | *Acanthoscelides* | 1 |
| Soft-winged flower beetle | *Melyridae* | 1 |
| Soldier beetle | *Cantharidae* | 1 |
| **Order Coleoptera–Beetles** | | |
| Spotted cucumber beetle | *Diabrotica* | 1 |
| Tumbling flower beetle | *Mordella* sp. | 1 |
| Twig borers | *Bostrichidae* | 1 |
| Two-stabbed ladybird | *Chilocorus orbus* | 1 |
| Vegetable weevil | *Listroderes* sp. | 1 |
| **Order Siphonaptera–Fleas** | | |
| Fleas | *Siphonaptera* | 1 |
| **Order Diptera–Flies** | | |
| Bathroom fly | *Clogmia albipunctata* | 1 |
| Beach fly | *Fucellia* sp. | 1 |
| Bee fly | *Bombylius* sp. | 1 |
| Bee fly | *Conophorus* sp. | 1 |
| Bee fly | *Heterostylum* sp. | 1 |
| Bee fly | *Villa* sp. | 1 |
| Big black horse fly | *Tabanus punctifer* | 1 |
| Blow fly | *Cochliomyia* | 1 |
| Blue bottle fly | *Calliphora* sp. | 1 |
| Bumble bee conopid | *Physocephala texana* | 1 |
| Bumblebee robber fly | *Mallophora fautrix* | 1 |
| Cactus fly | *Copestylum mexicana* | 1 |
| Chloropid fly | *Chloropidae* | 1 |
| Flesh fly | *Sarcophagidae* | 1 |
| Fruit fly | *Trupanea* sp. | 1 |
| Green bottle fly | *Phaenicia sericata* | 1 |
| House fly | *Musca domestica* | 1 |
| Humpbacked fly | *Phoridae* | 1 |
| Leaf-miner fly | *Agromyzidae* | 1 |
| Long-legged fly | *Dolichopodidae* | 1 |
| March fly | *Bibionidae* | 1 |
| Mosquito | *Culicidae* | 1 |
| Mydas fly | *Pseudonomoneura* | 1 |
| Picture-winged fly | *Pogonartalis doclea* | 1 |
| Pomace fly | *Drosophila* sp. | 1 |
| Robber fly | *Cophura vanduzeei* | 1 |
| Robber fly | *Procantacanthus* | 1 |
| Seaweed fly | *Coelopa* sp. | 1 |
| Shore fly | *Ephydridae* | 1 |
| Stable fly | *Stomoxys calcitrans* | 1 |
| Tachinid fly | *Archytas apicifer* | 1 |
| Vinegar fly | *Drosophila* | 1 |
| Water midge | *Chironomidae* | 1 |
| Window fly | *Hermetia illucens* | 1 |
| **Order Lepidoptera–Butterflies and Moths** | | |
| Acmon blue butterfly | *Plebejus acmon* | 1 |
| Alfalfa looper moth | *Autographa californica* | 1 |
| Alfalfa sulfur butterfly | *Colias eurytheme* | 1 |
| Anise swallowtail | *Papilio zelicaon* | 1 |
| Armyworm moth | *Pseudaletia unipuncta* | 1 |
| Beet armyworm moth | *Spodoptera exigua* | 1 |
| Bernardino blue butterfly | *Euphilotes battoides bernardino* | 1 |
| Black cutworm moth | *Agrotis iosilon* | 1 |
| Bramble hairstreak | *Callophyrs dumetorum* | 1 |
| Buckeye butterfly | *Precis coenia* | 1 |
| Cabbage looper moth | *Trichoplusia ni* | 1 |
| Checkered white | *Pieris protodice* | 1 |
| Chocolate looper moth | *Autographa biloba* | 1 |
| Common hairstreak | *Strymon melinus* | 1 |
| Corn earworm moth | *Helicoverpa zea* | 1 |
| Dainty dwarf butterfly | *Nathalis iole* | 1 |
| Eufala skipper butterfly | *Hylephila phyleus* | 1 |

*Terrestrial invertebrate species detected on Naval Base Point Loma.*

| Common Name | *Scientific Name* | Source |
|---|---|---|
| European cabbage white | *Pieris rapae* | 1 |
| Field skipper butterfly | *Apatelodes campestris* | 1 |
| Fiery skipper butterfly | *Heliopetes ericetorum* | 1 |
| Funeral duskywing | *Erynnis funeralis* | 1 |
| Gelechiid moth | *Gelechiidae* | 1 |
| Genista moth | *Uresiphita reversalis* | 1 |
| Giant swallowtail | *Papilio cresphontes* | 1 |
| Granualte cutworm moth | *Agrotis subterranea* | 1 |
| Gulf fritillary butterfly | *Agraulis vanillae* | 1 |
| Indian meal moth | *Plodia interpunctella* | 1 |
| Large white skipper | *Heliopetes ericetorum* | 1 |
| MacDunnough’s pero | *Pero macdunnoughi* | 1 |
| Marine blue butterfly | *Leptotes marina* | 1 |
| **Order Lepidoptera–Butterflies and Moths** | | |
| Meal moth | *Pyrausta depalis* | 1 |
| Measuring worm moth | *Camptogramma* | 1 |
| Measuring worm moth | *Drepanulatrix* sp. | 1 |
| Measuring worm moth | *Euphyia implicata* | 1 |
| Measuring worm moth | *Eupithecia* sp. | 1 |
| Measuring worm moth | *Itame* sp. | 1 |
| Measuring worm moth | *Platea californica* | 1 |
| Measuring worm moth | *Semiothias* sp. | 1 |
| Measuring worm moth | *Stamnodes* sp. | 1 |
| Medusa moth | *Gloveria medusa* | 1 |
| Mexican tiger moth | *Apantesis proxima* | 1 |
| Monarch butterfly | *Danaus plexippus* | 1 |
| Moon umber moth | *Zale lunata* | 1 |
| Mormon metalmark | *Apodemia mormo* | 1 |
| Mournful duskywing | *Erynnis funeralis* | 1 |
| Mourning-cloak butterfly | *Nymphalis antiopa* | 1 |
| Navel orange worm | *Amyelois transitella* | 1 |
| Nicippe yellow butterfly | *Eurema nicippe* | 1 |
| Omnivorous looper moth | *Sabulodes aegrotata* | 1 |
| Owlet moth | *Apamea cinefacta* | 1 |
| Owlet moth | *Euacontia semirufa* | 1 |
| Owlet moth | *Heliothis virescens* | 1 |
| Owlet moth | *Hemeroplanis finitima* | 1 |
| Owlet moth | *Orthodes* sp. | 1 |
| Painted tiger moth | *Arachinis picta* | 1 |
| Painted lady butterfly | *Vanessa cardui* | 1 |
| Plume moth | *Pterophoridae* | 1 |
| Pygmy blue butterfly | *Brephidium exilis* | 1 |
| Pyralid moth | *Jocara trabalis* | 1 |
| Pyralid moth | *Pyrausta depalis* | 1 |
| Red admiral butterfly | *Vanessa atalanta* | 1 |
| Sandhill skipper | *Polites sabuleti* | 1 |
| Senna sulfur butterfly | *Phoebis sennae* | 1 |
| Southern blue butterfly | *Glaucopsyche lygdamus australis* | 1 |
| Tiger swallowtail | *Papilio rutulus* | 1 |
| Tobacco hornworm | *Manduca sexta* | 1 |
| Tortricid moth | *Amorbia cuneana* | 1 |
| Umber skipper butterfly | *Paratrytone melane* | 1 |
| Variegated cutworm | *Peridroma saucia* | 1 |
| Virginia lady butterfly | *Vanessa virginiensis* | 1 |
| Wandering skipper | *Panoquina errans* | 1 |
| West coast lady | *Vanessa annabella* | 1 |
| Western checkered skipper | *Pyrgus albescens* | 1 |
| Western elfin butterfly | *Incisalia augustinus* | 1 |
| Woodland skipper | *Ochlodes sylvanoides* | 1 |
| **Order Hymenoptera–Bees, Wasps, and Ants** | | |
| American sand wasp | *Bembix americana* | 1 |
| Andrenid bee | *Andrena* sp. | 1 |
| Carpenter ant | *Camponotus festinatus* | 1 |
| Ant | *Formica* sp. | 1 |
| Argentine ant | *Irdomyrmex humilis* | 1 |
| Ant | *Liometopum* | 1 |
| Harvester ant | *Pogonomyrmex* | 1 |
| Ant | *Pseudomyrmex apache* | 1 |
| Thief ant | *Solenopsis molesta* | 1 |
| Southern fire ant | *Solenopsis xyloni* | 1 |
| Aphid wasp | *Aphidius* sp. | 1 |
| Blue mud wasp | *Chalybion* sp. | 1 |

*Terrestrial invertebrate species detected on Naval Base Point Loma.*

| Common Name | Scientific Name | Source |
|---|---|---|
| Braconid wasp | *Braconidae* | 1 |
| California bumble bee | *Bombus californicus* | 1 |
| California velvet ant | *Dasymutilla* | 1 |
| Cuckoo wasp | *Chrysididae* | 1 |
| Digger bee | *Anthophora* sp. | 1 |
| Digger bee | *Diadasi* sp. | 1 |
| Digger bee | *Melissodes* sp. | 1 |
| Edward's bumble bee | *Labiduridae riparia* | 1 |
| Electra buckmouth | *Bombus edwardsii* | 1 |
| Encyrtid wasp | *Encyrtidae* | 1 |
| Eulophid wasp | *Eulophidae* | 1 |
| Gall wasp | *Cynipidae* | 1 |
| Golden paper wasp | *Polistes fuscatus* | 1 |
| Halicitid bee | *Dialictus* sp. | 1 |
| Halicitid bee | *Duforea* sp. | 1 |
| Halicitid bee | *Halictus so.* | 1 |
| Halicitid bee | *Lasioglossum* sp. | 1 |
| Honey bee | *Apis melifera* | 1 |
| Ichneumonid wasp | *Paracentrobia* sp. | 1 |
| Ichneumonid wasp | *Trichogramma* sp. | 1 |
| Large blue mud dauber | *Chlorion aerarium* | 1 |
| Leafcutting bee | *Anthidium* sp. | 1 |
| Leafcutting bee | *Chalicodoma* sp. | 1 |
| Leafcutting bee | *Megachile* sp. | 1 |
| Leafcutting bee | *Osmia* sp. | 1 |
| Metallic sweat bee | *Agapostemon* sp. | 1 |
| Mud dauber wasp | *Sceliphron* | 1 |
| Paper wasp | *Ancistrocerus* sp. | 1 |
| Plasterer bee | *Colletes* sp. | 1 |
| Platygasterid wasp | *Platygasteridae* | 1 |
| Pteromalid wasp | *Pteromalidae* | 1 |
| Sand wasp | *Bembix comata* | 1 |
| Sawfly | *Tenthredinidae* | 1 |
| Scelionid wasp | *Scelionidae* | 1 |
| Sonoran bumble bee | *Bombus sonorus* | 1 |
| Sphecid wasp | *Podalonia argentifrons* | 1 |
| Sphecid wasp | *Podalonia* sp. | 1 |
| Sphecid wasp | *Prionyx* sp. | 1 |
| Sphecid wasp | *Psammaecius* sp. | 1 |
| Sphecid wasp | *Sphex ichneumoneus* | 1 |
| Sphecid wasp | *Tachysphex* sp. | 1 |
| Spider wasp | *Anoplius* sp. | 1 |
| Spider wasp | *Aporinellus* sp. | 1 |
| Spider wasp | *Aporus* sp. | 1 |
| Spider wasp | *Pepsis* sp. | 1 |
| Thread-waisted wasps | *Ammophila* sp. | 1 |
| Tiphiid wasp | *Brachycistis* sp. | 1 |
| Valley carpenter bee | *Xylocopa varipuncta* | 1 |
| Velvet ant | *Chyphotes* sp. | 1 |
| Velvet ant | *Sphaeropthalma* sp. | 1 |
| Vosnesenski's bumble bee | *Bombus vonesenskii* | 1 |
| Western paper wasp | *Polistes dorsalis* | 1 |
| Yellow-faced bee | *Hylaeus* sp. | 1 |
| Yellowjacket | *Vespula pennsylvanica* | 1 |

| | | |
|---|---|---|
| **BEPA** | = | Bald Eagle Protection Act |
| **BLM** | = | Bureau of Land Management |
| **CFP** | = | California fully protected species |
| **CSC** | = | California Department of Fish and Game species of special concern |
| **FSC** | = | Federal Species of Special Concern (former Candidate species) |
| **FE** | = | Listed as endangered by the federal government |
| **FS** | = | Forest Service sensitive |
| **FT** | = | Listed as threatened by the federal government |
| **P** | = | California Department of Fish and Game protected species |
| **SE** | = | Listed as endangered by the state of California |

| | | |
|---|---|---|
| **ST** | = | Listed as threatened by the state of California |
| ***** | = | Taxa listed with an asterisk fall into one or more of the following categories:<br>-Taxa considered endangered or rare under Section 15380(d) of CEQA guidelines<br>-Taxa that are biologically rare, very restricted in distribution, or declining throughout their range<br>-Population(s) in California that may be peripheral to the major portion of a taxon's range, but which are threatened with extirpation in California<br>-Taxa closely associated with a habitat that is declining in California at an alarming rate (e.g., wetlands, riparian, old growth forests, desert aquatic systems, native grasslands |
| **PIF** | = | Partners in Flight: A coalition of state, federal, and private sector organizations working together to protect birds of the western hemisphere |
| **MMPA** | = | Marine Mammal Protection Act |
| **MSCP** | = | City of San Diego Multiple Species Conservation Plan covered species |

| | |
|---|---|
| **1** | Naval Base Point Loma INRMP July 2002. |
| **2** | Chief Scientist of Cabrillo National Monument 2003. |
| **3** | Resouces Management Plan Cabrillo National Monument 1998. |

# Appendix D: Cultural Resources

Point Loma Cultural Resources and Fire Management Map
(*Confidential–exempt from public distribution under Freedom of Information Act*)

San Diego Metro Programmatic Agreement on
Cultural Resources

*Map D-1. Joint Wildland Fire Management Plan Cultural Resources including historical buildings, structures and archaeological sites.*

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**PROGRAMMATIC AGREEMENT**
**AMONG**
**THE COMMANDER NAVY REGION SOUTHWEST,**
**THE ADVISORY COUNCIL ON HISTORIC PRESERVATION,**
**AND THE CALIFORNIA STATE HISTORIC PRESERVATION OFFICER**
**REGARDING**
**NAVY REGION SOUTHWEST UNDERTAKINGS**
**WITHIN THE**
**SAN DIEGO METROPOLITAN AREA, CALIFORNIA**

WHEREAS, the Commander Navy Region Southwest (CNRSW) area of responsibility (AOR) in California includes, but is not limited to, the San Diego metropolitan area (Metro Area), which encompasses Naval Base Coronado, Naval Base Point Loma, Naval Base San Diego, and various satellite installations as listed below; and

WHEREAS, in order to meet its national defense mission requirements, CNRSW authorizes, carries out, or causes to be carried out a variety of undertakings within its AOR, such as: training operations; maintenance, rehabilitation, repair, construction and demolition of buildings, structures, and roads; and work regarding grounds and associated landscaping; and

WHEREAS, CNRSW has determined that certain of these undertakings may have an effect upon properties listed or eligible for listing on the National Register of Historic Places (NRHP); and

WHEREAS, pursuant to Section 800.14 of the regulations, 36 CFR 800, which implement the National Historic Preservation Act (NHPA), 16 U.S.C. 470f, Section 106, CNRSW seeks to programmatically fulfill its responsibilities under Section 106 of NHPA through development of this programmatic agreement (PA); and

WHEREAS, CNRSW will ensure coordination of all Section 106 compliance with other requirements of other statues, as applicable, including the National Environmental Policy Act (NEPA), the Archaeological Resources Protection Act (ARPA), the American Indian Religious Freedom Act (AIRFA), and the Native American Graves Protection and Repatriation Act (NAGPRA); and

WHEREAS, CNRSW has consulted with Advisory Council on Historic Preservation (ACHP), and the California State Historic Preservation Officer (SHPO); and

WHEREAS, CNRSW has consulted with the Kumeyaay Indian tribes, who may attach religious or cultural significance to historic properties within the AOR, and requested their participation as invited signatories to this PA. These Indian tribes include the Barona Band of Mission Indians, Ewiiaapaayp Band of Mission Indians, Jamul Indian Village, Manzanita Band of Mission Indians, San Pasqual Band of Mission Indians, Sycuan Band of Mission Indians, Campo Band of Mission Indians, Inaja Band of Mission Indians, LaPosta Band of Mission Indians, Mesa Grande Band of Mission Indians, Santa Ysabel Band of Diegueno Indians, and Viejas Band of Kumeyaay Indians; and

WHEREAS, individual bases and satellite facilities within the AOR lie within the jurisdictions of various local governments, including the City of Coronado, City of Imperial Beach, City of National City, City of

San Diego, and County of San Diego, CNRSW has consulted with these parties and requested their participation as invited signatories to this PA; and

WHEREAS, CNRSW has consulted with the Coronado Historical Association, National Park Service, National Trust for Historic Preservation, San Diego County Archaeological Society, Save Our Heritage Organisation, and other individuals and organizations with a demonstrated interest and has invited these parties to concur in this PA; and

WHEREAS, CNRSW is preparing Integrated Cultural Resources Management Plans (ICRMPs) addressing each of its three naval bases within the San Diego Metro Area;

NOW, THEREFORE, CNRSW, ACHP, and SHPO agree that CNRSW will undertake its national defense mission and related activities within its San Diego Metro AOR in accordance with the following stipulations for management of historic properties.

## Stipulations

In cooperation with ACHP, SHPO, and other consulting parties to this PA, CNRSW shall ensure that the following measures are carried out, as indicated:

1. This PA applies to all undertakings initiated within CNRSW's San Diego Metro AOR (see Attachments B and C). As of the date of this PA, the CNRSW San Diego Metro AOR includes the bases, installations and satellite facilities listed below. The Navy will notify the parties to this PA if bases, installations or satellite facilities are added to or deleted from coverage under this PA through the annual report developed in accordance with Stipulation 11. The addition or deletion of such bases, installations and satellite facilities does not require an amendment to the PA.

A. <u>Naval Base Coronado</u>

Naval Air Station North Island (NASNI)
Naval Amphibious Base Coronado (NAB)
Naval Radio Receiving Facility (NRRF)
Outlying Landing Field Imperial Beach (OLFIB)
Special Warfare Mountain Training Center La Posta (La Posta)

B. <u>Naval Base Point Loma</u>

Naval Submarine Base San Diego (SUBASE)
Space and Warfare Systems Center (SSC), including Old Town Campus (OTC)
Fleet Combat Training Center Pacific (FCTC)
Fleet Industrial Supply Center (FISC)
Fleet Anti-Submarine Warfare Training Center (ASW)
Fleet Intelligence Training Center (FITC)

C. <u>Naval Base San Diego</u>

Naval Station San Diego (NAVSTA)

Broadway Complex
Admiral Baker Field Recreational Area (Admiral Baker Field)

D. Off-Station Family Housing Areas (not shown on Attachments B or C)

Admiral Hartman
Bayview Hills
Beech Street Knolls
Bonita Bluffs
Cabrillo Heights
Chesterton
Chesterton Townhomes
Chollas Heights
Chollas Historical
Diamond Pointe Apartments
El Dorado Hills
Eucalyptus Ridge
Gateway Village
Hilleary Park
Holly Square Apartments
Home Terrace
Howard Gilmore Terrace
La Mesa Park
Lofgren Terrace
Mira Mesa Ridge
Murphy Canyon Heights
Paradise Gardens
Park Summit
Pomerado Terrace
Prospect View
Ramona Vista
River Place
Silver Strand I & II
Sycamore Ridge Apartments
Terrace View Villas
Villa Royale
Vista Ridge
Vista Village Apartments
Westlake Gardens Townhomes
Woodlake

2. In accordance with 36 CFR 800.2, CNRSW will ensure that all work pursuant to this PA regarding historic properties will be carried out, reviewed by, or conducted under the supervision of individuals meeting the professional qualifications standards identified in *The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation*, 36 CFR 61 (Federal Register Vol. 62, No. 119. 1997).

A. All work pursuant to this PA regarding historic buildings and structures will be carried out, reviewed by, or conducted under the supervision of a person or persons meeting the professional qualifications for Architectural Historian or Historic Architect, as defined under 36 CFR 61.

B. All work pursuant to this PA regarding prehistoric and historic archaeological resources, and any historic properties to which federally recognized Native American groups may attach religious and cultural significance, will be carried out, reviewed by, or conducted under the supervision of a person or persons meeting the professional qualifications for Archeologist, as defined under 36 CFR 61.

C. Individuals meeting the above professional qualifications are hereinafter referred to as "qualified personnel" or "qualified CNRSW personnel."

D. CNRSW will ensure that all reviews to determine if an undertaking requires further review will be carried out by persons who are either qualified personnel or have been trained and certified by qualified CNRSW personnel to conduct this review in their respective discipline.

E. Where contractors are employed to work on eligible or potentially eligible properties, CNRSW will ensure that experience in relevant aspects historic preservation will be an evaluation factor in the contractor selection process, as appropriate. Contracts may include clauses addressing appropriate historic preservation requirements developed in consultation with professionals meeting the standards of Stipulations 2.A or B. For example, appropriate historic preservation clauses may address: project planning, resource identification and evaluation, description, pre-construction surveys, professional qualifications of contractor personnel, protection of historic fabric, CNRSW supervision and oversight, and contractor accountability.

3. CNRSW shall ensure that all appropriate Navy personnel responsible for making decisions regarding the planning, construction, maintenance, preservation, or rehabilitation standards for the performance of work on properties listed or eligible for listing on the National Register receive suitable training in the application of *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (36 CFR 68).

A. CNRSW shall provide for training in implementation of the ICRMP for appropriate treatment, preservation, and protection of cultural resources, including cultural awareness training for the appropriate treatment of historic properties of religious or cultural significance to Federally recognized Indian tribes.

B. CNRSW shall develop and implement an in-house orientation program to advise appropriate Navy personnel responsible for decisions potentially affecting historic properties of the PA and its procedures regarding historic properties within the AOR.

4. Other agreements exist or may come to exist which have a bearing on properties and actions within the AOR. An agreement or other document having legal precedence will control, otherwise the agreement with the most specific provision addressing the matter at issue will control.

5. CNRSW is developing ICRMPs for each of the following complexes: Naval Base Coronado, Naval Base Point Loma, and Naval Base San Diego.

A. These ICRMPs will provide more detailed management guidance for historic properties within the CNRSW San Diego Metro AOR and better facilitate review of CNRSW undertakings in support of the Navy's national defense mission. The ICRMPs will be prepared in accordance with Navy ICRMP guidelines.

B. CNRSW will informally consult with ACHP, SHPO, and appropriate invited signatories and concurring parties in the development of each ICRMP. Following internal development and review by CNRSW, these documents will be provided to ACHP, SHPO, invited signatories and concurring parties for review and comment on the following schedule of documentation:

- 80% Draft ICRMP
- Final ICRMP

The reviewing parties will be requested to provide written comments to CNRSW within thirty calendar days of receipt. CNRSW will consider and address all comments received.

C. Procedures for the treatment of historic properties included in the ICRMPs will be developed and implemented in consonance with the standards, protocols and review processes set out in this PA. Should CNRSW choose to reconsider any treatment proposed by an ICRMP, the reconsideration will be conducted in accordance with 36 CFR 800. The ICRMPs will also include procedures and consultation protocols for compliance with requirements for compliance with historic preservation statutes and implementing regulations, as applicable, including ARPA, AIRFA, and NAGPRA.

6. Qualified CNRSW personnel shall determine and document the area of potential effect (APE) for undertakings accountable under this PA. Consistent with 36 CFR 800.16(d), an APE will be defined as the geographical area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties. Definition of APEs will be influenced by the scale and nature of the undertaking and may be different for different kinds of effects caused by an undertaking. As specified below, determination of an undertaking's APE will not require individual consultation with the SHPO or other participants in this PA. Definition of APEs for undertakings that depart from the circumstances described below will be subject to consultation with participants in this PA, consistent with 36 CFR 800.4(a)(1).

A. For undertakings limited to the construction, maintenance, repair or renovation of buildings or structures more than 100 m from a listed or eligible historic district or isolated listed or eligible building or structure, APEs will be defined as the discrete site of the undertaking and any associated lay down or staging areas.

B. For undertakings where the construction, maintenance, repair or renovation of buildings or structures will occur within a listed or eligible historic district or within 100 m of a listed or eligible historic district or isolated listed or eligible building or structure, APEs will be defined to include the historic district or isolated historic property along with the discrete construction site for the individual building or structure and any associated lay down or staging areas.

C. For undertakings involving ground disturbing activities, APEs will include the planned area surface and subsurface disturbance, including any associated lay down or staging areas and a 30-m buffer around each area of ground disturbance. If any part of a known archaeological site falls within an APE, the entire documented site will be included in the APE.

D. Except in the relevant vicinity of National Register-eligible or -listed Native American religious or cultural sites identified within the CNRSW San Diego Metro AOR, APEs will not include potential visual or acoustic effects on known or potential archaeological resources.

7. Professional investigations have identified eligible and potentially eligible properties within the CNRSW Metro AOR. In conjunction with ICRMP development and as future investigations are developed, CNRSW will determine if additional properties in the Metro AOR not previously evaluated may be eligible.

A. CNRSW acknowledges that Native Americans possess special expertise in assessing the eligibility of historic properties of religious and cultural significance to them. CNRSW will consult with affiliated Federally recognized Kumeyaay Indian groups to determine if they attach religious or cultural significance to historic properties that might be affected by Navy undertakings within the AOR.

B. If a property in the Metro AOR not previously evaluated for potential eligibility is determined by CNRSW to be eligible, CNRSW shall treat the property as eligible for Section 106 purposes. Such determination requires no SHPO review. Any such determinations will be included in the report described in Stipulation 11. CNRSW may at its discretion request SHPO review of such determination.

C. In accordance with 36 CFR 800.4 and, in consultation with the signatories to this PA, CNRSW may reevaluate the eligibility of selected historic properties previously determined eligible or ineligible for listing in the National Register. The results of any such determinations will be included in the report described in Stipulation 11.

8. CNRSW will ensure that all new construction, alterations, equipment installation, structure modifications, or repairs and maintenance on Class 1 (land) and Class 2 (buildings and structures) properties will be reviewed in accordance with CNRSW instructions for "Project Approvals for Construction, Repair, Maintenance and/or Modification of Facilities" (Attachment D). In conjunction with the Project Approval Review process, undertakings will be reviewed for potential effects to historic properties. Attachment E to this PA identifies undertakings that shall require no additional review:

A. When qualified personnel determine that an undertaking with the potential to affect historic properties will not affect listed, contributing or eligible properties consistent with a finding of "No Historic Properties Affected" under 36 CFR 800.4(d)(1), no further review under this PA and the NHPA is required. Resulting documentation will be made available upon request to the parties in accordance with Stipulation 11.

B. If qualified personnel determine that an undertaking has the potential to cause effects on historic properties but will have no adverse effect in accordance with 36 CFR 800.5(b), or if such property affected by an undertaking is treated in accordance with the Secretary of the Interior's Standards for Rehabilitation of Historic Properties, no consultation under 36 CFR 800.5 is necessary. CNRSW will monitor the project, and will document, record, and report the finding in accordance with Stipulation 11.

C. Consultation will be initiated under 36 CFR 800.6 for any undertaking which may have an adverse effect on: (a) an eligible or listed historic district; (b) an individual property listed or eligible, either individually or as a contributor to a historic district; or (c) an historic property identified to be of religious and cultural significance to a Federally recognized Native American group. CNRSW will document, record, and report findings in accordance with Stipulation 11.

D. During planning of undertakings with potentially adverse effects on historic properties, CNRSW may redesign the undertakings to avoid adverse effects in consultation with qualified personnel, thereby resolving the matter. CNRSW will document and report this decision to redesign in accordance with Stipulation 11, as appropriate.

E. If after completion of an undertaking's review pursuant to this PA or during the implementation of any previously reviewed project, CNRSW finds that it is necessary to modify the project scope or construction documents, qualified personnel shall review the proposed changes to determine if these modifications may affect a historic property. When such project changes are found to create no adverse effects to historic properties, CNRSW will document, record, and report findings in accordance with Stipulation 11, and the matter will be resolved.

F. If qualified CNRSW personnel find that the modification may result in an adverse effect, CNRSW will determine if the adverse effect can be avoided, thereby resolving the matter. If the adverse effect cannot be avoided, CNRSW will consult with parties to this PA to resolve the adverse effects in accordance with 36 CFR 800.6, or Stipulation 10 as appropriate. CNRSW will document, record, and report findings in accordance with Stipulation 11.

9. CNRSW will ensure that ground-disturbing activities include appropriate measures to protect archaeological resources.

A. As appropriate, CNRSW will provide for archaeological monitoring of ground disturbing activities within areas of known or provisional archaeological sensitivity. During the preparation of ICRMPs and in consultation with pertinent parties to this PA, CNRSW will develop maps for San Diego Metro Area installations identifying areas which will require monitoring by a qualified archaeologist, as defined in Stipulation 2.B. Conversely, the ICRMP process will explicitly map areas where existing conditions, including previous disturbance and land areas created by filling of bay or wetlands, generally preclude the potential for accountable archaeological deposits, and where, at the discretion of qualified CNRSW personnel, archaeological monitoring would not be required.

B. Any required archaeological testing or monitoring shall be implemented in accordance with an archaeological research framework developed under the ICRMP process, and in compliance with other requirements of the NHPA, ARPA, NAGPRA and their implementing regulations, including 36 CFR 79. Such archaeological testing or monitoring shall also be implemented under appropriate consultation with SHPO and any Federally recognized Kumeyaay Indian tribe that may attach religious and cultural significance to the affected historic property. CNRSW will document, record, and report on the findings of these testing and monitoring activities, and provide notice of the resulting reports in accordance with Stipulation 11.

10. CNRSW will manage discoveries, unanticipated effects, and emergencies to avoid or minimize harm to historic properties, as follows:

A. If during the performance of an undertaking, historic properties are discovered or unanticipated effects are found, CNRSW will stop work in the vicinity of the discovery until it concludes consultation consistent with Stipulation 10.C as appropriate.

B. CNRSW will establish working procedures with Navy contracting commands to ensure that:

(1) Contractors and other authorized agents engaged in ground disturbing activities will be required to stop work in the vicinity of any discovered archaeological deposit upon direction from a CNRSW-authorized archaeological monitor and/or contracting officer of the encounter of any such deposit, and

(2) Construction in the vicinity of the discovery will not be resumed until CNRSW has completed the consultation in accordance with Stipulation 10.A.

C. CNRSW will notify SHPO and other parties to the PA as appropriate as soon as practical, and will develop actions that will take the effects of the undertaking into account. CNRSW will notify these parties of any time constraints. When appropriate, CNRSW will consult with SHPO regarding which parties to the PA should be notified and consulted. CNRSW and these parties will seek to mutually agree upon the time frame for this consultation but in no instance will the consultation exceed ten working days. CNRSW will provide SHPO and other parties to the PA as appropriate with written recommendations reflecting the consultation. If the parties do not object to CNRSW's recommendations within the agreed time frame, CNRSW will modify the scope of work as necessary to implement the recommendations.

D. In the event that natural disasters, fires, spill events or other emergency events occur, CNRSW may take actions that may affect historic properties without consultation to protect life safety, stabilize any involved historic properties, and prevent further damage to property, consistent with 36 CFR 800.12. Emergency response work will be undertaken in a manner to avoid or minimize effects on historic properties to the extent possible. Should historic properties be discovered during emergency repair or response activity, work in the immediate area of the property will cease if CNRSW has determined that a work stoppage at the site will not impede emergency response activities. As early as possible given the nature of the emergency, CNRSW will provide telephonic or email notification of the emergency to the SHPO and other appropriate parties to the PA. Notification will include the steps being taken to address the emergency, the discovered property and its apparent significance, and a description of the emergency work and potential effects on the discovered property. Within 30 calendar days following this notification, CNRSW will provide SHPO and other parties to the PA as appropriate a written report documenting the actions taken to minimize effects, present status and planned treatment of the property. This action will be included in the report developed in accordance with Stipulation 11.

11. Annually for the first five years following execution of this agreement, beginning in February 2004, and biennially thereafter, CNRSW shall, by March 1, provide to all parties to this PA a report that summarizes CNRSW undertakings under this PA in relation to historic properties. Electronic reporting will be utilized as the preferred method to transmit this information.

A. The reports will include the following information, subject to the confidentiality requirements of 36 CFR Part 800.11(c) and other applicable laws:

(1) Summary of actions taken under Stipulations 7.A, B, and C; 8.B, C, and D; 9.B; and 10.C to include:

(a) Building or site number/name, location and eligibility categorization;

(b) Project name and designation with a brief description of proposed action;

(c) List of agencies or parties consulted;

(d) Date of project completion;

(e) List of any reports that present the findings of archaeological work; and

(f) Name of the reviewer with applicable date.

(2) Reports of any training given pursuant to Stipulation 3.

(3) Identification of current CNRSW points of contact and notification of any changes in key historic preservation personnel;

(4) Any recommendations to amend this PA or improve communications among the parties.

B. SHPO and ACHP may review each report and may provide CNRSW with comments. SHPO and ACHP may request additional documentation or explanations from CNRSW. CNRSW will provide timely responses to all comments and requests.

12. The ACHP and the SHPO may review activities carried out pursuant to this PA and will review such activities, if so requested. CNRSW will cooperate with ACHP and SHPO in carrying out their review responsibilities.

13. Objections to the conduct of actions under this PA will be managed through consultation:

A. Should a signatory to this PA object in writing to CNRSW regarding any action carried out or proposed with respect to the implementation of this PA, CNRSW shall consult with the objecting party. If after initiating such consultation CNRSW determines that the objection cannot be resolved through consultation, it shall forward all documentation relevant to the objection to ACHP, including CNRSW's proposed response to the objection. Within 30 calendar days after receipt of all pertinent documentation, ACHP shall exercise one of the following options:

1. Advise CNRSW that ACHP concurs in CNRSW's proposed response to the objection, whereupon CNRSW will respond to the objection accordingly;

2. Provide CNRSW with recommendations, which CNRSW shall take into account in reaching a final decision regarding its response to the objection; or

3. Notify CNRSW that the objection will be referred to ACHP membership for formal comment and proceed to refer the objection and comment within 45 calendar days. The resulting comment shall be taken into account by CNRSW in accordance with Section 110(1) of the NHPA.

B. Should ACHP not exercise one of the above options within 30 calendar days after receipt of the pertinent documentation, CNRSW may assume ACHP's concurrence in its proposed response to the objection.

C. CNRSW shall take into account any ACHP recommendation or comment provided in accordance with this stipulation with reference only to the subject of the objection; CNRSW's responsibility to carry out all actions under this PA that are not the subjects of the objection shall remain unchanged.

D. Should an objection be raised by a member of the public to any stipulation under this PA or the manner of its implementation, CNRSW shall take the objection into account and consult as needed with the objecting party, ACHP and SHPO to address or consider may be better terms the objection.

14. If any of the parties to this PA believe that the terms of the agreement cannot be carried out, or that an amendment to the terms of the agreement is required, that party shall immediately notify the other parties and request consultation to amend the PA. The process for amending the PA shall be conducted in accordance 36 CFR Part 800.14. No amendment shall take effect until authorized representatives of ACHP, SHPO, and CNRSW have executed it.

15. ACHP, SHPO, or CNRSW may terminate this PA by providing 30 calendar days written notice to the other signatories, explaining the reasons for the termination. The parties shall consult during this 30-calendar-day period to seek agreement on amendments or other actions that would avoid termination. In the event of termination, CNRSW will comply with 36 CFR 800.3 through 800.7 with regard to individual undertakings covered by this PA.

16. In accordance with 36 CFR 800.14(b)(2)(v), should CNRSW not be able to carry out the terms of this PA or if ACHP determines that the terms of this PA are not being carried out, CNRSW shall comply with 36 CFR 800.3 through 800.7 with regard to undertakings covered by this PA.

17. This PA shall expire ten years after the date of the final signature. Six months prior to the expiration date, ACHP, CNRSW, and SHPO shall review the PA for possible amendment and renewal.

18. Execution and implementation of this PA evidences that CNRSW has satisfied its Section 106 responsibilities for all undertakings relative to its national defense mission requirements, including, but not limited to training operations, maintenance, rehabilitation, repair, construction and demolition of buildings, structures, roads; and work regarding grounds and associated landscaping within the CNRSW San Diego Metro AOR.

Nothing in this agreement serves to create any right or benefit, substantive or procedural, enforceable in law or equity by a party against the United States, its officers or any person.

The Anti-Deficiency Act, 31 USC 1341, prohibits federal agencies from incurring an obligation of funds in advance of or in excess of available appropriations. Accordingly, the parties agree that any requirement for the obligation of funds arising from the terms of this agreement shall be subject to the availability of appropriated funds for that purpose, and that this agreement shall not be interpreted to require the obligation or expenditure of funds in violation of the Anti-Deficiency Act.

Each of the undersigned certifies that they have full authority to bind the party that they represent for purposes of entering into this agreement.

COMMANDER, NAVY REGION SOUTHWEST

By: ______________________ Date: 21 Feb 2003

Rear Admiral Jose Luis Betancourt Jr.
Commander, Navy Region Southwest

STATE HISTORIC PRESERVATION OFFICER

By: ______________________ for Date: 21 Feb 2003

Knox Mellon, Ph.D.
California State Historic Preservation Officer

ADVISORY COUNCIL ON HISTORIC PRESERVATION

By: ______________________ Date: 21 Feb 2003

John L. Nau, III
Chairman, Advisory Council on Historic Preservation

INVITED SIGNATORIES:

LOCAL GOVERNMENTS:

By: ______________________________ Date: __________________
Ed Kleeman, Community Development Department
City of Coronado

By: ______________________________ Date: __________________
Matt Rodriguez, City Manager
City of Imperial Beach

By: ______________________________ Date: __________________
Tom McCabe, City Manager
City of National City

By: ______________________________ Date: __________________
Gail Goldberg, Planning Department
City of San Diego Historic Resources Board
City of San Diego

By: ______________________________ Date: __________________
Gary Pryor, Director
Department of Planning and Land Use
County of San Diego

INVITED SIGNATORIES (continued):

FEDERALLY RECOGNIZED KUMEYAAY TRIBES:

By: ______________________________ Date: __________________
Clifford M. LaChappa, Sr., Chairman
Barona Band of Mission Indians

By: ______________________________ Date: __________________
Ralph Goff, Chairman
Campo Band of Kumeyaay Indians

By: ______________________________ Date: __________________
Chairman Harlan Pinto
Ewiiaapaayp Band of Mission Indians

By: ______________________________ Date: __________________
Chairwoman Rebecca Maxcy
Inaja Band of Mission Indians

By: ______________________________ Date: __________________
Chairman Kenny Meza
Jamul Indian Village

By: ______________________________ Date: __________________
Chairwoman Gwendolyn Parada
La Posta Band of Mission Indians

INVITED SIGNATORIES (continued):

FEDERALLY RECOGNIZED KUMEYAAY TRIBES:

By: ______________________________ Date: __________________

Chairman Leroy Elliott
Manzanita Band of Mission Indians

By: ______________________________ Date: __________________

Chairman Howard Maxcy
Mesa Grande Band of Mission Indians

By: ______________________________ Date: __________________

Spokesman Allen E. Lawson
San Pasqual Band of Mission Indians

By: ______________________________ Date: __________________

Chairman Ben Scerato
Santa Ysabel Band of Diegueno Indians

By: ______________________________ Date: __________________

Chairwoman Georgia Tucker
Sycuan Band of Mission Indians

By: ______________________________ Date: __________________

Chairman Steven TeSam
Viejas Band of Kumeyaay Indians

CONCURRING PARTIES:

By: ______________________________ Date: __________________

Terry DiMattio, Superintendent
National Park Service
Cabrillo National Monument

By: ______________________________ Date: __________________

Chairman Steve Banegas
Kumeyaay Cultural Repatriation Committee

By: ______________________________ Date: __________________

Page Harrington, Executive Director
Coronado Historical Association

By: ______________________________ Date: __________________

Ronald V. May, Chairman
Fort Guijarros Museum Foundation

By: ______________________________ Date: __________________

Tom Carnes, President
National City Historical Society

By: ______________________________ Date: __________________

Page Harrington
Executive Director
Coronado Historical Association

CONCURRING PARTIES (continued):

By: ______________________________ Date: __________________

Christine Gonzalez, President
San Diego County Archaeological Society

By: ______________________________ Date: __________________

Robert Witty, Executive Director
San Diego Historical Society

By: ______________________________ Date: __________________

Bruce Coons, Executive Director
Save Our Heritage Organisation

By: ______________________________ Date: __________________

Cyndi Stankowski, Director
San Diego Archaeological Center

## ATTACHMENT A: PARTICIPANTS IN THE CNRSW SAN DIEGO METRO PA

### SIGNATORIES

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California State Historic Preservation Officer
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Rear Admiral Jose Luis Betancourt Jr.
Commander, Navy Region Southwest
937 North Harbor Drive
San Diego, CA 92132-0058
(619) 532-2925

### INVITED SIGNATORIES

***Neighboring Government Agencies***:

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comdev@coronado.ca.us

Tom McCabe, City Manager
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Gail Goldberg, Director
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## ATTACHMENT A: PARTICIPANTS IN THE CNRSW SAN DIEGO METRO PA

### *INVITED SIGNATORIES (continued)*

**_Federally Recognized Indian Tribes_**

Chairman Clifford M. LaChappa
Barona Band of Mission Indians
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619.443.6612 (F) 619.443.0681

Chairman Ralph Goff
Campo Band of Mission Indians
36190 Church Road, Suite 1
Campo, CA 91906
619.478.9046 (F) 619.478.5818

Chairman Harlan Pinto
Ewiiaapaayp Band of Mission Indians
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Alpine, CA 91903
619.445.6315 (F) 619.445.9126

Chairwoman Rebecca Maxcy
Inaja Band of Mission Indians
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Escondido, CA 92025
760.747.4785 (F) 760.747.8568

Chairman Kenny Meza
Jamul Indian Village
P.O. Box 612
Jamul, CA 91935
619.669.4785 (F) 619.445.669.4817

Chairwoman Gwendolyn Parada
LaPosta Band of Mission Indians
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Boulevard, CA 91905
619.478.2113 (F) 619.478.2125

Chairman Leroy Elliott
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Boulevard, CA 91905
619.766.4930 (F) 619.766.4957

Chairman Howard Maxcy
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760.782.3818 (F) 760.782.9029

Spokesman Allen E. Lawson
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Valley Center, CA 92082
760.749.3200 (F) 760.749.3876

Chairman Ben Scerato
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Santa Ysabel, CA 92070
760.765.0845 (F) 760.765.0320

Chairwoman Georgia Tucker
Sycuan Band of Mission Indians
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El Cajon, CA 92019
619.445.2613 (F) 619.445.1927

Chairman Steven TeSam
Viejas Band of Kumeyaay Indians
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619.445.3810 (F) 619.445.5337

## ATTACHMENT A: PARTICIPANTS IN THE CNRSW SAN DIEGO METRO PA

### *CONCURRING PARTIES*

#### *Agencies*

Terry DiMattio, Superintendent
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San Diego, CA 92106-3601
(619) 557-5450
terry_dimattio@nps.gov

#### *Local Historical, Archaeological, and Native American Organizations:*

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Lakeside, CA 92040
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Ronald V. May, Chairman
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(619) 229-9743

Tom Carnes, President
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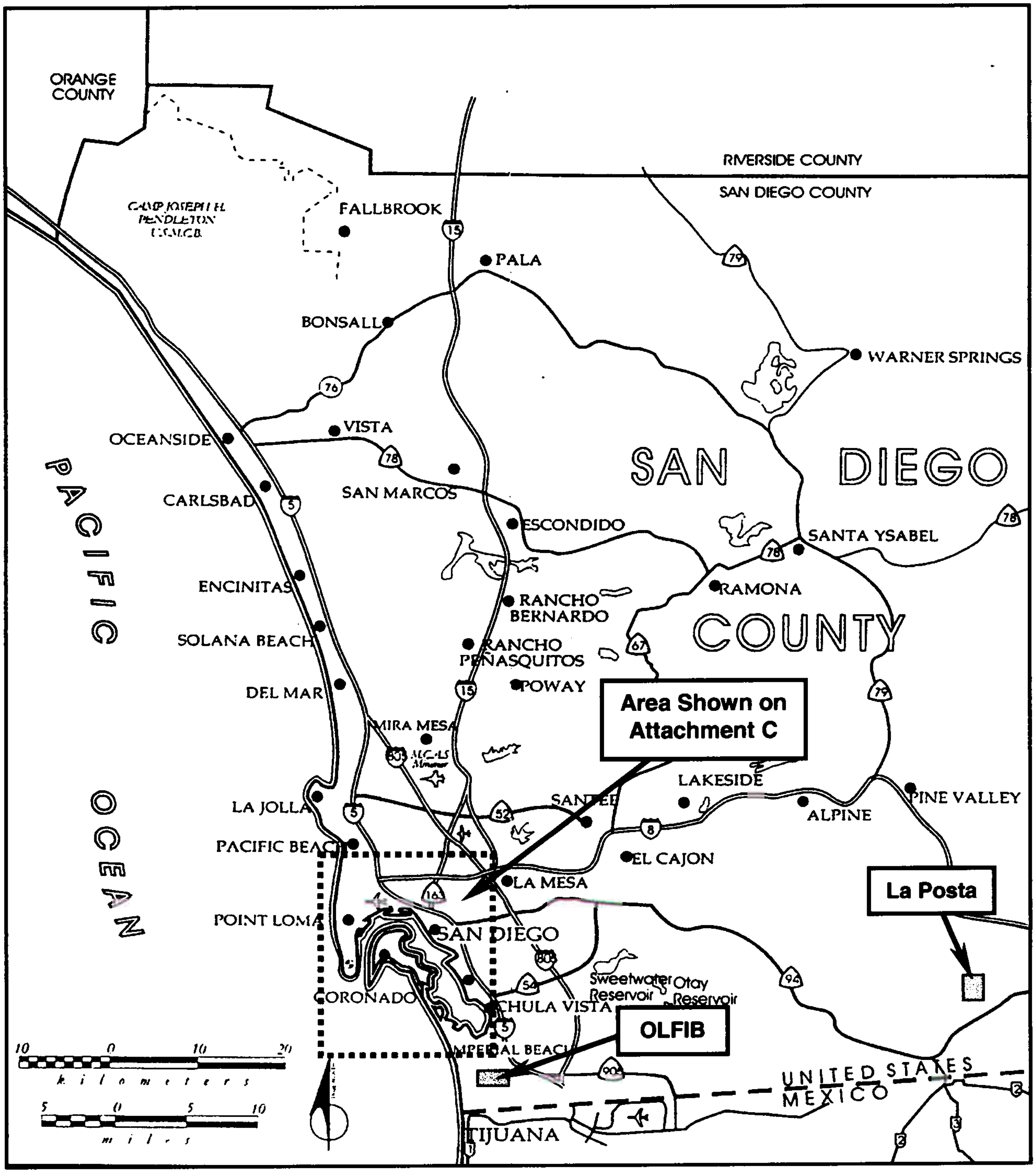


**Attachment B. Location Map for CNRSW San Diego Metro Area of Responsibility**

## Attachment C. CNRSW Installations around San Diego Bay

DEPARTMENT OF THE NAVY
COMMANDER NAVY REGION SOUTHWEST
937 NO. HARBOR DR.
SAN DIEGO, CA 92132-0058

IN REPLY REFER TO:
COMNAVREGSWINST 11010.1
N46RM
11 APR 2002

COMNAVREGSW INSTRUCTION 11010.1

Subj: PROJECT APPROVALS FOR CONSTRUCTION, REPAIR, MAINTENANCE AND/OR MODIFICATION OF FACILITIES

Ref: (a) COMNAVREGSW 130001Z APR 01
(b) NAVFACINST 11010.45
(c) OPNAVINST 11010.20F
(d) NAVFACINST 11010.44E

Encl: (1) Project Approval Checklist

1. Purpose and Scope. The purpose of this instruction is to re-establish and clarify project approval procedures for all new construction, alterations, equipment installation, structure modifications, or major repairs and maintenance on class 1 (land), class 2 (buildings), and miscellaneous re-locatable structures such as trailers, vans and Conex boxes used as temporary facilities. This instruction provides further guidance to requirements established in reference (a). This instruction is separate from the site approval requirements outlined in reference (d).

2. Discussion. Proposed work on COMNAVREGSW bases must be reviewed to ensure:

a. Compliance with references (a) through (d);

b. That the most cost effective life cycle facilities solution is selected;

c. Compliance with the National Environmental Policy Act (NEPA) and other environmental regulations;

d. Identification of existing conditions that need remediation such as asbestos and lead paint;

e. Compliance with Regional Shore Infrastructure Plan (RSIP) Functional and Activity Overview Plans, Air Installation Compatible Use Zones (AICUZ), Base Exterior Architecture Plans (BEAP), Explosive Safety Quantity Arcs (ESQA), Installation Restoration (IR) Sites, and electromagnetic and laser hazard zones;

f. Utilities (electricity, water, etc.) requirements are coordinated;

g. Compliance with historic preservation act consultation requirements or programmatic agreements;

h. As-built drawings, maintenance manuals, and property record changes are flagged for updates after project completion;

i. Compliance with operational requirements for the activity's mission.

3. Applicability. All proposed facility construction, alterations, equipment installation, structure modifications, major maintenance, major repairs, will be approved by the base Commanding Officer regardless of funding source or method of accomplishment (in-house, contractor, etc.). However, different methods of acquisition and contracting vehicles will require different levels of detail for applicable documentation. Different levels of supporting documentation in no way removes the requirement to have the project approved by the base Commanding Officer.

4. Policy. The project approval process is initiated via a request submitted to the base Public Works Officer (PWO). The project approval request will normally contain the following information:

a. Detailed project description and scope of work, project plans, drawings, specifications, and a site map showing utilities connections;

b. Quantity of utilities required (if utility requirements are known);

c. For new construction/modifications/alterations, the purpose or intended use of the facility for new construction or additions to existing facilities;

d. If excavation is required, attach draft digging permit (leave construction dates blank for later input as appropriate);

e. What actions will be taken to protect personnel and property occupying areas adjacent to the project site (as applicable);

f. A copy of Site Approval documentation, if already received;

g. Proposed funding source(s);

h. A point-of-contact with telephone number and e-mail address for any questions about the project.

5. <u>Responsibilities</u>

a. The project proponent will complete the Project Development portion of the Project Approval Checklist (see Enclosure (1)) prior to submitting the project package to the PWO. The project proponent will notify the PWO pending receipt of project funds, if funds are from a proponent-identified source. The proponent will also continuously coordinate with all parties involved throughout the life of the project, to ensure all issues are addressed to provide a usable facility that meets mission requirements.

b. The base PWO shall review the package submitted by the project proponent. If modifications to the proposed project are needed, the PWO shall identify those changes needed to the project proponent. Upon completion of project review, the PWO shall make a recommendation to the base Commanding Officer as to whether the proposed project should be approved. Upon approval of a project on an Integrated Priority List (IPL), the PWO will notify the project proponent of the approval. The PWO will notify the proponent of receipt of project funds, if funds are for an approved project listed on an IPL. The PWO shall also follow-up on all applicable project closeout items, and complete the Project Closeout portion of the Project Approval Checklist after all proposed work has been completed.

c. The base Commanding Officer shall approve or disapprove all proposed projects for the activity. Upon approval of a proposed project, the Commanding Officer will direct the PWO to add the project to the appropriate IPL for funding consideration, unless the project proponent has an existing source of funds identified. If the proponent does not have an existing source of funds identified, the project will be added to either the

Military Construction, Special Project or Specifics IPL, based upon the project's cost estimate and the funding limits for each of these IPLs.

D. C. KENDALL
Deputy and
Chief of Staff

Distribution:
www.cnrsw.navy.mil/admin/menu.htm

**PROJECT APPROVAL CHECKLIST**

| | | | |
|---|---|---|---|
| ▪ Detailed project description and scope of work. | Y | N | N/A |
| ▪ The purpose or intended use of the facility for new construction or additions to existing facilities. | Y | N | N/A |
| ▪ Project plans, drawings, specifications. | Y | N | N/A |
| ▪ Site map showing utilities connections, if available, based on acquisition method/ contracting vehicle. | Y | N | N/A |
| ▪ Quantity of utilities required (if utility requirements are known). | Y | N | N/A |
| ▪ Safety Plan. | Y | N | N/A |
| ▪ Excavation Permit attached? | Y | N | N/A |
| ▪ Site Approval attached? | Y | N | In progress |

▪ A point-of-contact with telephone number and e-mail address for any questions about the project.

Name:____________________ Phone:__________________________

▪ PWO Review and Approval

Signature: __________________________ Date: ____________

---

Public Works Use Only

Project Closeout: *Signature and date indicates the listed items have been completed or received.*

▪ Mitigation requirements are complete, and monitoring reports have been completed.

Signature: __________________________ Date: ____________

▪ Property record cards have been updated.

Signature: __________________________ Date: ____________

▪ Maintenance manuals have been received.

Signature: __________________________ Date: ____________

▪ As-built drawings have been received.

Signature: __________________________ Date: ____________

# ATTACHMENT E

# UNDERTAKINGS REQUIRING NO FURTHER REVIEW

## I. SPECIFIC UNDERTAKINGS

Provided that personnel, as described in Stipulation II, determine that the proposed work: (1) will be carried out in accordance with "*The Secretary of the Interior's Standards for the Treatment of Historic Properties*," NPS, 1997 (Standards) or (2) is excluded by a provision within this attachment, the following undertakings will not require consultation with the California State Historic Preservation Officer, the Advisory Council on Historic Preservation, or other parties to the PA. When referenced in this document, "in-kind" shall mean that the result will match visual characteristics of existing character-defining elements of historic properties.

<u>General</u>

1. Undertakings involving ground-disturbing activities outside areas of known or provisional archaeological sensitivity.
2. Undertakings involving aspects of the built environment that are not listed or eligible for listing on the National Register of Historic Places.

<u>Interior Work</u>

3. Plumbing system rehabilitation/replacement, to include pipes and fixtures in both bathrooms and kitchens.

4. Heating, ventilation, and air conditioning rehabilitation /replacement including furnaces, pipes, radiators or other heating/air conditioning units, where new equipment does not adversely affect character-defining elements or structural integrity.

5. Rehabilitation/replacement of electrical wiring including lighting, fire alarms, smoke/heat detectors, fire suppression systems, telephones, and local area network.

6. Toilet and bathroom improvements, including alterations necessary for handicap access.

7. Interior surface (floors, walls, ceiling, woodwork) treatments, providing the work is restricted to repainting, refinishing, re-papering, re-paneling, or laying carpet, linoleum, or other recognized floor systems.

8. Replacement of insulation.

9. Replacement/repair of vertical transportation systems (elevators, dumbwaiters, escalators, personnel lifts, conveyors, and hoists).

10. Repair and cleaning of flues, chimneys, and stacks.

11. Installation of modular furniture systems.

12. In-kind repair or replacement of structural members and elements.

Exterior Work

13. Repair or replacement of stucco, siding, trim, or hardware when done in-kind to match existing material and design.

14. Replacement of glass when done in-kind to match existing material and design. Where possible, replacement glass will be wavy to simulate original historic glass. Where necessary, window glass may be double or triple glazed as long as it is clear and replacement does not alter existing window glazing rabbets. This excludes the use of tinted glass, which will require consultation.

15. Repair of wood window frames by patching, splicing, consolidating or otherwise reinforcing or replacing in-kind those parts that are extensively deteriorated or are missing. The same configuration of panes will be retained.

16. Maintenance of features such as window and door frames, hood molds, paneled or decorated jambs and moldings through appropriate surface treatments, such as cleaning, rust removal, limited paint removal, and reapplication of protective coating systems.

17. Repair or replacement of roofs or parts of a roof that are deteriorated, when done in-kind to match existing material, color, and design. Adequate anchorage for roofing material to guard against wind damage and moisture penetration shall be provided.

18. Repair or replacement of porches and stairs when done in-kind to match existing material and design.

19. Installation of storm windows or screens, provided that they conform to the shape and size of historic windows and that the meeting rail coincides with that of the existing sash. Removable units installed on the interior shall be given preference. Color shall match prime window color; mill finish aluminum is not acceptable.

20. Painting exterior surfaces when the new paint matches the existing or original color. If the existing paint color is not desirable and the original color is not known, the color should be in keeping with historic color schemes. Damaged or deteriorated paint may be removed to the next sound layer, using the gentlest methods possible, such as hand scraping or hand sanding. Abrasive methods, such as sandblasting and water blasting, are not allowed.

21. Replacement or installation of caulking and weather stripping around windows, doors, walls, and roofs.

22. Repair and replacement of gutters and down spouts in-kind.

23. In-kind sidewalk, driveway and curbing repair or replacements. Care will be given to identifying and preserving historic sidewalk stamps when present.

24. Removal of exterior, wiring, conduit, wiring devices, transformers and related electrical systems.

25. Repair or removal of fire escapes, vestibules, canopies, awnings, railings, ramps, and other similar additions to historic properties that are not original character-defining elements.

26. Removal, repair-in-kind, or replacement of package air-conditioning equipment.

Other Activities

27. In-kind street, parking lot, driveway, sidewalk, curb and gutter and storm drainage structure repair or replacements.

28. Routine repairs and maintenance of piers, berths, and dry docks, including repair/replacement of dolphins, piling, decking, cleats, bollards, or capstans, aids to navigation, and related items required to maintain operational capability of vessels.

29. Routine repair and maintenance of runways, aprons, airport approach lighting systems, aircraft tie down devices, fueling systems, starting systems, and related devices required to maintain operational capability of aircraft.

30. Routine repair and maintenance of antennas and signaling devices.

31. Use of interpretive signs or exhibit structures that are not attached to a historic property and that do not visually intrude on an historic property. They shall be constructed of materials and painted colors that harmonize with the historic property and its setting.

32. Repair and installation of utilities, such as sewer, water, storm, electrical, gas, steam, compressed air, leach lines, and septic tanks, where installation is restricted to areas previously disturbed by installation of these utilities.

33. Removal, repair or replacement of railroad or crane track.

34. Routine repair/replacement/maintenance of cranes, hoists, and lifting devices, or their components, when done in-kind to match existing material and design.

35. Repair/maintenance of swimming pools; outdoor playground and athletic equipment; and related recreational items.

36. Repair/maintenance of fencing when done in-kind to match existing material and design.

37. Maintenance and replacement of trees, shrubs, and turf; removal of dead or unsalvageable trees and plant materials

38. Removal, repair, or replacement of overhead steam distribution systems that are not character-defining features of a historic district.

39. Removal, repair, or replacement in-kind of utility poles, street and parking lot lighting.

Emergency work.

40. In those situations where unanticipated and sudden events, such as fire or storm damage, irreversibly alter the structural stability of a property, rendering it an immediate health and safety hazard, CNRSW will:

    a. Take the necessary steps to make the property safe.

b. Advise SHPO of the situation, providing a brief description of the nature of the emergency and corrective work.

## II. REVISION OF APPENDIX

This appendix may be revised with the written agreement of ACHP, SHPO, and CNRSW without a revision being made to the underlying PA. Any such revision will be documented in the report described in Stipulation XI.

# Appendix E: Mutual Aid Agreements

(IA-5-92-02-005)
INTER-AGENCY FIRE AGREEMENT
BETWEEN
COMMANDER NAVAL BASE SAN DIEGO
AND
U.S. DEPARTMENT OF AGRICULTURE, FOREST SERVICE
CLEVELAND NATIONAL FOREST

THIS INTER-AGENCY FIRE AGREEMENT, is made and entered into between the USDA Forest Service, Cleveland National Forest, hereinafter referred to as the Forest Service; and the Commander Naval Base San Diego, hereinafter referred to as the Federal Fire Department, under the provisions of 31 USC section 1535; 42 USC section 1856. Signatories to this agreement hereinafter are refered to as the parties.

WITNESSETH:

WHEREAS, responsibility for prevention and control of wildfires on U.S. Navy lands rests with the Federal Fire Department, and for National Forest System lands, with the Forest Service, and

WHEREAS, the Forest Service maintains prevention, detection, and suppression forces throughout the National Forests covering areas near and adjacent to lands which the Federal Fire Department protects, and the Federal Fire Department maintains prevention, detection, and suppression forces to protect areas near and adjacent to lands which the Forest Service protects, and

WHEREAS, it is to the mutual advantage of both the Federal Fire Department and the Forest Service to coordinate their efforts in the prevention, detection, and suppression of wildfires in and adjacent to their respective areas of responsibility, without duplication, and

WHEREAS, it is the intent of the parties hereto that Federal Fire Department firefighters be allowed to assist in the suppression of wildfires on all National Forest System lands, and other lands upon which the Forest Service is obligated to deploy suppression forces, and

WHEREAS, it is the intent of the parties hereto that Forest Service firefighters be allowed to assist in the suppression of wildfires on all U.S. Navy lands which the Federal Fire Department is committed to protect, and

WHEREAS, each of the parties hereto maintains equipment and personnel for the suppression of fires within its own jurisdiction and areas, and

WHEREAS, the parties desire to augment their respective fire protection capabilities in areas near and contiguous to their own in the event of conflagrations and attendant emergencies, and

WHEREAS, the lands of the parties hereto are near, adjacent or contiguous so that mutual assistance in a fire emergency is desired and feasible, and

WHEREAS, it is the policy of the parties to this agreement to render assistance, within their respective capabilities, to neighboring fire suppression organizations when such assistance is deemed necessary as herein set forth,

NOW THEREFORE, in consideration of the above premises, the parties hereto agree as follows:

## I. DEFINITION OF TERMS

A. Annual Fire Protection Plan. This is a document that provides:

1. Maps showing boundaries delineating Federal Fire Department and Forest Service areas of responsibility under this agreement.

2. Protection and firefighting facilities and equipment which are available for cooperative use, subject to each party's regulations and procedures.

3. Details of reimbursable and nonreimbursable costs and services, including provisions for overhead costs, if any.

4. Details of interagency air operations.

5. Resourse ordering and dispatch procedures.

6. Designations of authorized agency representatives.

B. Mutual Aid Assistance This is assistance given at no cost to the protecting agency, which includes such initial attack resources as engines and supervisory officers and, in general, require less than 2 hours travel or response time. Because they are initial attack resources of the supporting agency, they should be released as soon as possible. In no case should they be held beyond the 24-hour mutual aid period without consent of the supporting agency. Resources that are held beyond this period or require more than a two hour response period are no longer Mutual Aid Assistance but will be Assistance by Hire.

C. Assistance by Hire Assistance by Hire is the providing of fire suppression resources, by one agency to another, on a full reimbursement basis. All requests to hire fire protection assistance must be clear and precise and shall be processed and recorded through the disptaching systems of the participating agencies. Requests not processed in this manner will not be reimbursable.

All requests for fire suppression assistance in an agency's direct protection area shall be Assistance by Hire, except Mutual Aid Assistance. Personnel, equipment, or supplies provided by the supporting agency, but not specifically ordered by the protecting agency, shall be considered a voluntary contribution.

D. Direct Cost. These are those costs directly related to the suppression effort. These costs are not to include dispatch or other administrative costs.

E. First 24 hours. This shall mean the period of fire suppression from the time of initial dispatch to the fire and ending 24 hours later.

F. Initial Attack Forces. These are suppression personnel and equipment (air and/or ground) of either or both agencies that are initially dispatched to a fire in accordance with a predetermined dispatch plan.

G. Overhead Cost. These, as applicable to services provided under this agreement, are those costs not directly chargeable to suppression efforts, but which are part of the overall cost of operation.

1. Forest Service overhead costs are chargeable at the current Forest Service overhead assessment rate.

2. Federal Fire Department overhead costs are chargeable at the current Federal Fire Department overhead assessment rate.

H. Reciprocal Fire Protection Services. These shall mean nonreimbursable, Mutual Aid, fire protection assistance, extended by either party to lands of the other, as each may be in a position to furnish. These lands are described and shown in the annual fire protection plan.

I. Reimbursable Fire Protection Services. This shall mean fire protection resources exceeding reciprocal fire protection services furnished by either party, at the request of the other. This is Assistance by Hire.

J. Reinforcements. These are all additional personnel and equipment needed to facilitate suppression action following initial attack.

## II. RECIPROCAL FIRE PROTECTION 42 USC section 1856

A. The Forest Service shall respond with initial attack resources on wildfires on Federal Fire Department protected lands as requested by the Federal Fire Department.

B. The Federal Fire Department shall respond with initial attack resources on wildfires on Forest Service protected lands as requested by the Forest Service.

C. Both Parties agree:

1. Annually, prior to April first of each year, the Federal Fire Department and the Forest Service shall mutually review this agreement and outline those Mutual Aid resources available to each other and the dispatching procedures necessary for the activations of these forces. A list of these resources and procedures are shown in the Annual Operating Plan, Exhibit A.

2. The receiving party shall reimburse the assisting party for all costs, including overhead, incurred by the assisting party for reinforcement and services furnished beyond the Mutual Aid resources during the first 24-hour period and for all costs (including the Mutual Aid forces) incurred beyond the first 24-hour period, in accordance with section III of this agreement.

3. When suppressing wildfires on lands for which the other party is responsible, each of the parties to this agreement do hereby expressly waive all claims against the other party for compensation for any loss, damage, personal injury, or death occurring in consequence of the performance under this section of this agreement.

4. Wildfires resulting from prescribed fires which escaped and which were ignited by or at the direction or under the supervision of one of the parties to this agreement shall be the responsibility of that party. All suppression costs shall be borne by the responsible party.

## III. REIMBURSABLE FIRE PROTECTION 31 USC section 1535

A. The Forest Service shall respond with Forest Service personnel and Forest Service equipment to requests by the Federal Fire Department for assistance in the suppression of incidents in those areas outside the 2 hour response time. Upon request the Forest Service will assist the Federal Fire Department in the suppression of incidents with Forest Service owned equipment and with non-Forest Service owned air tankers and helicopters under current contractual agreement with the Forest Service. Such requests would be assistance by hire and all costs are reimbursable to the Forest Service.

B. The Forest Service shall maintain accurate personnel time reports, aircraft and other equipment use records to support reimbursement billings to the Federal Fire Department.

C. All bills for services provided to the Federal Fire Department will be mailed to the following address for payment:

Commander Naval Base San Diego
937 North Harbor Drive
San Diego, California 92101
Attn. Comptroller

D. The Federal Fire Department shall reimburse the Forest Service for Assistance by Hire personnel, aircraft, and equipment costs when actually ordered for and working under the supervision of the Federal Fire Department. Reimbursement will be based on actual Forest Service personnel labor rates, including fringe benefits and Forest Service equipment use rates.

E. The Federal Fire Department shall reimburse, on the basis of actual cost, the Forest Service for supplies ordered by the Forest Service at the request and with the approval of the Federal Fire Department.

F. The Federal Fire Department agrees that all bills will have a due date 60 days after the date of issuance. If payment cannot be made before the 60 days expire, then a 30-day extension, with oral or written justification, may be requested. Written notice that a bill is contested must be mailed to the address listed below within 60 days of issuance of original bill, and must fully explain the area of dispute. Contested items will be resolved not later than 180 days following control of the fire. The uncontested portion of the bill may be paid pursuant to normal requirements with a notation that the contested portion is being withheld, or the entire bill may be paid with a credit provided when final resolution is made.

For bills remaining unpaid at the close of the fiscal year, Federal Fire Department must provide obligational amounts to the Forest Service.

Payments for reimbursement made pursuant to the above billing will refer to the bill number using SF-1081, and will be sent to the appropriate billing address:

Cleveland National Forest
10845 Rancho Bernardo Road Ste. 200
San Diego, California 92127-2107
Attention:Budget and Finance

G. Both Parties agree:

1. The Forest Service and the Federal Fire Department will not be expected to deplete their own protection resources to the detriment of their normal protection responsibilities.

2. It shall be the responsibility of each agency to inform all responsible persons within their organization of the contents of this Agreement.

3. Nothing herein shall be construed as obligating the Forest Service or the Federal Fire Department to expend or as involving the United States in any contract or other obligation for the future payment of money in excess of appropriations authorized by law and administratively allocated for this work.

4. The annual fire protection plan shall cover reimbursable services to be furnished by each agency. It shall include the current equipment rental rates and aircraft hourly rates of each agency, and further provide that salary and wage costs of personnel assigned to fire suppression shall be at the actual cost of the sending agency.

## IV. MISCELLANEOUS CONDITIONS

A. Annually, prior to April first of each year, the parties hereto shall meet and review the Annual Fire Protection Plan. Further, this agreement shall be reviewed by the respective parties each year, and an addendum attached to the Agreement with any changes. Finally, the addendum shall be signed by the appropriate representative of each party.

B. Either party may terminate this agreement by providing 60 days written notice to the other. Unless terminated by written notice, this agreement shall remain in force indefinitely.

C. Either agency shall notify the other party in advance of prescribed burning operations in areas of mutual protection or adjacent to boundaries.

D. Fire prevention and law enforcement efforts shall be coordinated to the maximum extent possible.

E. Both agencies shall furnish each other or otherwise make available upon request such maps, documents, instructions, records, and reports including but not limited to fire reports and law enforcement reports, which either agency considers necessary in connection with this agreement, subject to the United States Department of Agriculture and/or the United States Navy policies and regulations.

F. Each agency, when suppressing wildfires for the other agency, shall adhere to the suppression and mopup standards of the receiving agency insofar as facilities and personnel are available. If adequate facilities and personnel are not available to meet standards, the sending agency shall notify the other agency at the earliest possible time.

G. Personnel of either agency shall, upon discovering or receiving reports of wildfires on areas protected by the other agency, report such wildfires promptly to the responsible agency in accordance with current practice and instructions as described in the annual fire protection plan.

H. When a wildfire is on or threatening lands of both parties, either agency may, upon its own initiative and without reimbursement, go upon lands of the other to engage in wildfire suppression activities for the protection of its lands. The responsible field unit shall be recognized as being in charge of wildfire suppression until a qualified officer is present and available to assume responsibility.

When a wildfire is burning on or near lands of both parties and reinforcements are required in addition to the initial attack forces, the parties may agree upon one of the following:

1. Division of fire responsibilities based upon ownership, acreage, access, or damage potential.

2. Dual agency fire organization with unified command.

3. One agency to assume total fire effort, with the other agency maintaining full liaison with the fire organization.

   When one party performs work or otherwise incurs expenses for which the other party is responsible, the officers in charge shall reach agreement, including cost reimbursement, as to the specific work to be performed while on the ground. Such agreements shall be in writing and modified as necessary by changing fire situations. Plan for suppression action, mopup, and patrol shall be arrived at in the meeting, agreed upon, and be recorded in writing at that time.

I. Equipment owned and used by either agency to suppress fires on land for which the other is responsible shall normally be operated, serviced, and repaired by the owning agency. Exceptions to this practice, where needed, shall be agreed to in writing by both parties, in advance.

J. All aircraft and pilots used to transport Forest Service personnel or that are directly controlled by the Forest Service shall be certified by a qualified Forest Service Aviation or Officer of Aviation Services inspector prior to Forest Service use.

K. This agreement is not intended to conflict with or supercede any agreements between the Department of Defense and the Department of Agriculture and/or the Department of the Interior.

L. To comply with Public Law 91-190, the National Environmental Policy Act of 1969, the Federal Fire Department and Forest Service agree to direct their program activities covered by this agreement toward managing and enhancing the environment for the widest range of beneficial uses without its degradation or risk to health or safety or other undesirable consequences.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement on the dates shown below.

Commander Naval Base,
San Diego

F.K. Holian

Signature

15 MAY 93

Date

F.K. HOLIAN
RADM U.S. NAVY

USDA Forest Service
Cleveland National Forest

Anne S Fege

Signature

May 3, 1993

Date

ANNE S. FEGE
FOREST SUPERVISOR

OPERATING PLAN

Between

COMMANDER NAVAL BASE SAN DIEGO

for the

FEDERAL FIRE DEPARTMENT

and

UNITED STATES FOREST SERVICE

CLEVELAND NATIONAL FOREST

TABLE OF CONTENTS

I. Operation Plan (definition)

II. Authority for Operation Plan

III. Purpose of Operation Plan

IV. Definitions and Descriptions
- A. Fire Protection Areas
- B. Mutual Aid Assistance

V. Fire Protection Organization and Facilities
- A. Cleveland National Forest
- B. Federal Fire Department
- C. Leased Facilities

VI. Air Operations

VII. Designation of Authorized Agency Representatives

VIII. Maps

IX. Procedures
- A. Fire Reporting
- B. Assistance by Hire and Resource Ordering
- C. Initial Attack
- D. Training
- E. Documentation and Accounting
- G. Repair of Resource Damage
- F. Communications

X. Fire Prevention Activities

XI. General Provisions
- A. Periodic Reviews
- B. Updating of this Plan
- C. Changes During the Year

XII. Administrative Listings

## I. OPERATION PLAN (Annual Fire Protection Plan)

Operating procedures to be used by the Cleveland National Forest(CNF) and Federal Fire Department (FFD), in response to implementation of the Interagency Fire Agreement, between the United States Forest Service, Cleveland National Forest and the Federal Fire Department dated May 15, 1993.

## II. AUTHORITY FOR OPERATION PLAN

Operation Plan shall conform to, and be consistent with, applicable Forest Service or Federal Fire Department policy. The annual operation plan shall be developed in accordance with the Interagency Fire agreement between the Commander Naval Base San Diego and the Cleveland National Forest.

## III. PURPOSE OF OPERATION PLAN

The purpose of this plan is to identify each agency's resources and responsibilities, and how they are exercised for implementing the Interagency Fire Agreement.

## IV. DEFINITIONS AND DESCRIPTIONS

A. Fire Protection Areas: Those areas upon which one of the agencies has primary responsibility for fire suppression. This responsibility is by law or ownership.

B. Mutual Aid Assistance: Those areas on either side of the boundary which are mutually identified as areas in which a fire could pose a threat to the protection area of the adjoining agency. Upon receipt of a report of fire within the Mutual aid area either agency shall ensure an appropriate suppression response is sent immediately. See enclosed map for locations of the Mutual Aid Assistance Areas.

## V. FIRE PROTECTION ORGANIZATION AND FACILITIES

A. The Cleveland National Forest suppression/detection organization consists of the following resources:

| | |
|---|---|
| Engines (Brush) | 22 Type III |
| Lookouts | 2 |
| Helicopters | 2 Type III |
| Airtanker | 1 Type I |
| Hand crews | 2 Type I: 20 member Hot Shot |
| Hand crews | 1 Type II |

B. The Federal Fire Department fire Suppression organization consists of the following resources:

| | |
|---|---|
| Engines | 16 Type I |
| Engines (Brush) | 4 Type III |
| Crash Trucks | 9 |
| Water Tender | 1 2500 Gallon |

C. Leased Facilities: Each agency maintains two separate reciprocal lease agreements. Under these lease agreements, prevention inspections, and responsibility definitions are outlined for each agency.

## VI. AIR OPERATIONS

The Federal Fire Department will request Firefighting aircraft through the Cleveland National Forest as assistance by hire for wildfires within Federal Fire Department Jurisdiction. Cleveland National Forest aviation personnel will report to the Federal Fire Department Incident Commander at the incident.

## VII. DESIGNATION OF AUTHORIZED AGENCY REPRESENTATIVES

On fires confined to the protection area of either agency then the ranking officer of the protecting agency will become incident commander.

Boundary fires shall be managed by the Unified Command concept.

Fire Protection and Mutual Aid Zone Map

IX. **PROCEDURES**

A. Fire Reporting:

Forest Service will promptly notify FFD of fires burning on or threatening FFD responsibility areas or facilities under CNF protection. FFD will promptly notify CNF of Fires burning on or threatening National Forest System lands or facilities under FFD direct protection.

B. Assistance by Hire and Resource Order Process: During the Suppression action of a fire, FFD and CNF can use assistance-by-hire resources in accordance with the Interagency Fire Agreement. All requests must be clear and precise and shall be processed and recorded through the dispatching systems including, but not limited to, incident name, order number, and request number.

C. Initial Attack: Both agencies shall use their preplanned attack procedures within the mutual aid zones.

D. Training: Emergency operations training (fire, hazmat, EMS, etc.) opportunities will be made available to either agency.

E. Documentation and Accounting: Each agency will bear the cost of it's own initial attack forces on any response within the mutual aid dispatch area. The order number of the agency having protection responsibility at the point of origin will be used throughout the duration of the fire.

F. Repair of Resource damage: It shall be the responsibility of the agency that has jurisdiction to ensure repair of all resource damages incurred by the suppression action. All agencies will take necessary steps to minimize resource damage.

G. Communications:

## FREQUENCY PLAN

Cleveland National Forest
Frequencies to be used on incidents:

| Net | Transmit | Receive |
|---|---|---|
| Forest (Direct) | 168.750 | 168.750 |
| Forest (Repeat) | 170.500 | 168.750 |
| Tactical | 168.200 | 168.200 |
| Air to Ground | 170.00 | 170.00 |
| Administrative (Direct) | 168.150 | 168.150 |
| Administrative (Repeat) | 169.725 | 168.150 |

Federal Fire Department
Frequencies to be used on Incidents

| Net | Transmit | Receive |
|---|---|---|
| OES White Net 1 | 154.280 | 154.280 |
| San Diego County Red Net | 155.085 | 155.085 |

X. **GENERAL PROCEDURES**

A. Periodic Review: The CNF and FFD will make available, during fire season, at least one day for an on-the-ground inspection of this operating plan.

B. Updating this Plan: As needed, each agency will submit to the other, any revisions for approval.

This plan has been reviewed and is hereby approved as developed:

UNITED STATES DEPARTMENT OF AGRICULTURE, FOREST SERVICE
CLEVELAND NATIONAL FOREST

Approved by: ______________________ Date: 8/10/94
for: Dave Bacon
Fire Chief(Acting)

DEPARTMENT OF THE NAVY,
COMMANDER, NAVAL BASE, SAN DIEGO
FEDERAL FIRE DEPARTMENT

Approved by: ______________________ Date: 8-17-94
Dave Inman
Fire Chief

# Appendix F: Example Burn Plan for Prescribed Fire

# FIRE DEPARTMENT

# PRESCRIBED FIRE BURN PLAN

**SIGNATURES:_______________________________________________**
**FIRE DEPARTMENT CHIEF (Required)**

**REVIEWED BY:_______________________________________________**
**DEPUTY CHIEF, OPERATIONS (Required)**

**ENVIRONMENTAL REVIEW BY:____________________________________**

**NEPA DOCUMENTATION APPROVED BY:___________________________**

**PREPARED BY:_____________________________________________________**

**THIS APPROVED PLAN CONSTITUTES AUTHORITY TO USE PRESCRIBED FIRE AND ENSURES THAT ACTIONS WILL BE TAKEN BY APPROVED PERSONNEL, ACTING WITHIN THE SCOPE OF THEIR AUTHORITY.**

**PRESCRIBED FIRE BURN PLAN**

## I. PERSONNEL AND BURN ORGANIZATION:

**APPROVING CHIEF OFFICER**

**PRESCRIBED FIRE MANAGER**

**PRESCRIBED FIRE BURN BOSS**
**(INCIDENT COMMANDER)**

**OPERATIONS**

| IGNITION SPECIALIST | HOLDING SPECIALIST | MOP-UP SPECIALIST | PIO |
|---|---|---|---|
| ____________ | ____________ | ____________ | ___________ |

| HELIBASE (SEE HELIBASE ORGANIZATION) | CREWS/ENGINES | CREWS/ENGINES |
|---|---|---|
| | _____________ | _______________ |
| | _____________ | _______________ |
| | _____________ | _______________ |
| | _____________ | _______________ |
| | _____________ | _______________ |
| LIGHTING CREW | _____________ | _______________ |
| ____________ | _____________ | _______________ |
| ____________ | _____________ | _______________ |
| ____________ | _____________ | _______________ |
| ____________ | _____________ | _______________ |

**ENVIRONMENTAL OFFICER**
___________

**Complexity Level________**
**(using NWCG complexity level rating system)**

## II. PROJECT AREA AND UNIT DESCRIPTION (Vicinity, Project map attached)

**A. Topographic Features:**

**Elevation** (feet above MSL) **Top**_____ft. **Bottom** ______ft.

**Slope%** ___________ **Aspect** ____________

**B. Vegetation Type:**

1. **Fuel Model** (No. and veg type)______________________________
2. **Fuel Loading** (Total Tons/Acre) ____________________________

3. **Fuel Distribution (ton/ac. by size)** **0-1/4in**.__________
**¼-1in**.___________
**1-3in**.____________
**Live**_____________

4. **Fuel Arrangement** (e.g., vertical standing chaparral)

5. **Fuel Continuity**

6. **Surface Fuel Depth**____________________
7. **Duff Depth**_______________

8. **Describe vegetation under 12ft. tall** (include specific species and live/dead %)

## III. RESOURCE MANAGEMENT GOALS AND OBJECTIVES

**Goals:**

*(examples:)*
*1. Reduce the potential threat from large and intense wildfires to the watershed and plant and wildlife communities.*

*2. Reestablish fire into a fire dependent ecosystem to promote forest health.*

*3. Remove areas of vegetation to open feeding areas for deer. Promote re-vegetation in mixed chaparral to improve foraging for deer and other wildlife.*

*4. Create deer movement corridors and promote wildlife movement with burn patterns.*

*5. Protect human developments from high intense wildfires by reducing high fuel loading in the vegetation and creating an age class mosaic.*

**Objectives:**

*(examples:)*
*1. Burn 30% to 50% of identified areas.*

*2. <10% of the burn area are severely burned.*

*3. Consume 40% to 80% of the ten-hour fuels (0-1/4 in.). Remaining fuels (1/4 to 5 in.) charred.*

*4. In identified deer foraging paths create 30 to 40 acre foraging areas. Leave areas of unburned between foraging areas for deer coverage.*

*5. A 200ft. buffer, minimum, will be maintained along perennial riparian areas to protect any aquatic and riparian vegetation. A low intensity backing fire will be allowed to enter these areas from an ignition source above the riparian zone. If intensity increases suppression action will be taken. No more than 40% cover reduction will be allowed at one time.*

**IV. PROTECTION OF SENSITIVE FEATURES:** *(example:) Several perennial streams and riparian areas are within the project. Strategically placed firing patterns will eliminate threats to these areas. A backing fire lighted from above the riparian areas maybe allowed to back down the slope. If the backing fire becomes too intense suppression action will be taken. A population of federally-endangered plants are located within the burn and should benefit from the burn. Post-fire monitoring of sensitive resources will be performed by environmental officer.*

**VII. FIRE PRESCRIPTION: (**Contains key parameters to achieve desired results and provisions to be recorded on project site.)

| | DESIRED RANGE | ACCEPTABLE RANGE |
|---|---|---|
| **ENVIRONMENTAL VARIABLES:** | | |
| **1. Temperature, Dry Bulb F** | | |
| **2. Relative Humidity %** | | |
| **3. Wind Speed** | | |
| **4. Wind Direction** | | |
| **5. Dead Fuel Moisture (1 Hr.)** | | |
| **(10 Hr.)** | | |
| **6. Aspect** | | |
| **7. Slope%, Average** | | |
| **8. Live Fuel Moisture Range %** | | |

**VIII. WEATHER COLLECTION:**

*(example:) A morning spot weather forecast (SWF) is required for this project each day that ignition is planned and for two days after ignition has stopped. Weather observations will be recorded on site using a belt weather kit or RAWS equipment. Weather data required for a SWF are: Date, Location, Elevation, Time, Wind Direction, Wind Speed, Dry Bulb, Wet Bulb, Relative Humidity, Dew Point, and 10 Hour Fuel Stick. Weather data will be given to Dispatch by 1600 one-day prior to implementation. In addition to the required morning SWF it is recommended that a SWF be requested for 1600hr. daily while burning. During the burning operations weather observations are to be recorded hourly and reported to the Burn Boss. All weather observations are to be part of the post project record.*

**WEATHER FORECAST: Complexity level of High or Moderate shall have a spot weather forecast from the National Weather Service fire weather forecaster. General weather forecast will be acceptable for all other levels.**

## IX. SMOKE MANAGEMENT:

**AIR QUALITY MANAGEMENT DISTRICT INFORMATION:** *(example:) This project is in the San Diego Air Pollution Control District (SDAPCD). Prior to burning: 1. An approved Smoke Management Plan shall be in place. 2. Approval from SDAPCO must be obtained. 3. Valid Burn Permit in place. 4. Day of project implementation must be a "Burn Day".*

**Refer to SAN DIEGO COUNTY AIR POLLUTION CONTROL DISTRICT SMOKE MANAGEMENT PROGRAM; Item #5. Program Goals and Requirements, Procedures for Issuing Notice of Permission-Burn or No Burn Days.**
**This reference outlines procedures to be follow with SDAPCD one week prior to burning.**
**A copy is attached to this Burn Plan.**

**District:** *San Diego Air Pollution Control District*
**Contact:**
**Location:**

**SMOKE SENSITIVE AREAS:** (examples in italics)

| Sensitive Area | Direction | Distance | Elevation ft. |
|---|---|---|---|
| *Temecula/Murrieta* | *Northeast* | *X mi.* | *1200 ft.* |
| *Fallbrook* | *East/Southeast* | *X mi.* | *650 ft.* |
| *Oceanside* | *South* | *X mi.* | *250 ft.* |
| *San Clemente* | *West* | *X mi.* | *250 ft.* |

**VISIBILITY:** *(example:) Under prevailing wind flow conditions, southwest, smoke will drift into Temecula/Murrieta Valley and Deluz creating hazy visibility for a short duration. Only one project area will be ignited on a given day, this time line will alleviate excessive smoke production. To accommodate and inform affected homeowners _____________will issue press releases over a period of time to newspapers, television, and radio. Fliers will be distributed into mailboxes of residences directly adjacent to the project perimeter. During burning _____________will be available to disseminate information about the project.*

## X. FIRING PROCEDURES:

**Equipment Needs**

**Personnel Placement**

**Water** (Sources, pump locations, hoselays)

**Dozer line locations** (include map)

## XI. MOP-UP PATROL PROCEDURES:

## XII. SAFETY:
**Safety and Emergency Procedures:**

## XIII. PUBLIC INFORMATION PRE BURN CONTACTS AND INFORMATION COORDINATION:

**PRE-BURN INVOLEMENT/COORDINATION:**
**When:**
**Contacts:**
**How:**
**Who will do:**

**BURN DAY NOTIFICATION:**
**When:**
**Contacts:**
**How:**
**Who will do:**

## XV. ESCAPE FIRE CONTINGENCY PLAN:
(Identification of contingency actions to be taken if the fire exceeds prescription parameters and/or line holding capabilities and cannot be returned to prescription with project funds.)

**XV. RISK ASSESMENT:** (Portrays an estimate of the probabilities and consequences of success and failure to the approving official.)

**XVI. IDENTIFICATION OF COMPLEXITY LEVEL OF FIRE AND ORGANIZATION NEEDED:**
(No less than the organization described on the approved burn plan shall be used to execute the burn.)

**XVII. POST BURN SUMMARY AND DOCUMENTATION:**
(Document burn day conditions, fire behavior, smoke dispersal, and fire effects)

**Date Burned_____Time of Day_____Days since Rain______**

**Actual Weather: Temp______RH______Windspeed______Direction______**

**FDRS ______**

**Fuel Moistures: 1hr______10hr______100hr______**

**Live Fuel Moisture: Brush______Herbaceous______**

**Fire Behavior: ROS______ch/hr, Average Flame**

**Length______Height______ft.**

**Scorch Height: Bole______ft, Crown______ft.**

**Resource Goals Met? Yes______No______**

**Burn Objectives Met? Yes______No______**

**Smoke dispersal direction:**

**Test burn results narrative:**

**Burn evaluation narrative fire effects and fire results narrative:**

**Acres accomplished:**

## XVIII. BURN DAY GO-NO GO CHECKLIST

# A “no” response to any item means stop!

**A. BURNING OPERATIONS**

**1. Are ALL fire prescription criteria met?**

**2. Is the fire weather forecast favorable?**

**3. Are ALL personnel required in the prescribe fire burn plan on site?**

**4. Have ALL personnel been briefed on safety hazards, escape routes and safety zones?**

**5. Is ALL the required equipment on place and in working order?**

**6. Have ALL personnel been briefed on their prescribed fire burn plan requirements?**

**7. Are sufficient backup resources available for containment of escapes?**

**8. Can the burn be executed according to plan and meet management objectives?**

**B. HELICOPTER OPERATIONS**

**9. Have ALL aviation safety requirements been met?**

**10. Have aerial hazards been noted?**

**11. Have pilots been apprised of unavoidable flight hazards?**

**12. Have pilots been reminded of hazards?**

**13. Have overflights been avoided and personnel placed away from flight paths?**

**C. SMOKE MANAGEMENT:**

**14. Are ALL smoke management prescription specifications met?**

**IF ALL QUESTIONS ABOVE HAVE BEEN ANSWERED “YES” YOU MAY PROCEED WITH IGNITION.**

**A. CERTIFIED BY:________________________DATE__________________**
**TITLE_________________________**

# Appendix G: Annual Meeting Minutes

- **Annual Preparedness Meeting**
- **Annual Fire Plan Review and Update Meeting**

# Appendix H: Fire Monitoring and Evaluation Protocols

## Post-Burn Checklist and Critique Format

A post-burn checklist and critique format is presented in Section XVII of the Burn Plan in this Appendix. It is the minimum post-burn monitoring and evaluation requirement. The following outlines two levels of recommended basic natural resource monitoring and evaluation requirements for every fire, whether the fire is planned or unplanned. Optional, stepped-up procedures using transects, for surveying populations, and for long-term change are presented in Section 3.8 of the main Fire Plan.

## Monitoring Responsibility

For the Navy, the responsibility for monitoring decisions lies with the Botanist for Commander Navy Region Southwest. For the National Park Service, monitoring decisions will be made jointly by the Chief, National Resources Science, Scientist, Cabrillo National Monument and the Fire Management Officer from the Coast Mediterranean Network SMMNRA. These persons will decided what level of post-burn monitoring effort will be implemented.

## Recommended Natural Resource Basic Level I Post-Burn Monitoring and Evaluation

*Section XVII of the Burn Plan is required and must be filled out whether a fire was planned or unplanned. The following adds ambient environmental baseline conditions and presence/absence lists, organized different ways related to how the conceptual models predict community and habitat values (Chapter 2 of this Fire Plan).*

The following list of recommended monitoring elements should be collected each year in the event of a fire or prescribed burn. It includes monitoring protocols from the USDI “FIREMON” Monitoring Handbook and some additional methods specific to this Plan.

- Weather including rainfall (monthly, long-term average); other weather such as wind speeds, direction, relative humidities (nearest Remote Automated Weather Station (RAWS) or National Oceanic and Atmospheric Administration [NOAA] site) with metadata regarding elevation, location, equipment type, calibration, etc. Depict rainfall in relation to trend (such as compared to long-term average, graph of timing/seasonality, Palmer drought severity index).
- Fuel Conditions using Fire Behavior Prediction System fuel models 1-13 (Anderson 1982) or custom models using BEHAVE (Burgen and Rothermel 1984). Fuel type and load (based on maps, surveys, aerial photos, digital data). Fuel height on edge near development.
- Make sure the fire location and size is well-documented (labelled and dated map with coordinates, fire name and number assigned by Dispatcher), fire perimeter, aspect, slope, landform, legal or local descriptor of location, path, point of origin, ignition source, weather conditions at the time, fire severity, return interval, including beyond boundaries of the property. Absolute cover (percent bare ground) after the burn using a step-point

transect (see below). Track fire history on a subbasin or watershed basis, if possible.

- Map unburned islands. Map after-burn condition (severity) using the National Park Service Severity Rating system (Table 4-1).

*Table 4-1. Fire severity classes and definitions, adapted from National Park Service.*

| FIRE SEVERITY CLASS | Effects on Litter/Duff | Effects on Herbs/Grasses | Effects on Shrubs | Effects on Trees |
|---|---|---|---|---|
| 1<br>Completely Burned | Burned to ash | Burned to ash | Burned to ash, few resprouts | Burned to ash or killed by fire |
| 2<br>Heavily Burned | Burned to ash | Burned to ash | Burned to ash, some resprouts | Killed by fire or severely stressed |
| 3<br>Moderately Burned | Burned to ash | Burned to ash | Burned to singed, some resprouts | Crown damage only to smaller trees |
| 4<br>Lightly Burned | Blackened, but not evenly converted to ash | Burned to ash, some resprouting | Singed/stressed, many resprout/recover | No effect on mature trees, may kill seedlings/saplings |
| 5<br>Scorched | Blackened | Singed/stressed, many resprout/recover | Not affected, slight stress | No effect on trees |
| 6<br>Unburned | Unburned inclusions within a fire should be marked as 6 | | | |

- Presence/absence from a standardized Stressor Checklist developed for the site. For example, presence/absence of:
  - Stormwater runoff (fosters erosion, Argentine ant invasion)
  - Point-source erosion
  - Drought severity (Palmer Drought Severity Index or other) from NOAA, http://www.drought.noaa.gov/index.html)
  - Invasives on Target Weeds list.
  - Are Argentine ants present? If so, where in relation to factors that foster introduction of their increase?
  - Recreational or other use outside of defined rules or conservation goals for the site.
  - Fire regime outside of the resilience of desired plant communities or management focus species.
- Implement a means to evaluate displacement of focus management wildlife species.
  - Determine presence and use areas of target sensitive species.
  - Determine presence/ absence of other management focus species that are sensitive to fire regime such as canopy condition, too short interval, too long interval, or fires not hot enough for seed germination. For example: interior versus edge wildlife; understory versus tall canopy dominants; those with narrow canopy condition requirements; percent exotics on plant list; native species richness in each plant community. Continue to develop the plant species list by way of annual wandering transects. What is the native plant species richness based on species list and is it changing? Is there a diverse native understory in coastal

sage scrub? What is the ratio of sprouters/seeders and is it changing? Is the ratio of natives to exotics on the species list changing?

- Do a descriptive relevé of each plant community. This approach is used by California Native Plant Society (CNPS) as an intensive version of the Rapid Assessment protocol for plant communities, and for statewide vegetation mapping as a standardized procedure for describing plant communities using the Sawyer/Keeler-Wolf method. It is not intended to be repeatable, only descriptive (not statistical). This approach is selected to support that statewide program and also, if wetlands occur on the property, to support the California Rapid Assessment Method for wetlands. This plot will provide a baseline community description, including relative cover of dominants.
- Use the locations of the above relevés to also conduct bird point counts according to methods of the SDNHM Bird Atlas Program. Post-fire bird atlas surveys are seven times per year, four in the breeding season and three in winter. Try to relate presence/absence of birds to vegetation condition.through the use of the same size and style of relevé as recommended in the CNPS Relevé Protocol.
- Conduct a regular wandering transect for reptiles. Relate results to topographic complexity or abiotic patch richness such as rock outcrops. Is physical diversity contributing to species diversity? Do species abundance or location change with vegetation recovery?
- Are butterflies present in diversity and abundance in each habitat and does this change with habitat condition, with weather, or with the presence of understory host plants? Establish a Pollard walk-style (Pollard 1977, Royer et al. 1998) transect for monitoring butterfly populations each year. For example, from a specific window of time when butterflies are expected to be active, such as 11:00 to 13:00, walk within established transects (400m long and 5m wide). Surveyors walk back and forth along the transect and generate species lists and numbers for each species. Each transect contains vegetative habitat that is essentially homogenous. Butterflies are collected using a net and brought to the lab for identification. Butterflies that evade capture were recorded and identified as closely as possible in the field by sight. Temperature, wind, cloud cover, and plant species in flower were recorded. Each transect is sampled twice. Relate results to habitat condition and weather.
- To evaluate changes in landscape (matrix-level) boundaries, focus on ecotones because some changes will be evident there first. Are community, ecotone, or invasive species infestation borders changing?
- What percent of habitat patches are buffered from land use activities that may degrade it? Percent of assessment area with buffer; average buffer width, and buffer condition. Are patches fragmented?
- For a prescribed fire, monitor wetlands pre- and post-burn treatment for details and timing of water manipulation, such as the duration of drying out/draw-down and of winter flooding in days.

### Level II Vegetation and Short-term Fire Recovery, Fire Observation Monitoring

*Level II: Monitor vegetation and short-term fire recovery using stratified random approach, primarily for trend rather than statistical description of attributes and variables. This approach is not as statistically robust as higher levels described in Section 3.8 of the Fire Plan. An attempt to identify a reference site is recommended with little to no fire history or one with lots of fire history. The approach is still mostly habitat-based, using cover and frequency as primary metrics.*

**Landscape Stratification.** To improve the power of any data collected to make predictions related to fire effects, the property should be divided into units that are expected to demonstrate a similar response to fire. This is called stratification. Monitoring plots should be placed so as to not cross plant community boundaries, and each should represent a uniform fire history. When sampling is organized in a stratified random manner based on plant community and fire history, specific questions could be asked about trend related to fire. For instance, we could ask if there were any difference in seral community composition of coastal sage scrub versus maritime chaparral, and does it seem to be related to fire? Is diversity sustained in long-interval versus short-interval phases of the communities? Is there a difference in dominant plants?

**Monitoring Schedule.** Sampling should be conducted during the phenological peak of the season (flowering, as opposed to green-up, transition, or dormant) when biomass is greatest. This could occur twice in a year in areas with summer “monsoons” (USDI “FIREMON” Monitoring Handbook).

**Need for Reference Sites.** Reference sites improve the ability to make predictions based on small data sets, and this is one of the primary reasons that methods are selected for Point Loma that are consistent with that used by others, to improve the chance that an offsite reference site might be located. Reference plots are also helpful and necessary to evaluate whether specific management objectives are met. (The California Rapid Assessment Program is designed to evaluate the condition of wetlands through the use of reference sites, for example.) Depending on objectives, it may be important to look for opportunities on adjacent preserved lands, or join with another programs to compare data in the same community type and same region, for fire effects and for management effects. If an unburned area on the property could be used as a control, this would improve the predictive power of the sampling program.

Establishing control plots for evaluating long-term change is helpful for testing specific hypotheses comparing non-treatment effects (areas not treated with prescribed fire) with treatment-plus-time effects.

*If the decision is made not to install reference plots, the manager should be especially conscientious to maintain updated conceptual models of fire effects in order to help interpret the data collected.*

**Cover.** Point intercept is the best method for determining cover of the more dominant species. It is better than line intercept for herbaceous species; however, it is more difficult in tall vegetation types.

**Frequency** is the percentage of all sampling units for which the canopy of a species is present, best measured by nested plots because it is very sensitive to plant size, dispersal patterns and density. *Frequency is very sensitive to invasions by undesirable species, and very sensitive to relative change over time for key species.*

A single plot should be located in each monitoring type (plant community). The primary data collection method is point intercept. Grass and shrub plots use a 30-meter (m) plot, whereas woodland plots are 50 m in length. The descriptions of plot layouts, installation, and sampling methods recommended for Point Loma come directly from the USDI FIREMON Monitoring Handbook (2003).

Plot layout and installation methods vary with vegetation type. Two monitors are recommended for grassland, and three for brush or brush plot installation. A minimum of two monitors are needed for woodland plot installation, but a third and even fourth monitor will make it go more than twice as fast where vegetation is dense.

### Level III: Monitoring of short-term change in populations, recruitment, or habitat conditions for covered or management focus species, with effort to get at abundance trends to a defined statistical certainty. Abundance- and trend-focused rather than presence/absence. Adds density as a metric in plant communities to get better information on rare plants and recruitment/mortality. Adds a metric for monitoring landscape mosaics.

At Level III the monitoring framework adds plots to improve the statistical power of the established plots in the stratified random approach. It also moves from habitat-based to population monitoring of species that are targeted for management, using appropriately specialized detection techniques for each species.

For example, whereas at Level I we could answer the question of whether the ratio of natives to exotics on the species list is changing, at Level III we can answer whether the *abundance* of natives to exotics is changing to a specified level of certainty. For rare plants, since they are usually non-randomly located, randomly-placed plots would not likely provide sufficient information to detect their trend. Counts or density approaches are used where the rare plants are found to document abundance, recruitment, and mortality.

Finally, Level III adds an approach for monitoring spatial mosaics, also derived for FIREMON that was specially adapted for use at National Wildlife Refuges.

**Selecting a Desired Statistical Power and Minimum Detectable Change.** Level III adds plots to improve statistical power. To do this, the manager will need to calculate sample size needed to detect a change to a chosen level of significance. The manager decides, usually based on budget and the precision necessary to decide on a management adjustment, what level of certainty is acceptable.

The following example is derived from the FIREMON Handbook. For example, the manager wants to determine whether a change in the population of interest has taken place between two time periods (for example, between preburn and year-1 postburn). These will be used to calculate sample size. For change-related management objectives, the monitoring objective will specify:

- the minimum detectable change (MDC) desired
- a chosen level of power
- a chosen significance level (alpha)

****Use the FIREMON Handbook to suggest a Minimum Detectable Change goal for various species, the power, significance level, decisions about variability and certainty.****

**Minimum Detectable Change.** This is the size or amount of change that you want to be able to detect between two time periods. How much of a change is biologically meaningful for the population of interest? Is a 10% change meaningful? 30%? 50%? 80%? The management objectives should provide the specific quantifiable levels of change desired. Looking at these objectives, use the low endolfa range of values for your MDC. For example, if your management objective states that you want to see a 50-80% change, use 50% as the MDC.

The initial level of MDC, set during the design phase, can be modified once monitoring or new research provides new information about the size and rate of flux of the population. For example, the manager may discover that the 10% decrease in the mean percent cover of the “nonnative” species you choose was not biologically significant. This information might have come from recent research that found the percent cover of this species can fluctuate by more than 30% a year based on weather conditions alone.

The precision selected should be related to the need to have very close estimates of the true population mean. General guidelines for choosing the desired precision are as follows:

- Choose 25% of precision for most objective variables when the exact values are not critical; if small changes are not of a concern, then being within 25% of the true mean is probably sufficient.
- Choose 5-20% precision if the estimated mean must be within a small percentage of the true population mean (e.g. if a population’s survival depends on only slight changes).

Managers must decide on the precision of the estimate. The precision of a sample statistic is the closeness with which it estimates the true population value (Zar 1996). Do not confuse it with the precision of a measurement, which is the closeness of repeated measurements to each other (the maximum acceptable confidence interval). Managers might choose a wider confidence interval for areas unoccupied by endangered species than areas that are occupied with the constituent elements of their habitat.

Characterize each existing plant community baseline such that trend in ___ can be detected with 75% certainty alpha = 0.20 in ____ time frame? This means we want to be 75% certain of detecting a 25% increase in population status. We are also willing to accept a 25% chance of saying a 25% change took place when it did not. Here, power = 75%; MDC = +25%; and alpha = 25% (0.20).

**Confidence Interval.** This means the precision of the mean (standard error) with a stated level of confidence. While standard error is an estimate of the precision of the sample mean, confidence intervals provide added information about variability by using the standard error along with a stated level of confidence. The confidence interval is a range of values for a variable which has a stated probability of including the true population mean. To calculate the confidence interval, you need the following inputs:

- mean of the sample
- standard error
- desired confidence level (80*, 90% or 95%)
- critical value of the test statistic student's t (two-tailed), based on the selected confidence level and the degrees of freedom (number of plots -1)

**Pilot sampling**. Install ten plots using the restricted sampling method on page..... Analyze data. If density of key species is high, make the plot smaller. If density is low for objective variables, make the plot bigger *(just use a variable area for density because the appropriate size plot will vary with species)*. Calculate coefficient of variation for each variable (not just your objective variable[s]).

Restricted random sampling is a variant of stratified random sampling that helps ensure that your plots are distributed throughout your monitoring type. Use an n=10 for number of plots if area is small and when variability of your objective is low. Divide monitoring type into n portions. You will then choose at least 3-5, depending on the likelihood of initial plot rejection, plot location points per portion. Then establish a monitoring plot within each of these portions (i.e. generate a set of possible locations that will eventually be reduced to one.) Verify plot suitability.

**Caution–Pseudoreplication.** Pseudoreplication is the use of inferential statistics to test for treatment effects with data where treatments are not replicated (though observations may be) or replicates are not statistically independent (Hurlbert 1984). Pseudoreplication occurs, for example, when all of the plots for a particular monitoring type are located in one burn unit, and inferences about the burn program in general (i.e. a treatment effect), rather than the effects of one particular fire, were made from the data. See Irwin and Stevens (1996) for a good overview of this concept.

**Caution–Autocorrelation.** All monitoring programs need to address autocorrelation during the sampling design period. Data that are auto correlated are not independent over space or time and therefore are more difficult to analyze. For example, spatial autocorrelation can occur if plots are placed too close together such that the plots tend to record similar information. In this situation, the data may have an artificially low amount of variation. The fire monitoring program addresses spatial autocorrelation by using a restricted random sampling design to minimize the chance that plots would be placed in close proximity to one another.

Temporal autocorrelation occurs when the same plots are repeatedly measured over time, such as when permanent plots are used. The data from one year to the next are not completely independent of the data in preceding years.

**Interpreting long-term change results when results are not statistically significant (see Elzinga *et al.* 1998).** If a change does not meet significance criteria and you want to determine if an important change really has taken place, conduct a power analysis by either 1) solving for MDC using n, s, power, and confidence level; or 2) solve for power using n, s, MDC and confidence level. If MDC is acceptable or power is high, don't worry! the change probably did not take place. If MDC is unacceptable or the Power is low, then this should be a warning! An important change may have taken place.

**Recommended Monitoring Variables for Levels III and IV.** Level III includes Cover and Frequency as in Level II. It also adds **density** as a metric in shrublands and for rare plants in grasslands. Density is good for monitoring sensitive species because it samples the number of individuals per unit area, which is necessary to know about recruitment or mortality.

**Qualitative Monitoring of Mosaics.** These methods are derived from the FIRE-MON Handbook as adapted for National Wildlife Refuges.

Creating and managing for habitat variation is an important goal on some conservation area. Accordingly, prescribed fire is often used as a management tool to create vegetation or habitat "mosaics." Or, sometimes mosaics are already in existence due to fire history. For example, a general objective could be to create enough mosaic of burned to unburned patches that early- and late-seral sagebrush dependent wildlife species remain in a treatment area, and a more specific fire objective would be to use mosaic burning to reduce sagebrush stand density by 50%.

A fire-created mosaic can be characterized generally as the spatial variation in burned and unburned vegetation in a treatment area, or the proportion of the treatment area that is burned or unburned. The degree to which a mosaic is created by prescribed burning, and whether an objective to achieve a mosaic is achieved, generally depends on a combination of several variables such as the proportion of vegetation burned, the number and distribution of patches or stands following the burn, patch shape and size, and the amount of habitat edge and contrast created by the burn. For example, a treatment area that is 50% burned with several burned/unburned patches that are well-distributed would be considered a highly variable mosaic. Also, an area that is 50% burned overall, with very few patches but a big amount of edge contrast could also be considered a highly variable mosaic.

Several methods are available for evaluating existing or post-burn spatial variation. Quantitative approachs to measuring mosaics include using landscape metrics such as post-burn patch density, average patch size, variation in patch size, and perimeter-to-area ratios, or a multivariate combination of several variables. However, success criteria for most mosaic objectives may not be quantitative or based on thresholds in these types of metrics. As a minimum standard, we recommend implementing the following qualitative approach, which is efficient to implement and should provide enough information to characterize most post-burn mosaics. If mosaic objectives specify quantitative targets not adequately addressed by this approach, additional measurements will be required.

**Methods.** Conduct a post-burn walkthrough by walking through the treatment area. On a standardized data form, visually estimate and record the amount (%) of the treatment area that was burned. This will provide general information about the potential for post-burn vegetation. For example, 0% or 100% burned indicates no variation or mosaic within the treatment area. Values other than 0% or 100% indicate variation. On the data form, sketch the distribution of burned and unburned vegetation. This will provide spatial information about post-burn variation, as well as the type and amount of mosaic created. At a minimum, attempt to show the following: number and relative size of burned and unburned patches, patch shapes, and treatment area boundaries.

Take one or more representative photographs from suitable vantage points. Repeat the above methods at each plot location: visually estimate and record the amount (%) of the treatment area that was burned within the 100-meter distance from the plot. Also record the number of burned/unburned interfaces that bisect this sample area–this will provide a simple index of interspersion and patch scale.

### Level IV Monitoring Long-term Change, Other Environmental Attributes and Species Groups, Spatial Studies, Objective-based Monitoring

This Level adds *repeated* measures to those at lower levels. It adds a definition of minimum detectable change. It adds other environmental attributes and species groups, and spatial studies.

# Appendix I: List of Preparers and Persons Consulted

| **Preparers** | **Organization** |
|---|---|
| Elizabeth M. Kellogg | *Tierra Data Inc.* |
| Michael P. Rogers | *Firewise 2000* |

| **Persons Contacted** | **Organization** |
|---|---|
| Sherry Ashbaugh | SPAWAR Systems Center |
| Lyle Beller | Naval Base Point Loma, Public Works Center |
| Hiphil Clemente | NEPA Planner, Naval Facilities (NAVFAC) Southwest |
| Andrea K. N. Compton | Chief, Natural Resource Science, National Park Service (NPS) Cabrillo National Monument |
| Tammy Conkle | Wildlife Biologist, Commander Navy Region Southwest |
| Kevin Cummins | Master of Science candidate, Department of Biology, San Diego State University |
| Jon C. de Kerguelen | Tactical Planner, Public Works Center, Commander Navy Region Southwest |
| Terry DiMattio | Superintendent, NPS Cabrillo National Monument |
| Ely Edquid | Chief, Resource Management & Visitor Protection, NPS Cabrillo National Monument |
| Danielle Flynn | Fish and Wildlife Biologist, NAVFAC Southwest |
| CDR Paige Hoffmann | Naval Base Point Loma, Public Works Center |
| Steve Junak | Botanist, Santa Barbara Botanic Garden |
| Jon Keeley | Research Scientist, U.S. Geological Survey, Western Ecological Research Center, Sequoia National Park |
| Roger E. Kelly PhD | Senior Archeologist, CRM Team, NPS Pacific Great Basin Support Office |
| David D. Kerr | Fire Management Officer, NPS Coast Mediterranean Network, Santa Monica Mountains National Recreation Area (SMMNRA) |
| Kathryn Kirkpatrick | Fire Management Officer, NPS Coast Mediterranean Network, SMMNRA |
| Jan K. Larson | Director, Environmental Operations, Environmental Department, Commander Navy Region Southwest |
| Dawn Lawson | Senior Natural Resources Management Specialist, NAVFAC Southwest |
| William R. Manley | Regional Architectural Historian, Environmental Department, Operations Division Natural and Cultural Resources Office, Commander Navy Region Southwest |
| Corrina Marote | Fire Management Officer, NPS Coast Mediterranean Network, SMMNRA |
| Rudi Mattoni | Department of Geography, University of California Los Angeles |
| Patrick McCay | NEPA Program Manager, Commander Navy Region Southwest / NAVFAC Southwest |
| Kim O'Connor | Botanist, Commander Navy Region Southwest |
| Marty O'Toole | Fire Information Officer, NPS Coast Mediterranean Network, SMMNRA |
| Paul Reeberg | Fire Ecologist (Monitoring), NPS Pacific West Regional Office |
| LCDR Mary S. Reismeier | Environmental Attorney, Commander Navy Region Southwest |
| Philip W. Rundel | Department of Organismic Biology, Ecology, and Evolution, University of California, Los Angeles |
| Jack Salerno | Deputy Public Works Officer, Naval Base Point Loma Public Works Center |
| Alan Schmierer | NEPA Specialist NPS, Pacific Great Basin Support Office |
| Nelson Siefkin | Fire Program Archeologist NPS Pacific West Regional Office |
| Rick Smedley | Fire Planner, NPS Pacific West Regional Office |
| Calvin A. Smith | Fire Chief, Federal Fire Department, Commander Navy Region Southwest |
| Erica Spinelli | Environmental Protection Specialist, Historian, Cultural Resources, NAVFAC Southwest |
| Robert S. Taylor | Robert Taylor, Biogeographer/GIS specialist, NPS Coast Mediterranean Network, SMMNRA |
| Marti Witter, PhD | Fire Ecologist, NPS Coast Mediterranean Network, SMMNRA |
| Andy Yatsko, Ph.D | Archaeologist, Cultural Resources Program Manager, CNRSW Environmental Department |
| Paul H. Zedler, Ph.D | Professor of Environmental Studies, University of Wisconsin |

# Appendix J: Environmental Assessment

# Environmental Assessment
*for the*
Naval Base Point Loma and Cabrillo National Monument
Joint Wildland Fire Management Plan

June 2006

# Environmental Assessment

for

the Joint Wildland Fire Management Plan
Naval Base Point Loma and Cabrillo National Monument
San Diego, California

*June 2006*

*Abstract*

This Environmental Assessment (EA) is to determine if an Environmental Impact Statement (EIS) or Finding of No Significant Impact (FONSI) should be prepared on the policy strategies proposed in the final draft of the Joint Wildland Fire Management Plan (JWFMP) for the federal properties of Naval Base Point Loma (NBPL) and Cabrillo National Monument (CNM) in San Diego, California. The purpose of the JWFMP for these federal properties is to: protect personnel, facilities, and natural and cultural resources from the impacts of wildland fire; ensure perpetuation of native terrestrial habitat, fire adapted plant communities, and rare species, and minimize the total cost of fire pre-suppression and suppression practices on lands owned by the US Navy and National Park Service (NPS) on Point Loma.

The JWFMP is designed to comply with the Federal Wildland Fire Management Policy. The Department of the Interior signed the most recent Federal Fire Policy of 2001. It was adopted by the Department of Defense (DOD) Wildland Fire Policy Working Group in 1996, and made DOD fire policy through DOD Instruction 6055.6 (Fire and Emergency Services Program October 10, 2000).

This EA describes the Proposed Action – JWFMP with Enhanced Suppression Guidance, 50-foot Survivable Space Fuels Management, and Experimental Use of Prescribed Fire for Ecological Benefit; Alternative 1 – Same as Proposed Action but with 100-foot Survivable Space Fuels Management as Prescribed in Most Local San Diego Jurisdictions; Alternative 2 – Same as proposed Action but without Prescribed Fire for Ecological Benefit; Alternative 3 – No Action (Current Program), Suppression Only.

The Proposed Action enhances public safety and protects infrastructure, while providing a net benefit to the environment. The No-Action Alternative consists of structural fire suppression as the primary means of fire management on the peninsula. There would be no significant impacts, individually or cumulatively, associated with implementing the Proposed Action, since actions proposed are environmentally beneficial or fully mitigated.

The Proposed Action appears to most fully balance management objectives with issues of concern and it is also the environmentally preferred alternative. This Alternative applies a full range of fire management tools: wildland fire suppression (suppression of unwanted ignitions), mechanical fuels reduction, and four small scale experimental burns to achieve a better understanding of how to manage fires for ecological values in a naturally fire-adapted environment. The long-term, adverse, but minor effects on vegetation resulting from the implementation of the Proposed Action are far outweighed by the enhanced protection of human life and the investment in infrastructure and long-term protection against catastropic fire where all the vegetation and habitat is lost in a single event, and maintenance of a uniform rather than a diverse fire regime that results from fuels management.

The Alternative adopts best management practices for managing the effects of fuels management, fire and smoke on public health, and complying fully with Clean Air Act requirements along with other applicable laws and policies.

Under the National Park Service Organic Act and the General Authorities Act, as amended, the NPS may not allow the impairment of park resources and values except as authorized specifically by Congress (NPS Director's Order 55 or DO-55). Impairment is an impact that, in the professional judgement of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. CNM managers have examined each potential impact of the Proposed Action and determined that the combination of actions provided for in this environmental assessment or in the JWFMP will not result in the impairment of any monument resources and values.

Under the Sikes Act Improvement Act, Department of Defense landowners may not conduct activities that result in a net loss to the capability of the installation to achieve its military mission. NBPL managers have examined the Proposed Action and determined that the combination of actions provided for in this environmental assessment will not result in the impairment of any military mission values.

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# TABLE OF CONTENTS

**Page**

1.0 PURPOSE AND NEED....1-1
1.1 Purpose of Environmental Assessment....1-1
1.2 Need for Proposed Action....1-1
1.3 Goals and Objectives of the Navy and NPS Joint Wildland Fire Management Plan....1-2
1.4 Relationship of the Point Loma Joint Wildland Fire Management Plan to Other Plans and Policy Directives....1-5
1.5 Interdisciplinary Planning Team....1-7
1.6 Decision to be Made....1-7
1.7 Issues Considered....1-7

2.0 PROPOSED ACTION AND ALTERNATIVES....2-1
2.1 Introduction....2-1
2.2 Description of Alternatives....2-1
2.2.1 Proposed Action – Implement the Joint Wildland Fire Management Plan with Enhanced Suppression, 50-foot Survivable Space Fuels Management, and Experimental Use of Prescribed Fire for Ecological Benefit....2-1
2.2.2 Alternative 1 – Same as Proposed Action but with 100-foot Survivable Space Fuels Management as Prescribed in Most Local San Diego Jurisdictions....2-6
2.2.3 Alternative 2 – Same as Proposed Action but without Prescribed Fire for Ecological Benefit....2-8
2.2.4 Alternative 3 – No Action (Current Program), Suppression Only....2-8
2.2.5 Elements Common to All Alternatives....2-9
2.3 Alternatives Considered but Not Carried Forward....2-9
2.4 Matrix Comparing Alternatives with Proposed Action....2-10
2.5 Proposed Conservation Measures for Effects on Natural Resources....2-11

3.0 AFFECTED ENVIRONMENT....3-1
3.1 Land Use....3-1
3.2 Utilities and Infrastructure....3-6
3.3 Socioeconomics....3-6
3.4 Recreational and Scenic Values....3-9
3.5 Public Health and Safety....3-9
3.6 Natural Resources....3-10
3.6.1 Topography, Geology, and Soils....3-10
3.6.2 Water Resources, Including Regulated Waters and Wetlands....3-10
3.6.3 Plant Communities and Fire....3-11
3.6.4 Wildlife Populations and Fire Concerns....3-16
3.6.5 Sensitive Wildlife and Plant Species....3-17
3.6.6 Invasives and Fire Effects....3-25
3.6.7 Other Disturbance Processes That Interact with Fire Disturbance....3-26
3.6.8 Air Quality....3-32
3.7 Cultural Resources....3-34

4.0 ENVIRONMENTAL CONSEQUENCES OF PROPOSED ACTION AND ALTERNATIVES .... 4-1
4.1 Impacts Common to All Alternatives .... 4-2
4.2 Land Use .... 4-3
4.3 Utilities and Infrastructure .... 4-5
4.4 Socioeconomics .... 4-6
4.5 Recreation and Scenic Values .... 4-6
4.6 Education and Outreach .... 4-7
4.7 Public Health and Safety .... 4-8
4.8 Cultural Resources .... 4-9
4.9 Topography and Soils .... 4-10
4.10 Water Resources .... 4-11
4.11 Plant Communities .... 4-12
4.12 Wildlife Populations .... 4-14
4.13 Sensitive Plants .... 4-15
4.14 Sensitive Wildlife .... 4-17
4.15 Invasive Species .... 4-18
4.16 Air Quality .... 4-19
4.17 Impairment .... 4-21

5.0 CUMULATIVE AND OTHER IMPACTS .... 5-1
5.1 Cumulative Effects Analysis .... 5-1
5.2 Irreversible and Irretrievable Effects of the Proposed Action .... 5-2
5.3 Short-Term Use Versus Long-term Productivity .... 5-2

6.0 LIST OF ENVIRONMENTAL ASSESSMENT PREPARERS .... 6-1

7.0 REVIEWERS AND PERSONS CONSULTED .... 7-1

8.0 REFERENCES .... 8-1

APPENDIX A: ACRONYMS .... A-1
APPENDIX B: RECORD OF NON-APPLICABILITY .... B-1

# 1.0 Purpose and Need

## 1.1 Purpose of Environmental Assessment

This Environmental Assessment (EA) has been prepared to assess the potential environmental impacts of implementing fire management strategies identified in the Joint Wildland Fire Management Plan (JWFMP) for the federal properties U.S. Naval Base Point Loma (NBPL) and Cabrillo National Monument (CNM), San Diego, California. This EA determines if a Finding of No Significant Impact (FONSI) or preparation of an Environmental Impact Statement (EIS) is needed to avoid or minimize environmental impacts of implementing the JWFMP.

An EA is a procedural requirement under the National Environmental Policy Act (NEPA) intended to ensure that alternatives to federal actions that might significantly affect the quality of the environment are considered. This EA complies with:

- The National Environmental Policy Act of 1969 (42 U.S.C. § 4321, et seq, as amended);
- Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] parts 1500-1508) July 1, 1986;
- 32 CFR 775, Department of Navy (DON) Procedures for Implementing NEPA;
- Department of the Navy Procedures for Implementing NEPA (32 C.F.R. § 775), as described in Chief of Naval Operations (OPNAV Instruction) 5090.1B CH-3; and
- National Park Service Director's Order (DO) 12 NEPA Handbook.

Every fire management plan must be accompanied by an environmental assessment to document the environmental consequences of proposed actions. This requirement is outlined in NPS Director's Order 18 (DO-18), which states that all parks with vegetation capable of supporting fire must develop a fire management plan and that an environmental assessment must be prepared for each plan.

This EA presents four alternatives for the fire management program, based on effective fire management strategies, Navy and NPS policy, and applicable laws. Some details of the Proposed Action analyzed in this EA have not been determined or may not be funded. For this reason, some specific implementation objectives might need further NEPA analysis when additional detail becomes available.

## 1.2 Need for Proposed Action

The purpose of the JWFMP is to: protect personnel, visitors, facilities, and natural and cultural resources from the impacts of wildland fire; ensure perpetuation of native terrestrial habitat, fire adapted plant communities, and rare species, and minimize the total cost of fire pre-suppression and suppression practices on lands owned by the US Navy and NPS on Point Loma. The Navy and NPS lands are home to several billion dollars worth of infrastructure and provides a vital work center and economic base for the San Diego economy both in Navy employment and in visitor days spent at CNM. CNM hosts an average of 1.1 million annual visitors.

Wildland fire management is guided by fire management plans that provide direction for protecting natural and cultural resources while providing for public safety. Fire management plans are fundamental strategic documents that guide the full range of fire management activities. They are required by the 2001 Federal Wildland Fire Management Policy (hereafter, 2001 Federal Fire Policy), which states "Complete, or update, Fire Management Plans for all areas with burnable vegetation." The Department of the Interior signed the 2001 Federal Fire Policy. The National Park Service then implemented this requirement in Director's Order 18 (NPS 1998) which states "Every park area with burnable vegetation must have a fire management plan approved by the superintendent." Federal Fire Policy was adopted by the Department of Defense (DOD) Wildland Fire Policy Working Group in 1996. It was made DOD fire policy through DOD Instruction 6055.6 (Fire and Emergency Services Program October 10, 2000). This Instruction requires that fire department and natural resources preparedness and response to wildland fires shall be in accordance with federal policy, and provides criteria for the allocation, assignment, operations, and administration of the DOD Fire and Emergency Services (F&ES) and Emergency Medical Service programs. It states:

> "E2.5.9. Wildland Fire Preparation and Response. Fire department and natural resources preparedness and response to wildland fires shall be in accordance with the Federal Wildland Fire Management Policy and Program Review of 1995 and the Interagency Fire Management Agreement (reference (l)), except as covered under DOD Directive 3025.15 (reference (m)). The Department of Defense shall establish and maintain voting membership in the National Wildfire Coordinating Group to facilitate the development of policy, standards and training with the Federal wildland agencies."

There had been no fire management plans previously on either federal property.

In 2001 the 1995 Federal Wildland Fire Management Policy was reviewed for all federal wildland fire agencies and is referred to as the Guiding Principles and 2001 Federal Fire Policy. The 2001 review changed and updated the policy. In addition to the previous emphasis placed on ecosystem sustainability, restoration, science, education and communication, and program evaluation, programs will also need to consider operational and implementation aspects. This is a result of issues raised in the Cerro Grande Prescribed Fire Investigation Report and the subsequent independent review report. The revised fire management policy for the National Park Service has been expressed in Director's Order 18 and Reference Manual 18. This Fire Plan will reflect these changes in policy.

# 1.3 Goals and Objectives of the Navy and NPS Joint Wildland Fire Management Plan

Responding to the direction provided by the documents mentioned above and scoping by the interdisciplinary team, the fire and fuels management program has several primary goals and objectives:

*Goal 1 Human Safety: Provide for human safety as the first priority of every fire management activity.*

- Objective: All fire personnel will comply with the National Wildfire Coordinating Group (NWCG) and agency fitness requirements and will have personal equipment appropriate to the job or assignment.
- Objective: Comply with staff qualification requirements and experience necessary to accomplish fire management program objectives in a safe manner.
- Objective: Follow all safety standards and guidelines identified within the Interagency Incident Business Management Handbook.
- Objective: Apply the Job Hazard Analysis (JHA) process for all potentially hazardous fire management activities.

*Goal 2 Facilities: Protect the economic investment in facilities and infrastructure on Point Loma by strategically reducing the risk of ignitions and hazardous fuel conditions immediately adjacent to structures.*

- Objective: Based on structure-by-structure analysis, modify fuels out to an appropriate distance around all sides of each structure that cannot afford to be lost in a wildfire to provide survivable space.

*Goal 3 Cultural: Protect the cultural resources of Point Loma, including all historic, archeological, and commemorative resource values.*

- Objective: Prevent damage to cultural resources by fully integrating concerns into fire planning, providing for compliance with the San Diego Metro Programmatic Agreement (on Navy lands), DO-58 for NPS historic structures, and Section 106 of the NHPA, and providing sufficient location and value information to firefighters and fire planners to identify and prioritize suppression or pre-suppression response.
- Objective: Evaluate historic structures within 5 years to determine if, by virtue of the its significance or a museum or collection, adequate fire detection, warning, and suppression systems are warranted to be installed. Alternatively, determine if a change in the management and use of the structure, rather than modify the structure itself, is the most cost-effective approach.
- Objective: Develop pre-fire plans within 5 years for historic structures and buildings housing museum or library collections designed to identify the floor plan, utilities, hazards, and areas and objects requiring special protection. This information will be reviewed and updated annually and made available to FFD and NPS fire personnel.

*Goal 4 Ecological: Ensure the sustainability of ecological resources, including the full range of natural plant community structure and native biodiversity of plants, animals, and microbiota, emphasizing endemic species, while controlling exotic species.*

- Objective: Seek perpetuation of native plant community structure such that the full range of species composition and structural diversity that was present before Europeans arrived is present or potentially present in the seed bank, while controlling introduction and spread of exotic species.

- Objective: Over the long term, restore the above- and below-ground plant and animal communities to a condition such that the species diversity and density of a reference condition (as this can be surmised based on long-term monitoring plots and historic data) are self-sustaining.
- Objective: Foster conditions such that disturbance processes (fire, drought-El Niño cycles, animal burrowing, invasive species introduction, etc.) function together to achieve the goal of ecological conservation. For example:
- Objective: A sufficiently long inter-fire period, at least 40 years in southern maritime chaparral, should be provided for obligate-seeding species to establish sufficient seedbank to replace their populations when a burn occurs.
- Objective: Lichens and other species dependent upon older stands should have refugia for recolonization after disturbance such as fire.
- Objective: Soil erosion due to fire should not exceed the rate of soil formation, about one ton per acre per year, and that sedimentation due to fire does not affect water quality of surrounding ocean and bay waters.
- Objective: Conduct rehabilitation of sites affected by suppression so that there is no permanent loss of natural or cultural resource values.
- Objective: Conduct research and monitoring to guide fire management, improve the scientific soundness of decisions, and the future adaptive management of fire. This will be done through the Annual Review and Update meeting and JWFMP 5-year update process by regularly refining the conceptual models presented in Chapter 2 of the JWFMP, screening requests to conduct research on lands involved in the JWFMP by their ability to support refined conceptual models and management decisions, publicly announcing areas of interest to researchers, developing synopses of research interests, and requesting funds to conduct research as appropriate.
- Objective: Update the JWFMP, prescriptions, and treatment priorities as data suggest and agreed upon by the necessary attendees and under the terms of the Annual JWFMP Review and Update meeting and the 5-year JWFMP update.
- Objective: Conduct rehabilitation of sites affected by fire management practices so that there is no permanent loss of natural or cultural resource values, and all necessary work to achieve this is completed within 2 years of a fire.

*Goal 5 Suppression: Suppress 100% of all unplanned wildland fires, regardless of ignition source, to the smallest size possible but no more than 10 acres, protecting all values at risk in a prioritized manner.*

- Objective: Ensure suppression resources and agreements are in place to confine, contain, and control wildlfires at the start of each fire season and that they have passed an annual review based on content of the Annual Preparedness Meeting.
- Objective: Ensure that no wildland fire leaves the federal reservation lands and enters private lands.

*Goal 6 Fire Risk and Hazardous Fuels: Control fire risk and hazardous fuels such that ecological, cultural, and social values are not placed at risk from extreme fire behavior or fire management actions.*

- Objective: Prevent unplanned ignitions as the initial line of defense against wildfire threat through education and ensuring employees have the expertise and equipment to take initial action to suppress it while fire response authorities are on their way.
- Objective: Align fire ignition risk with fuel hazard conditions to reduce wildfire occurrence

using an effective Fire Danger Rating System (FDRS) that reduces ignition potential under severe and extreme hazard fire and weather conditions.

- Objective: Reduce fuel hazard cost effectively for the values at risk, using risk assessments that consider fire history, fuel hazard, ecological condition, location of sensitive resources, and other factors to identify and prioritize appropriate treatments to achieve the maximum benefit for the least impact and cost.

*Goal 7: Compliance: Comply with policies of both the U.S. Navy and NPS with regard to fire planning and management programs.*

- Objective: Perform all CNM fire management activities in accordance with the principles, policies, and recommendations of Departmental Manual, Parts 350 - 354 and 620 DO60, Aviation Management.
- Objective: Integrate explosive safety requirements (NAVSEA OP 5) and security requirements for clear zones and access to property boundaries (OPNAV Instruction 5530.14C) with fire safety planning.
- Objective: Maintain the highest standards of professional and technical expertise in safely implementing an effective wildland fire management program.
- Objective: Effectively serve the missions of NBPL and CNM while minimizing the total long-term costs of fire management.

*Goal 8 Education: Implement a communication and education program that enhances understanding of the fire management mission and fosters informed participation in fire management activities for both internal and external audiences.*

- Objective: Educate employees and the public about the scope and effect of wildland fire management, including fuels management, prevention, hazard/risk assessment, rehabilitation, and the role of fire in the southern California ecosystem.

*Goal 9 Staff Expertise: Develop and maintain staff expertise in all aspects of fire management.*

*Goal 10 Within Agency Fire Program Integration: Effectively integrate the fire management program into all agency activities and operations.*

*Goal 11 Interagency Fire Program Integration: Foster and maintain interagency fire management partnerships and, as feasible, contribute to the firefighting effort at the local, state, and national level.*

## 1.4 Relationship of the Point Loma Joint Wildland Fire Management Plan to Other Plans and Policy Directives

The proposed JWFMP complies with the National Fire Plan (2001), and laws such as the Endangered Species Act, Clean Air Act, Clean Water Act, and the National Historic Preservation Act (NHPA). It also complies with policies and plans of both agencies as described below.

The two agencies partner to coordinate and plan activities that affect their land through the Point Loma Ecological Conservation Area (PLECA) Working Group. In 1995 approximately 668 acres of Point Loma was designated as a reserve, entitled the PLECA, to be protected and restored by the U.S. Navy, CNM, and three other land holders. The PLECA functions as a means to preserve and provide conservation banking arrangements. Navy and NPS joint interests in managing the Federal Reservation have been managed through the PLECA Memorandum of Understanding (MOU). The MOU was established under an agreement with the U.S. Fish and Wildlife Service (USFWS) to “ensure the long-term existence and perpetuation of these resources in an Ecological Reserve Area using the concepts of ecosystem management." The policies of this Plan are, in the least, intended to be consistent with that MOU. The co-managers of this reserve are NPS, U.S. Navy, USCG, City of San Diego, and the Department of Veteran's Affairs (DVA).

### *DOD Policies and Plans*

Current DOD fire or vegetation management policy is implemented as:

- DOD Instruction 6055.6 (DOD Fire and Emergency Services Program October 10, 2000). This Instruction provides policy and criteria for the allocation, assignment, operations, and administration of the DOD Fire and Emergency Services (F&ES) and Emergency Medical Service programs. Related is DOD Instruction 6055.6-M (DOD Firefighting Certification Program December 1995, National Fire Protection Association "National Fire Codes").
- DOD 8910.1-M (DOD Procedures for Management of Information Requirements, June 1998).
- Chief of Naval Operations Instruction (OPNAV Instruction) 11320.23F (28 May 2004) "Shore Activities Fire Protection and Emergency Service Program" also provides specific guidance to Federal Fire Department.
- Security requirements along perimeter fence lines are designed to provide visibility for security personnel to detect intruders. These requirements provide for a perimeter "clear zone" and are in OPNAV Instruction 5530.14C (Navy Physical Security, 1 May 2001), and OPNAV Instruction 5530.13B (Physical Security Instruction for Conventional Arms, Ammunition, and Explosives, 5 July 1994 incl. CH-1 of 2 June 1999). OPNAV Instruction 5530.14C Chapter 6 requires a clear zone of at least 30 ft along the inside of the perimeter fence. The outside clear zone should be 20 ft or greater between the perimeter barrier and any exterior structures, vegetation or any obstruction to visibility.
- Vegetative clear zones are required for safety reasons in areas with magazines for storing ordnance. These requirements for managing vegetative fuels are in Naval Sea Systems Command Ordnance Pamphlet 5, Volume 1 "Ammunition and Explosives Safety Ashore Regulations for Handling, Storing, Production, Renovation and Shipping." Vegetation may be no higher than 18 inches atop of and within 50 feet of the toe of ordnance storage magazines.
- To protect against potential fire, fuel storage tank areas at the Fleet Industrial Supply Center (FISC) Fuel Depot are maintained with mandatory clear zones as dictated in DOD 4140.25-M (DOD Management of Bulk Petroleum Products, Natural Gas, and Coal).

The Sikes Act Improvement Act (SAIA) of 1997 (16 USC Section 670a), directed that the Secretary of Defense shall carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. In keeping with the principal use of military installations to ensure the preparedness of the U.S. Armed Forces, the SAIA mandates that an Integrated Natural Resource Management Plan (INRMP) shall provide for no net loss of the capability of the installation's lands to support the military mission while providing for this conservation and rehabilitation of natural resources. This Fire Plan will help meet the goals of the NBPL INRMP. As stated in the INRMP, these are:

> "to provide guidelines for implementing an ecosystem-based program that provides for conservation and rehabilitation of natural resources in a manner that:
>
> - fulfills requirements set forth in the SAIA of 1997 (16 U.S.C. 670a et seq.), DOD Instruction (DoD Instruction) 4715.3: Environmental Conservation Program of 5 May 1996,

and OPNAVINST 5090.1B CH-4 of 4 June 2003: Environmental and Natural Resource Program Manual;

- is compatible with the military mission;
- integrates and coordinates all natural resources management activities;
- provides for sustainable multipurpose uses of natural resources; and when appropriate;
- provides for public access for use of natural resources subject to safety and military security considerations."

The INRMP contains a number of objectives that are summarized in the Fire Plan, so that fire planning can be designed consistent with those objectives as far as feasible.

***National Park Service Policies and Plans***

The legal authority for preparing and implementing the JWFMP for CNM is 16 United States Code (USC) 1 through 4, which is the 1916 Organic Act for the NPS, and the General Authorities Act, as amended. These say that NPS may not allow the impairment of its resources and values except as authorized specifically by Congress (NPS DO-55). Impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources and values.The proposed fire management program responds to direction provided in other higher level policy and planning documents such as the General Management Plan (GMP), Resource Management Plan (RMP), NPS Management Policies (2001), and Director's Order 18.

CNM's GMP provides a blueprint to guide management decisions and offers strategies for addressing issues and achieving identified management objectives over a ten- to 15-year period. The primary planning concerns identified in the GMP relate to the increasing significance of the cultural and natural resources and increasing impacts of visitor use on those resources. The approved RMP addresses a number of issues or problems, including: perceived deterioration of the scenic views of the park; increasing rarity, fragmentation, and isolation of vegetation communities; certain inventory and monitoring gaps; and declines in the intertidal zone.

The Vegetation Management Plan (1995 with updates through 2002) discussed what it called the "senescence" of vegetation due to the exclusion of fire. The term 'senescence' was used to refer to ecologically derived structural changes in vegetation assemblages that result in the local extirpation of flora as seedbanks deplete and established plants die off. The Plan suggested that, on Point Loma, this could potentially manifest itself as a decrease in species diversity due to the exclusion of fire as a natural ecological process in coastal sage scrub. It expected a future Fire Plan to address this issue. The Vegetation Management Plan's primary objectives are: removing exotics; restoring coastal sage scrub; reducing water consumption; controlling erosion; using vegetation where possible to screen to minimize the visual impact of all existing human-made structures; and efficiently using limited staff resources.

## 1.5 Interdisciplinary Planning Team

This environmental assessment was produced by an interdisciplinary planning team that shared responsibility for its content. A list of planning team members, their specialties, and consultants is included in Chapter 6.

## 1.6 Decision to be Made

The Commanding Officer of NBPL and the CNM superintendent will choose among the alternatives presented here to guide fire management activities on the federal properties of Point Loma. The chosen alternative then becomes institutionalized in the JWFMP, which provides direction for a 5-year period.

After five years, the JWFMP will be reviewed and changed as necessary. Substantial changes will require additional environmental analysis.

## 1.7 Issues Considered

An "issue" is a concern that must be considered when designing and evaluating alternatives in an environmental assessment. Both NBPL and CNM are located within the large urban area of the City of San Diego. They also contain distinguished examples of a coastal Mediterranean ecosystem with components unique to the United States, an ecosystem that has a limited worldwide geographic distribution and high biological diversity. Wildland fire has long been recognized as a natural process operating within the southern California Mediterranean ecosystem with associated beneficial effects on individual components of the ecosystem. Fire has shaped the plant communities of the peninsula and is a major factor affecting their diversity, productivity, and stability. There is a need to manage wildland fire so that threats to life, property, and Navy and CNM resources are reduced, and fire's function as a natural process is maintained. The financial costs of fire management actions must also be assessed and be commensurate with protection or enhancement of the values at risk. The following list summarizes wildland fire-related issues considered in the Plan and in the alternatives developed in this EA.

1. The Navy in particular has a highly significant investment in facilities on its NBPL properties, and these facilities vary significantly in their fire safety conditions. Due to the upslope proximity of natural vegetation and steep, unstable terrain, significant post-fire erosion or flooding could adversely impact this multi-billion dollar infrastructure, as well as shoreline structures and the harbor and waters surrounding them. Significant investment in erosion control by both Cabrillo NM and the Navy, as well as the City of San Diego at the Metropolitan Wastewater Treatment Facility, has been ongoing even without fire, due to steep slopes, and naturally unconsolidated shale and sandstone sediments.
2. Point Loma is relatively unique within southern California in that it has been fire free for the most of the 20$^{th}$ century. However, the potential for wildfire always exists under the right combination of climatic conditions and anthropogenic ignition, and cannot be eliminated. NBPL and CNM should be prepared to anticipate the effects.
3. A serious wildfire on Point Loma is most likely to occur under the most extreme weather conditions when wildland firefighting resources are already committed and unavailable.
4. The current staffing at the Federal Fire Department does not meet standards of the National Wildfire Coordinating Group for compliance with Federal Fire Policy. A minimum of four people are required on each engine to fight a wildland fire efficiently and safely.
5. Fuel loads on the northern and eastern facing slopes are high. These slopes are steep, with minimal access for firefighting, narrow and winding roads and many structures and military facilities at vulnerable mid-slope and top-of-ridge positions. On the western slopes fuel loads are generally less but more easily ignited due to the presence of fine fuels. This same condition exists on steep slopes, with limited ingress north of the Point Loma Wastewater Treatment Facility. In addition, there are many ridge-top structures including old wooden structures. The concerns at specific locations regarding hazardous fuel conditions are identified in Appendix B. The hazardous fuel condition involving the Fort Rosecrans Historic District and intermixed eucalyptus trees is complicated by the fact that herons now use these trees for nesting.
6. Maintaining a natural fire regime is not possible in this wildland-urban interface (Map 2-2). The federal properties are isolated from most natural sources of ignition by urban development. It also has a higher probability of human ignitions for the same reason.

7. Wildfire would almost certainly have a dramatic impact on plant community composition and structure in the southern maritime chaparral, with a significant increase in individuals of obligate seeding, fire-dependent species. In the maritime succulent scrub, species that respond well would increase. Succulents may experience a temporary decline in abundance or permanent loss if a wildfire was sufficiently hot to kill them completely.
8. There is evidence that the plant communities of Point Loma are changing due to an extended fire-free period, but it is not known if the current fire-free interval is outside the norms of the "natural" fire regime, and if any animal or plant has been permanently lost from the peninsula as a result. Certain species are decreasing in their amount of surface cover, while others are increasing. Lemonadeberry, a species that recruits during fire-free periods, is increasing. Wart-stemmed ceanothus, considered a sensitive species and fire-dependent, is decreasing in abundance, and wedgeleaf ceanothus has apparently disappeared from the peninsula, based on accounts from the 1800s. Catalina cherry is missing (or nearly missing since we have no personal knowledge of its continued presence) from the flora, probably for other reasons than the long fire-free interval, such as historic harvesting for fuel needs of local people and industry. California sagebrush may be decreasing in cover. Within any chaparral stand, certain herbaceous natives are present only in the seed bank. While some of these changes are probably induced by human activity, the major changes have occurred naturally as a result of competition for resources and stand age without fire. Shift in species abundance and cover is expected to continue towards taller canopy dominants, and decreases in shorter-lived species of smaller stature, herbaceous understory species, and gap components are also expected to continue. There may be future effects on wildlife or microbiota that cannot be assessed because they are not known at this time.
9. We do not have much information on species-specific longevity of many of the seeds in the seed bank or about the loss of viability or abundance of seeds due to herbivory. The potential exists to lose this component of the flora that currently exists only in the seed bank. Also, wildlife dependencies on this portion of the flora have not been investigated.
10. The wildfire risks to succulents that are abundant in the maritime succulent scrub flora should be weighed against the risk of closure of the shrub canopy, erosion, or exposure to unplanned fires that burn on their own terms rather than within conservation objectives. Succulents are abundant in Baja, California which has a more frequent fire history, than here. They are also more common in inland coastal sage scrub areas where fire frequencies are higher than at Point Loma. Given their location, mostly outside of southern maritime chaparral and in open sage scrub or maritime succulent scrub, they are not exposed to any special risk if fires are not overly hot.
11. Altered disturbance cycles and competition may lead to an increase in invasive weeds, and may be a consequence of fire management actions taken under this Plan.
12. Effective wildland fire policy for Point Loma requires interagency coordination; however the primary interagency group, the PLECA, has not taken on wildland fire management as part of its mission.

# 2.0 Proposed Action and Alternatives

## 2.1 Introduction

The range of issues developed during the interdisciplinary scoping and planning process led to a range of alternatives. The alternatives were structured around the fire management tools available to accomplish program goals and objectives. They were designed to provide effective fire protection while protecting natural and cultural resource values.

## 2.2 Description of Alternatives

The four alternatives considered in the environmental analysis include a No Action alternative (Alternative 3) and three additional alternatives. NEPA requires agencies to consider a “No Action” option that provides a baseline condition against which the other alternatives can be evaluated. The range of alternatives constitutes an additive hierarchy of the available fire management techniques that are feasible and effective in the fire environment of the Point Loma peninsula.

- Proposed Action – Implement the Joint Wildland Fire Management Plan with Enhanced Suppression, 50-foot Survivable Space Fuels Management, and Experimental Use of Prescribed Fire for Ecological Benefit
- Alternative 1 – Same as Proposed Action but with 100-foot Survivable Space Fuels Management as Prescribed in Most Local San Diego Jurisdictions.
- Alternative 2 – Same as Proposed Action but without Prescribed Fire for Ecological Benefit
- Alternative 3 – No Action (Current Program), Suppression Only

### 2.2.1 Proposed Action—Implement the Joint Wildland Fire Management Plan with Enhanced Suppression, 50-foot Survivable Space Fuels Management, and Experimental Use of Prescribed Fire for Ecological Benefit

The primary recommendations of the JWFMP that resulted in a change from the No Action Alternative are listed below.

***Preparedness, Prevention, and Suppression Guidelines***

- The Plan provides site-specific suppression guidance tailored to Point Loma (establishment of FMUs, maximum initial response guidelines, etc.).
- Enhanced preparedness is advocated such as, on a regular basis, and in accordance with applicable laws and regulations, FFD should inspect industrial operations, power lines, and occupied structures for survivable space standards. Annual pre-season maintenance checks should be scheduled for all firefighting vehicles, pumps, and hoses.
- The Plan recommends pursuit of augmented suppression agreements to secure more reliable access to a firefighting helicopter with the City of San Diego and the Navy’s reserve helicopter wing (COMHELWINGRES HC-85).
- Conduct an Annual Preparedness/Fire Plan Update Meeting to include: review of evacuation plans; a brief for fire personnel on revisions to natural or cultural resource

sensitive areas; evaluation of how the National Fire Danger Rating System (NFDRS) and fire weather data are working; evaluation of any suppression response tactic implemented that season to see if it fully considered objectives of the Point Loma Ecological Conservation Area (PLECA) and Minimum Impact Suppression Tactic (MIST) guidelines; and a review of mutual aid and other written agreements.

- Suppression tactics will be selected which create the least collateral damage, and are commensurate with effective wildfire containment and control strategies, firefighter and public safety, and resource values to be protected. Minimum Impact Suppression Tactics are employed, where feasible, to avoid sensitive natural and cultural resources.
- The Navy and NPS will provide the Federal Fire Department, and its cooperators through the use of the Incident Command System, information concerning sensitive resources, including maps of sensitive natural and cultural resources that are updated annually. This will assure that any collateral damage to natural and cultural resources are minimized and that resource protection is integrated into the strategic planning of all fire and fuels management activities.
- The person discovering a fire should take initial action to suppress it while fire authorities are on their way. Fire extinguishers should be mounted on Navy and NPS buildings, and these should be maintained and tested annually. Navy and NPS vehicles on Point Loma should be equipped with gloves, a shovel, a McLeod, and a Pulaski.
- Implement a NFDRS to establish the beginning and end of fire season, and assure appropriate precautions are implemented as fire danger increases. The Fire Management Officer at Santa Monica Mountains National Recreation Area (SMMNRA) should be provided access to the Naval Base Coronado (NBC) weather data from naval Air Station North Island (NASNI) to run it through the NFDRS. The NASNI meteorological office would forecast daily fire weather for Point Loma during the fire season on a website accessible to Navy, CNM, and SMMNRA personnel, or by other method agreeable to the PLECA Working Group. During extreme conditions, visitors at CNM should be confined to paved roads and trails. All fuel management activities for the year should be completed by the start of fire season.
- A new agreement among NPS, Naval Base Point Loma, and the NBC meteorological unit should provide access to the Remote Automated Weather Station (RAWS) data from the NBC meteorological unit in order to implement a Fire Danger Rating System.
- To support fire weather prediction, CNM staff should chart live fuel moisture levels in key fuel species. The start and end of fire season should be declared when live fuel moisture reaches or drops below ~ 120%.
- The FFD, Navy, and NPS should continue annual training to maintain the highest standards of professional and technical expertise in planning and safely implementing an effective wildland fire management program.
- Unoccupied historic buildings on CNM and NBPL will not receive special treatment during fire suppression. When warranted by the significance of a historic structure or a museum or a collection, adequate fire detection, warning, and suppression systems will be installed. Every attempt will be made to comply with national building and fire codes unless compliance cannot be met without significantly impairing a structure's integrity and character, at which point, a change in the management and use of the structure should be considered to minimize potential losses, rather than modify the structure itself.
- The Navy and NPS should post signs asking visitors to prevent all fires. Visitor entry points should disseminate a brief fire prevention message. Fire prevention education should be provided to anyone working in or adjacent to the wildland environment, such

as construction crews that operate during the fire season. The public information officers should develop fire program-related information activities and capabilities in response to escalating fire danger, fire activity, or public and media scrutiny.

### *Survivable Space Fuels Management or Building With Fire-safe Materials*

- The Plan recommends survivable space fuels management or fire-safe building construction around each structure that is adjacent to wildland fuels. This strategy has been shown to be the most effective at preventing structure loss and provides a safety zone for firefighters. It will permit firefighters to concentrate on suppressing the wildland fire and will minimize their need to focus on structure protection and evacuating people during a fire. A fuel management zone of 50 feet should be maintained around all structures that cannot afford to be lost in a wildfire. Appropriate fuel modification zones may be further refined, either expanded or reduced, following a building-by-building inventory conducted by a building assessment team, which should consider the factors listed below. The team should consist of a botanist or plant ecologist, structural engineer and fire behavior specialist. In rare instances, it may be appropriate to reduce the fuel management zone to less than 50 feet based upon one or more of the following criteria: 1) sensitive habitat for endangered or threatened species, or any species that is a candidate for listing as an endangered or threatened species by the state or federal government; 2) the conservation or scenic value of the adjacent vegetation; 3) whether the structure is occupied by people, or is a contributing feature to, or listed on the National Register of Historic Places; 4) whether the structure is constructed of fire resistant materials; 5) the value of the building and its contents; and 6) the structure's location with respect to burnable vegetation and the fire threat.
- Fuels management around all buildings should be accomplished using hand tools such as pole saws, pruning shears and weed whackers for pruning, cutting and thinning the vegetation. Cut vegetation will be clipped into four-inch lengths and left on the site as mulch, not to exceed four inches in depth, at the discretion of the Commander Navy Region Southwest (CNRSW) Botanist (on Navy land) and the Chief, Natural Resource Science at CNM. Some cut material may introduce invasive weeds, so may not be approved to leave on site. A combination of 30 feet of irrigated green space or fuels management (still allowing for lawn, groundcovers, bedding plants, low perennial shrubs, bulbs, and perennial grasses) within the developed area of NBPL, shortening the height of the most flammable species of vegetation to four to six inches, and thinning would adequately provide for the survivability of the structures from radiant heat. Fuel treatment does not mean that all vegetation needs to be removed within the fuel modification zone. The spacing between shrubs left behind should be about 2-1/2 times their height. Trees may be left if they are limbed up and the vertical distance between the nearest shrub and the lower fuel layer of the tree branches is 10 feet. Separation of tree canopies should be 10-30 feet depending on slope. Certain species need to be shortened to four to six inches in the fuel management zone due to their flammability. These are: California sagebrush *(Artemisia californica),* buckwheat *(Eriogonum fasciculatum),* sage species *(Salvia* spp.*),* and chamise *(Adenostoma fasciculatum).* All invasive exotic shrubs or trees should also be removed during fuel treatment regardless of their flammability.
- CNRSW and NPS should jointly develop a format for critiques of mechanical treatment projects, including a consistent means of cost accounting for fuel treatments.
- Building retrofits may be considered in lieu of, or in combination with, survivable space. For example, the addition of skirting around the base of the NBPL historic structures that are vulnerable to entry of flying embers would prevent ignition of the structures. Any such installation of skirting may require NHPA Section 106 consultation or compliance with the Navy's San Diego Metro Programmatic Agreement.

- New construction should meet national building code and national fire code requirements and will consider the recommendations of this JWFMP, to include limiting the siting of new structures to areas with safe ingress and egress. In areas with heavy fuel load, avoid mid-slope road locations, and long lengths of access, new structures should not be located so close to habitat areas that regular thinning of native vegetation is necessary to reduce fire threat, or appropriate fire-safe construction should be mandated.)

### *Flammable Tree Removal Plan*

- Develop a tree removal/replacement plan for fire safety. The Navy should investigate the potential for removing eucalyptus trees where they are adjacent to burnable structures, especially adjacent to the Fort Rosecrans historic buildings. Removal of eucalyptus at Fort Rosecrans is important because these highly flammable stands are adjacent to the historic, wooden buildings where people live and work. In recent years, the Navy has considered replacing eucalyptus or ficus trees with heron nests at a 1:1 ratio with Torrey pines. Both eucalyptus and ficus trees have problematic characteristics in a landscape setting. However, Torrey pines are also considered a hazardous fuel due to accumulation of dead pine needles, and the tree's resin is highly flammable. In addition, blowing, burning pine needles could be a problem for historic structures without solid skirting. If Torrey pines were to replace the eucalyptus stands near Fort Rosecrans, they should be planted no closer than 100 feet to the wooden structures, and pine needles should be kept cleaned up. The CNRSW Botanist should be consulted about other candidates for replacing these trees. If possible, the area should be irrigated. Removal of the eucalyptus trees around these buildings may require NHPA Section 106 consultation or compliance with the Navy's San Diego Metro Programmatic Agreement. The Torrey pines on the west side of the Point Loma Federal Fire Station should be removed.

### *Roadside Fuel Modification*

- Identify fuel modification zones along public paved roads. Each road should be evaluated on a case-by-case basis for fuel management distances, which may be adjusted based on whether access for firefighting vehicles is impaired, conservation concerns, the risk of ignitions in that location, hazardous fuel condition, nearby structures, and the effectiveness the road could serve in stopping a fire. Fuel management along roads allows them to function better as firebreaks, and to prevent the spread of wildfire ignitions that commonly occur along roads. The minimum dimensions of the fuel modification zone depend on road width and the criteria described above. Exceptions are upon approval by the Fire Authority Having Jurisdiction for NBPL and superintendent CNM.
- Roadsides should be planted to low-growing, native, fire resistant plants to reduce the need for annual maintenance and the risk of spreading exotic weeds. Perennial grasses stay green most of the year, for example, and will keep flame lengths low. Succulents are naturally fire resistant. Since example plantings of such native, fire-resistant plantings in natural environments are lacking, and there is concern about fostering the spread of exotic species and the cost of annual weed abatement, we recommend a demonstration project be implemented on both Navy and NPS lands before undertaking a new maintenance program for all roads.
- Develop annual weed abatement plan for fuel modification zones, to be completed by June of each year. Once grasses have cured along the road, annual weed abatement along the roadside should be considered.

### *Invasive Weed Management*

- Formulate a post burn weed eradication plan including a timeline that can be implemented after wildfires to prevent major infestations and establishment of noxious weeds. Map weed locations, species, and abundance every two to three years. Jointly develop an Invasive Weed Management Plan that considers whether fire and fuels management might be a disturbance factor that could promote weed spread.

### *Monitoring and Research*

- Conduct effects monitoring for fuel hazard reduction for survivable space and roadsides that focuses on invasive weeds.
- The FFD should maintain records of all fires of any size, including: severity; intensity; mapped extent; point of origin; time of start; time of containment; and ignition source.
- To guide adaptive decision-making, continue to evaluate and refine the decision models for fire and natural resource management. Support other studies as described in Section 3.8.3.
- Implement long term vegetation monitoring on NBPL lands. The NPS and Navy should be prepared to monitor any sensitive plant populations that experience wildfire in order to develop basic information on fire effects in these species.
- NBPL and CNM should continue to collect seed from mature plants to use in revegetation of disturbed areas if necessary.

### *Experimental Prescribed Burns for Ecological Benefit*

- Four experimental plots would be burned, each measuring about 30 square meters. Each burned plot is to be paired with an unburned control plot for comparison. Two of these experimental plots will be located in the East Side FMU in southern maritime chaparral, with a hot fire planned as the most appropriate for this plant community. The other two plots will be located in the West Side FMU in maritime succulent scrub, with a low- to moderate-intensity burn planned. Each plot will be fully surveyed before and after the burn for biota in all classes. Each plot will be manipulated by hand to blend into the landscape. The surrounding vegetation would be sprayed with gum-thickened, 75 phoschek or foamed to prevent escapes into the surrounding landscape. The firing pattern would be planned to achieve a high-intensity fire in chaparral, and a moderate- or low-intensity fire in maritime succulent scrub to avoid mortality of succulents. The experimental burns would be located on NPS lands. Based on the results, the Navy may elect to conduct additional burns on its land at some future date. Locations with sensitive lichen species or with federally listed species will be avoided. The Navy and CNM resource staffs would jointly perform annual monitoring of the control plots and burned plots. The public information officers should provide a minimum of 48-hour notice to residents adjacent to prescribed burn areas, and notify all who might view smoke from a prescribed burn on Point Loma through news organizations.
- To support the experimental burns and other fire management activities not related to suppression, a new agreement is needed between FFD and NPS so that resources can be shared for prescribed fire as well as for a wildfire. This agreement would be similar to the agreement that the Cleveland National Forest has with Federal Fire and separately with NPS.

### *Conclusion*

The Proposed Action reduces the potential loss of human life and socio-economic values by seeking more assured access to a backup firefighting helicopter and by providing enhanced pre-suppression planning for the Federal Fire Department and its cooperators. The Proposed Action also implements mechanical reduction of hazardous fuels for survivable space around buildings, and alongside roads. Ecological damage may occur through some loss of native habitat by this hazardous fuels reduction. It also reduces risk to ecological values by providing critical information required for long-term planning and management of sensitive natural resources by diversifying the fire regime under controlled conditions, managing for some younger age classes of vegetation that will benefit certain species, allowing for scientific study of unknown fire dependencies on the peninsula, and increasing the probability that all classes of natural resources are protected, consistent with the mission of both NBPL and CNM. Without the addition of the knowledge that is expected from these experimental burns, the No Action Alternative and Alternative 2 result in a uniform fire regime (fire exclusion) that depends upon some future random, unplanned ignition to regenerate fire-dependent species, and could risk the extirpation of some species from the Point Loma peninsula.

### 2.2.2 Alternative 1 – Same as Proposed Action but with 100-foot Survivable Space Fuels Management as Prescribed in Most Local San Diego Jurisdictions

The first Alternative considered to the Proposed Action is to increase the distance of fuels management around structures to 100 feet, which is a more conventional distance used in local San Diego County jurisdictions. The State of California, the County of San Diego, and the City of San Diego require the management of native vegetation within a 100-foot wide fuel management zone around structures located in the wildland-urban interface.

The Federal Fire Department currently does not have enough Engine Companies on Point Loma to simultaneously make an initial attack on a wildfire and protect all of the structures and facilities in its path. This is why creating survivable space around all occupied structures is necessary. The survivable space concept provides for structures to survive a wildfire without the immediate intervention of the Fire Department personnel who would be already committed to attacking and containing the fire. Knowing that a fire, accidental or otherwise, will consume the vegetation on Point Loma and in the process may destroy a significant amount of high-value property; the most effective approach is to create survivable space between the standing dense vegetation and the structures that currently occupy the landscape.

There are two conditions that contribute to the loss of a structure during wildland fires. The first is the direct impact of radiant heat. To protect a structure from the effects of radiant heat, adequate survivable space should be maintained. The second condition is wind blown embers that land on roofs or are blown up under exposed eaves or beneath structures. The only defense against such embers is a fire resistant structure.

Neither the National Park Service nor the Department of Defense has developed guidance or requirements for the establishment of survivable space around structures. Guidance may be gleaned from codes for the State of California. The federal government, however, is not required to adhere to the requirements found in these state codes. The State of California, Public Resources Code, Section 4290/4291, requires that a minimum zone of 30 feet be maintained around all **habitable** structures, with clearing up to 100-feet from structures or to the property line, whichever is closer, with a written order from the fire authority. The California Government Code, Section 51182, requires that "Any person who owns, …controls, operates or maintains any **occupied** dwelling or …structure in, upon, or adjoining any … brush-covered land, …or any land that is covered with flammable material, which …is within a very high fire hazard severity zone designated by a local agency pursuant to Section 51179, shall at all times …(1) Maintain around and adjacent to the …structure a firebreak made by removing and clearing away, for a distance of not less than 30 feet on each side…, all flammable vegetation or other combustible growth. (2) Maintain around and adjacent to the occupied …structure additional fire protection or firebreaks made by removing all brush, flammable vegetation, or combustible growth that is located from 30 feet to 100 feet from the occupied …structure…, as may be required by the local agency if the local agency finds that, because of extra hazardous conditions, a firebreak of only 30 feet…is not sufficient to provide reasonable fire safety. Grass and other vegetation located more than 30 feet from the …structure and less than 18 inches in height above the ground may be maintained where necessary to stabilize the soil and prevent erosion."

There are exemptions, however. Section 51184, subsection (a) of the California Government Code states that Section 51182 shall not apply to any land or water area acquired or managed for one or more of the following purposes or uses:

1. Habitat for endangered or threatened species, or any species that is a candidate for listing as an endangered or threatened species by the state or federal government.
2. Lands kept in a predominantly natural state as habitat for wildlife, plant, or animal communities.
3. Open space lands that are environmentally sensitive parklands.
4. Other lands having scenic values, as declared by the local agency, or by state or federal law.

(b) This exemption applies whether the land or water areas is held in fee title or any lesser interest. This exemption applies to any public agency, any private entity that has dedicated the land or water areas to one or more of those purposes or uses, or any combination of public agencies and private entities making that dedication.

NBPL and CNM are located within the federal reservation on Point Loma, an area of exclusive federal jurisdiction, and are not subject to state law. In addition, as a unit of the National Park system, CNM meets criteria (1) through (4) above, while the Navy land within the Point Loma Ecological Conservation Area and some of the Navy land outside the Conservation area meets at least one of these criteria. Furthermore, Point Loma and the federal reservation therein have not been designated as a "very high fire hazard severity zone," and therefore would not be subject to the requirements of Section 51182.

While the NPS and the Navy are not subject to the state codes identified above, these codes do provide a framework for creating survivable space. The NPS and the Navy are committed to protecting the lives of their employees, contractors and visitors and the structures in which they work and recreate. Each one owns public, administrative and historic structures around which survivable space should be maintained to ensure the safety of their employees and partners and to protect the government's investment. The NPS and the Navy are also committed to the long-term preservation of the sensitive habitats found on Point Loma within their respective jurisdictions. They are concerned about the possible effects of fuel reduction on erosion, natural processes, appearance and the further infestation of noxious weeds into native habitat.

Table 2-1 compares the expected disturbance from fuels management activities, including the difference in habitat affected by the two distances. The acreage affected by roadside fuel management along public, paved roads for up to 10 feet is not included in the table because it is very localized and not possible to quantify before a site-specific inventory. About 55 acres would need to be surveyed for potential need.

*Table 2-1. Mapped acreages of natural vegetation impacted by proposed fuel management actions on federal properties of the Point Loma peninsula (numbers in parentheses indicate the percent of the total acreage of the given vegetation type encompassed by each acreage value).*

| **Mapped Vegetation Type Occurring Around Structures, Along Roads, and Along Northern Property Line of Naval Base Point Loma** | **Maximum Acres Impacted if All Treatment Areas Around Structures can be reduced to 50-ft Buffer** ***(% of total community affected; % in PLECA)*** | **Maximum Acres Impacted With 100-ft Buffer** ***(% of total community affected; % in PLECA)*** | **Acreage Affected by 30-ft Fuel Management Area Along Northern Fence line of NBPL [1]** ***(% of total community affected)*** |
|---|---|---|---|
| Coastal Sage Scrub | 2.77 *(2.0%; 0.7%)* | 11.13 *(8.0%; 4.0%)* | 0.05 *(0.04%)* |
| Coastal Sage Scrub- DISTURBED | 0.01 *(0.5%; 0.9%)* | 0.13 *(7.0%; 14.1%)* | none |
| Coastal Sage Scrub/ Southern Maritime Chaparral | 1.19 *(2.5%; 1.9%)* | 5.38 *(11.1%; 8.5%)* | none |
| Maritime Succulent Scrub | 5.87 *(1.6%; 0.9%)* | 18.98 *(5.3%; 3.5%)* | 0.77 *(0.2%)* |
| Maritime Succulent Scrub- DISTURBED | 1.27 *(6.0%; 3.5%)* | 3.91 *(18.5%; 15.5%)* | 0.01 *(0.01%)* |
| Maritime Succulent Scrub/Southern Maritime Chaparral- DISTURBED | 0.09 *(6.4%; 3.7%)* | 0.37 *(26.7%; 24.1%)* | none |
| Southern Coastal Bluff Scrub | 1.59 *(3.0%; 2.3%)* | 6.56 *(12.2%; 10.4%)* | 0.05 *(0.1%)* |
| Southern Foredune- DISTURBED | 0.11 *(6.7%; 5.2%)* | 0.60 *(36.2%; 34.2%)* | none |
| Southern Maritime Chaparral | 5.14 *(4.5%; 2.6%)* | 17.11 *(14.9%; 9.2%)* | 0.09 *(0.1%)* |
| Southern Maritime Chaparral- DISTURBED | 1.73 *(24.6%;0.3% )* | 4.08 *(58.0%; 9.6%)* | none |
| DISTURBED | 8.83 *(8.8%; 1.4%)* | 21.93 *(21.8%; 5.9%)* | 0.09 *(0.1%)* |
| **TOTAL ACRES** | **19.8 / 28.6 [incl. disturbed]** ***(2.6%; 1.3%)*** | **68.2 / 90.2** ***(9.1%; 5.5%)*** | **1.05** ***(0.14%)*** |

[1] Required as part of Navy perimeter security, but also benefiting fire and fuels management.

## 2.2.3 Alternative 2 – Same as Proposed Action but without Prescribed Fire for Ecological Benefit

Alternative 2 eliminates the use of Experimental Prescribed Fire from the Proposed Action. The outcome of small experimental burns is intended to provide critical information on vegetation response and allow for long-term planning to determine an appropriate prescribed fire regime to meet target vegetation conditions.

This alternative does not provide the positive benefits and critical information needed for long-term resource management planning that would be derived from experimental prescribed burns. Over time, there is the potential to lose components of the plant community through aging of the vegetation and seed bank, and through competition that leads to taller, canopy-dominant species. There may be unknown dependencies of wildlife and other organisms on younger or more open stages of the plant community that are also at risk.

## 2.2.4 Alternative 3 – No Action (Current Program), Suppression Only

The No Action alternative continues the current program that uses the Federal Fire Department’s (FFD’s) existing capability supplemented by San Diego Fire Department as necessary. FFD is generally the first responder on all federal properties and would be the Incident Commander in the event of a wildfire emergency. FFD’s capability includes two engines, with about seven engines available within 45 minutes. A brush truck is available from 32nd Street and from North Island. FFD can request resources from the City of San Diego consistent with its agreement between the two agencies, and this includes a firefighting helicopter with water bucket. The City of San Diego, through its local Office of Emergency Services (OES) coordinator could activate OES resources under the California statewide master Mutual Aid Agreement. Also, air tanker support is available through Mutual Aid Agreement with the Joint Air Base at Ramona, California.

This alternative is expected to result in potentially larger and more damaging wildfires than the other alternatives. It does not provide as effective control of wildfire spread, so homes, facilities, and human life are at greater risk. Since wildland fires on Point Loma are expected to take place when firefighting resources are scarce, the City of San Diego helicopter may not be available, and the entire peninsula could burn within one hour under extreme fire danger conditions. The current staffing at the Federal Fire Department does not meet standards of the National Wildfire Coordinating Group for compliance with Federal Fire Policy. Also, this alternative is not compliant with Federal Fire Policy because there is no wildland fire management plan.

This alternative does not provide the positive benefits and critical information needed for long-term resource management planning that would be derived from experimental prescribed burns. Over time, there is the potential to lose components of the plant community through aging of the vegetation and the seed bank, and through competition that leads to taller, canopy-dominant species. There may be unknown dependencies of wildlife and other organisms on younger or more open stages of the plant community that are also at risk. However, this alternative is less damaging to sensitive communities, in the shorter term, since no fuel modification around structures would be conducted. Compared to these losses, there is a much greater impact to socio-economic values due to greater potential losses of structures and human life.

### 2.2.5 Elements Common to All Alternatives

In addition to the combination of actions unique to each alternative, there are certain actions that are common to all alternatives and that will be implemented regardless of the final alternative selected. Briefly, these include:

***Complete suppression of wildfires.*** Wildfire suppression is essential to protecting human life and property on the peninsula, which is entirely comprised of an intermixed wildland-urban interface. Suppression also provides some ecological benefit by ensuring that the age class of vegetation is sufficiently long and not so uniform that it affects biodiversity.

***Coordination of fire suppression to improve the effectiveness of fire management activities on Point Loma.*** Through coordinated efforts implemented as Mutual Aid agreements, fire and fuels management activities can occur across jurisdictional boundaries, increasing their overall effectiveness.

## 2.3 Alternatives Considered But Not Carried Forward

Two alternatives were considered but rejected from further consideration as being inconsistent with Navy or NPS policies and guidelines, were a threat to public safety, were logistically infeasible, or were inconsistent with the goals of the fire management program.

***Alternative 4- Wildland Fire Use***. Wildfire use is the management of unplanned ignitions for natural resource benefit. This approach was determined to be too risky to human life, social, and economic values on the peninsula due to the concentrated mix of wildland and urban environments. It is also logistically infeasible to implement on the scale of Point Loma because of the peninsula's small size and wildland-urban interface.

***Alternative 5- Landscape-Level Fuel Reduction.*** This alternative would implement large burns to manage hazardous fuel loads. This approach is considered too ecologically damaging due to the small acreages of wildland on the peninsula, and the high percentage of sensitive habitats. While landscape-level fuels management has been found effective at reducing flame lengths and allowing firefighters to gain a foothold on advancing wildfires under moderate weather conditions, it is not as likely to be effective under extreme weather conditions. In other locations in southern California, this approach has also been found difficult to implement because of regulatory constraints, especially those related to air quality standards.

## 2.4 Matrix Comparing Alternatives with Proposed Action

The matrix below (Table 2-2) compares the options considered in this EA, summarizing the discussion in this chapter.

*Table 2-2. Comparison of elements of the JWFMP with the Alternatives considered in this EA.*

| JWFMP Topic | Proposed Action | Alternative 1 100-foot Survivable Space | Alternative 2 No Prescribed Fire | Alternative 3 No-Action (Current Program), Suppression Only |
|---|---|---|---|---|
| **Preparedness, Prevention, and Suppression Guidelines** | Site-specific suppression guidance tailored to Point Loma. Pre-season survivable space inspection, maintenance checks by FFD. More reliable access to a firefighting helicopter. Annual Preparedness/ Fire Plan Update Meeting. Fire extinguishers mounted on Navy and NPS buildings, maintained and tested annually. Navy and NPS vehicles equipped with firefighting supplies. Fire Danger Rating System to assure appropriate precautions during extreme conditions, visitors at CNM would be confined to paved roads and trails. New agreement among NPS, NBPL to access Remote Automated Weather Station (RAWS) data at Naval Air Station North Island. CNM to chart live fuel moisture in key fuel species to declare the start and end of fire season. Annual training for FFD, Navy, and NPS. Fire prevention education through various means. | Same as Proposed Action | Same as Proposed Action | FFD's existing capability includes two engines, with about seven engines available within 45 minutes. FFD can request additional resources from Mutual Aid agreements. |
| **Survivable Space Fuels Management or Building With Fire-safe Materials** | Maximum 50 feet of fuels management or fire-safe building construction for structures adjacent to wildland fuels. This and other fuels thinning would affect a maximum of 19.8 acres (1.7% of PLECA acreage). Fuel modification distances may be adjusted following a building-by-building inventory. Annual weed abatement plan for fuel modified zones. | Maximum 100 feet of fuels management or fire-safe building construction for structures adjacent to wildland fuels. This and other fuels thinning would affect a maximum of 68.2 acres (9.1% of PLECA acreage). Fuel modification distances may be adjusted following a building-by-building inventory. Annual weed abatement plan for fuel modified zones. | Same as Proposed Action | None implemented |
| **Flammable Tree Removal** | Tree removal/replacement plan for fire safety. Navy should consider removing eucalyptus trees where they are adjacent to burnable structures, especially adjacent to the Fort Rosecrans historic buildings, or implement building retrofits. Section 106 consultation, compliance with the Navy's programmatic agreements may be needed. | Same as Proposed Action | Same as Proposed Action | None implemented |

| JWFMP Topic | Proposed Action | Alternative 1 100-foot Survivable Space | Alternative 2 No Prescribed Fire | Alternative 3 No-Action (Current Program), Suppression Only |
|---|---|---|---|---|
| **New Construction** | Designs for any new construction to include fire-resistant materials. Limit siting of new structures to areas with safe ingress and egress. Avoid mid-slope road locations. Set-backs from habitat areas to avoid need to thin native vegetation, or fire-safe construction mandated. | Same as Proposed Action | Same as Proposed Action | No guidelines for new construction. |
| **Wildland Fire Use** | All unplanned fires would be suppressed regardless of ignition source | Same as Proposed Action | Same as Proposed Action | Same as Proposed Action |
| **Prescribed Fire for Fuels Modification** | Prescribed fire is not considered for fuels modification | Same as Proposed Action | Same as Proposed Action | Same as Proposed Action |
| **Experimental Prescribed Burns for Ecological Benefit** | 4 experimental plots would be burned, each about 30 square meters, in southern maritime chaparral and maritime succulent scrub.<br>New agreement between FFD and NPS so that resources can be shared for prescribed fire as well as for wildfire. Navy and CNM resource to jointly perform annual monitoring. | Same as Proposed Action | No experimental burns for ecological benefit | No experimental burns for ecological benefit |
| **Roadside Fuel Modification** | Fuel modification along public paved roads on a case-by-case basis based on fire risk/hazard criteria. Roadsides should be planted to low-growing, native, fire resistant plants. Demonstration project to be implemented on both Navy and NPS lands before undertaking new maintenance program. Annual weed abatement plan for fuel modification zones. | Same as Proposed Action | Same as Proposed Action | None implemented |
| **Invasive Weed Management** | Post burn weed eradication plan | Same as Proposed Action | Same as Proposed Action | None implemented |
| **Monitoring and Research** | Monitor fuel thinning zone for invasive weeds. Improve fire reporting, documentation. Monitor to support adaptive decision-making. Support fire research. Long term vegetation monitoring and post-fire monitoring, both agencies. NBPL and CNM to collect seed to use in revegetation. | Same as Proposed Action | Same as Proposed Action except no support of fire research projects | None implemented |

## 2.5 Proposed Conservation Measures for Effects on Natural Resources

The primary actions proposed to prevent or minimize negative impacts to natural and cultural resources and to achieve the fire management goal and objectives are to provide enhanced suppression guidance, and to conduct experimental burns in order to understand better how to plan for sensitive resource protection and sustainability. Other conservation measures include:

- Existing roads and trails are used for fire lines rather than introducing new ones.
- To avoid potential weed invasion as a result of survivable space fuel treatments, the status of weeds will be monitored, and an annual weed abatement plan is recommended. All fuel modification zones should be monitored for the presence of serious invasive plant species, and these plants eradicated as part of a weed management plan. Species known to be aggressive invaders of wildland areas, such as acacia, are recommended for control as part of the mechanical fuel treatment activity.
- To avoid unnecessary vegetation removal and conversion that degrades habitat without increasing fire safety or reducing fire ignitions, a building-by-building inventory is recommended for structures within 100 feet of wildland areas. To minimize fuel

modification zones, the Navy and NPS and other agencies should work together to identify the amount of fuel modification required to protect structures from catching fire. They should analyze the potential cumulative impacts to habitat from fuel modification that exceeds the amount necessary to protect structures (e.g. 30 feet versus 50 feet and 100 feet).

- The Navy and NPS should cooperate with the City of San Diego and improve outreach methods to inform residents about appropriate fuel modification techniques; the importance of improving native habitat; the importance of limiting non-natives that increase fuel load; the importance of preserving slope vegetation; and appropriate structure siting to limit the size of the required fuel modification zone.
- Providing annually-updated natural and cultural resource sensitivity maps to the Federal Fire Department will enhance its ability to avoid these resource during suppression or other fire management activities.
- The Navy and NPS and other agencies should cooperate in all activities that promote fire prevention in order to reduce fire frequency.
- Habitat fragmentation is avoided by a lack of fuels management activity (that could potentially exacerbate fragmentation), so contiguous, large blocks of natural habitat remain intact. Fire prevention and suppression techniques are used on habitat boundaries to reduce the probability of large-scale, catastrophic wildfires in natural areas.
- The inadequate data available to evaluate impacts due to the interaction between fire regime and habitat fragmentation is ameliorated by conducting experimental burns and research projects. Research is recommended on the role and significance of the current long fire-free intervals as a potential extinction mechanism in fragmented habitats.
- The potential impact due to the spread of weeds as a result of hazard fuel reduction projects along roads and around structures is minimized by evaluating these projects for effectiveness, eliminating invasive species and providing annual weed abatement.
- Identifying the locations of sensitive habitat and consulting with FFD before a wildfire occurs helps to avoid damage to sensitive species. Since it is expected that a fire will spread rapidly, the Navy and NPS should consult with FFD regarding the location and importance of natural and cultural resources to minimize impacts associated with suppression activities.
- The NPS and Navy will monitor any sensitive plant species that is affected by a wildfire to develop basic information on the effect of fire on that species. Basic information on species response to fire should be collected through literature review and field observation and shared through the PLECA Working Group. Fire response information should be incorporated into the sensitive species database as part of the Navy's and NPS' individual inventory and monitoring programs.
- Avoiding potential impacts to geology and soils by improved wildfire suppression; reducing the size of the survivable space zones through a building-by-building inventory; improving the siting of structures away from habitat edges; avoiding building fire lines during suppression; by conducting only small-sized ecological prescribed fires; and using existing roads and trails for fuelbreaks. The Fire Plan objective regarding soil erosion due to fire is that it will not exceed the rate of soil formation, which is about one ton per acre per year, and sedimentation due to fire will not affect water quality of surrounding ocean and bay waters. If any of these occurs, then action will be taken to prevent further damage. The Fire Plan provides post-burn rehabilitation guidelines to avoid soil erosion or exotic weed establishment after wildland fire.

- Preventing potential impacts to the health and safety of firefighters and others by improved fire suppression, a policy that that keeps firefighter safety as the first priority during incidents, providing adequate survivable space, developing and communicating evacuation plans, and improving coordination and education notification procedures.
- For smoke issues providing the minimum 48-hour notice to residents and compliance with burn days avoids any problems. Burn days should be selected for their ability to transport smoke to upper elevations and lessen the impacts to the local populations. Smoke sensitive areas are also identified in advance, and burn plans will be developed that carry smoke away from smoke sensitive areas.
- Also to improve health and safety and impacts to native habitats, appropriate zoning is recommended that limits new structures in areas that lack safe ingress and egress due to mid-slope road location, length of access, or heavy fuel load.
- Avoiding potential impact to scenic resources by not scheduling experimental burns during high use periods, such as holiday weekends, at CNM. Monitoring sensitive air quality indicators, such as visibility and lichens, to establish baseline conditions. Designing and implementing management activities to meet or exceed adopted visual quality objectives of NPS. No distinct edge between treated and untreated areas will be evident.
- Preventing potential impacts to recreation by avoiding the introduction of new fire lines that could lead to a proliferation of trails. Addressing the perception of fire as “damaging” by an increased emphasis on environmental interpretation of fire ecology.
- The Plan calls for taking advantage of enhanced ecological interpretation opportunities with experimental burns.
- Improved coordination of fire and fuels management will improve the effectiveness of fire suppression activities involving Navy and NPS lands. Through better coordinated efforts, fuels management activities can occur across jurisdictional boundaries, increasing the overall effectiveness of both suppression and fuels treatment.
- Implementation of MIST protocols will minimize damage to sensitive resources during suppression.

# 3.0 Affected Environment

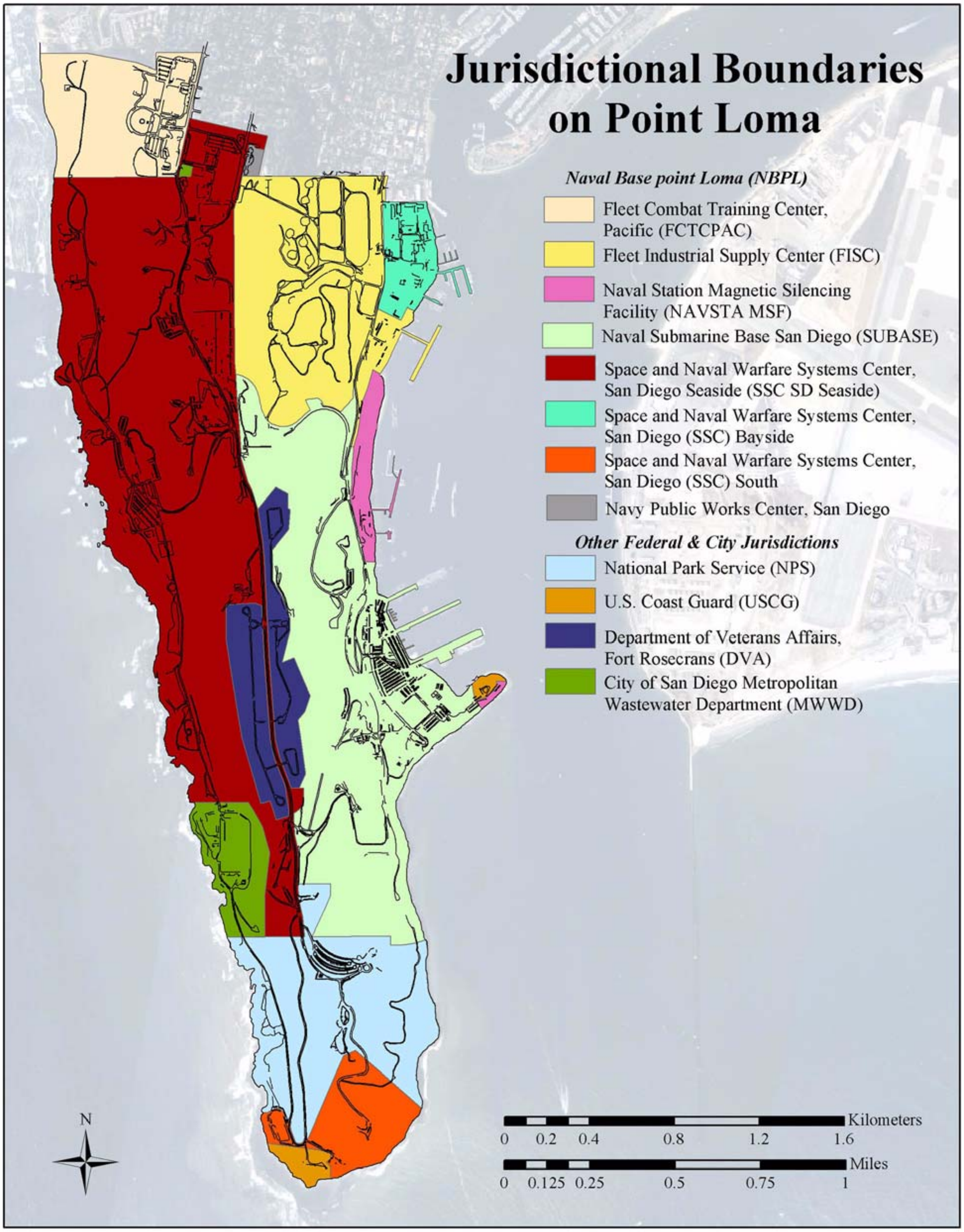
## 3.1 Land Use

NBPL occupies a majority of land on the Point Loma peninsula and adjacent marine assets. NBPL lands, while administered by Commander Navy Region Southwest (CNRSW) on behalf of the Commander, Naval Installations (CNI), are occupied by seven major tenant commands. Five of these are located on the peninsula, one is located adjacent to San Diego Bay, and one on Marine Corps Air Station (MCAS) Miramar. For the purposes of this Fire Plan, the NBPL lands are those located on the Point Loma peninsula up to 300 yards seaward (beyond the mean lower low water line [MLLW]), along both sides of the peninsula. Map 3-1, as well as Map 1-2 of the JWFMP, shows the Federal Reservation (all federal landholders) on Point Loma with jurisdictional boundaries.

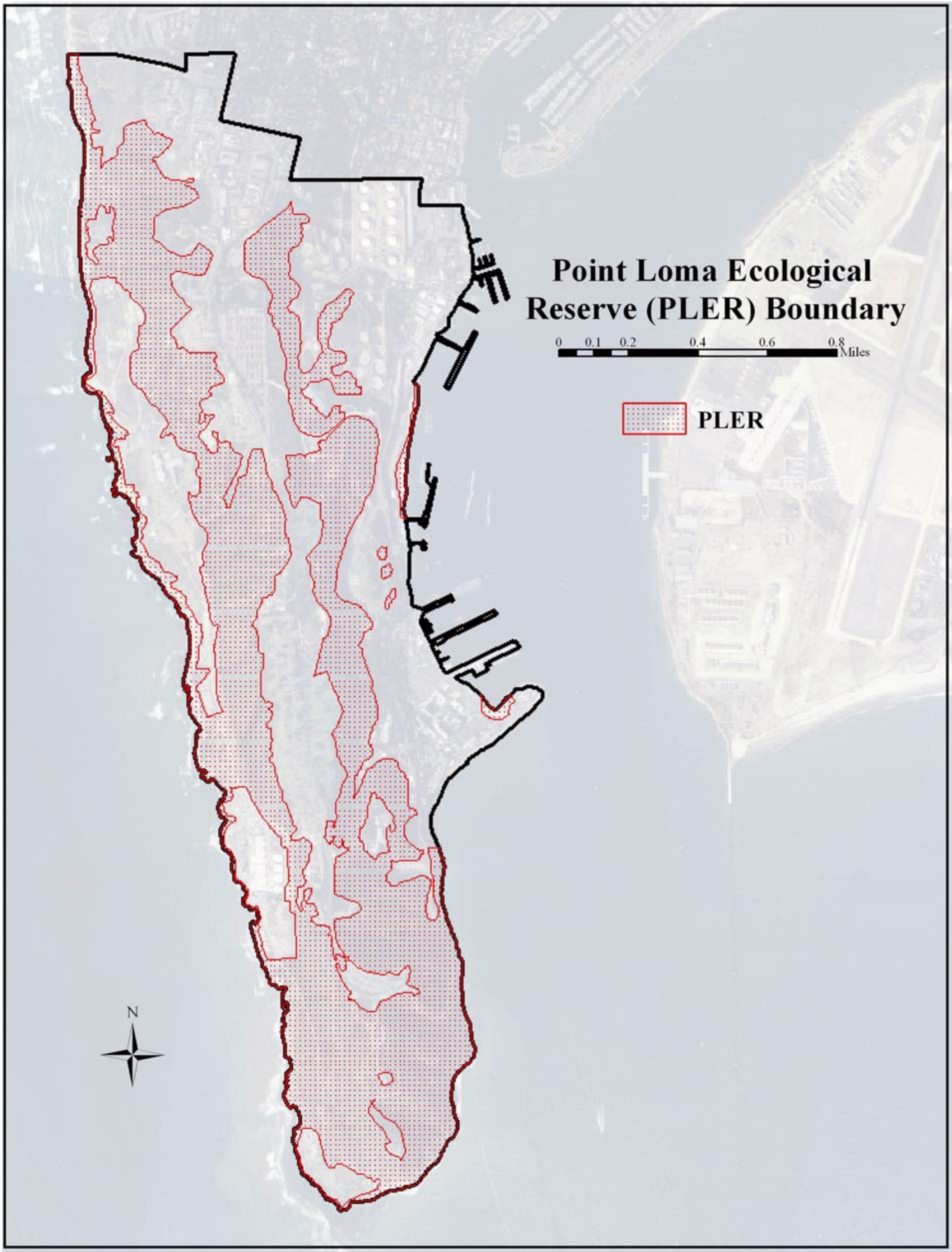
CNM is located on the southern end of Point Loma within the city limits of San Diego. From its 420-foot elevation, the monument offers a magnificent view of San Diego and its bay and adjacent cities to the north, east, and south; Mexico to the far south; and the Pacific Ocean to the west. The property is bordered by the SUBASE on the north and northeast; Space and Naval Warfare Systems Center, San Diego (SSC) on the north, south and west; the City of San Diego Point Loma Wastewater Treatment Plant (PLWTP) on the northwest; and the U.S. Coast Guard (USCG) Point Loma Light Station on the southwest. Access to PLWTP, USCG Light Station, and Battery Humphreys is through the park. Access to the park is along Cabrillo Memorial Drive, and is controlled by NBPL.

Other land uses on Point Loma include the City of San Diego's PLWTP, Ballast Point Coast Guard Station; Fort Rosecrans National Cemetery; residential neighborhoods of Point Loma, Loma Portal, and Ocean Beach; the Point Loma Nazarene University; a support facility for the University of California, Scripps Institution of Oceanography; Sunset Cliffs Park; and Shelter Island.

Table 3-1 shows acreages of the major government landholders and tenants on Point Loma, totaling about 1, 511 land acres. Lands involved in the PLECA are summarized in Table 3-2. Jurisdictional boundaries are shown on Map 3-1, and those involved in the PLECA on Map 3-2.




*Map 3-1. Naval Base Point Loma jurisdictional boundaries.*




*Map 3-2. Boundaries of Point Loma Ecological Reserve.*

*Table 3-1. Approximate acreages of major landholders and tenants on Point Loma.*

| Complex | Land | Water (Submerged Lands) | Total |
|---|---|---|---|
| Naval Base Point Loma | 1,226.5 | 418.4 | 1,645 |
| *Naval Submarine Base San Diego* | *325* | *99* | *424* |
| *Space and Naval Warfare Systems Center, San Diego* | *597* | *277* | *874* |
| *Fleet Combat Training Center, Pacific* | *94* | *41* | *135* |
| *Naval Station Magnetic Silencing Facility* | *19.5* | *1.4* | *21* |
| *Fleet Industrial Supply Center* | *191* | *0* | *191* |
| *Publice Works Center Housing* | *2.6* | *0* | *2.6* |
| National Park Service | 160 | 0 | 160 |
| City of San Diego Point Loma Metropolitan Wastewater Department Treatment Plant | 42 | 0 | 42 |
| Department of Veterans Affairs/Fort Rosecrans | 71 | 0 | 71 |
| U.S. Coast Guard | 11.5 | 0 | 11.5 |
| U.S. Army Corps of Engineers | 0 | 120 | 120 |
| **Total** | **1,513.7** | **538.4** | **2,052** |

NOTE: Navy land acreages from INRMP (U.S. Navy 2002). An additional 254 acres of in-water resources are within the NBPL boundary, including 36 acres adjacent to FISC, 75 acres adjacent to MSF, 61 acres adjacent to SSC, and 82 acres adjacent to SUBASE. U.S. Army Corps of Engineers owns submerged land on west shore; this land is managed by NPS through a Cooperative Agreement DACA09-4-00-0001.

*Table 3-2. Acreage of the Point Loma Ecological Reserve agencies, with boundaries as delineated in Naval Base Point Loma Integrated Natural Resources Management Plan. (Map 3-2)*

| Agency of the Point Loma Ecological Reserve | Approximate Totals Based on NBPL INRMP |
|---|---|
| Naval Base Point Loma | 527 |
| National Park Service | 130 |
| City of San Diego Point Loma Metropolitan Wastewater Department Treatment Plant | 8.9 |
| Department of Veterans Affairs/Fort Rosecrans | 1.1 |
| U.S. Coast Guard | 1.5 |
| **Total** | **668.5** |

The U.S. Navy owns in fee the 1,013 acres of land and 417 acres of water that comprise NBPL lands on the Point Loma Peninsula. The land is owned by CNI and occupied by major tenant commands, five of which harbor burnable vegetation and therefore are addressed in this Fire Plan:

- Naval Submarine Base San Diego (SUBASE)
- Space and Naval Warfare Systems Center, San Diego (SSC [formerly NCCOSC, NRAD, and NOSC])
- Fleet Combat Training Center, Pacific (FCTCPAC)
- Fleet Industrial Supply Center (FISC) Fuel Depot
- Naval Station Magnetic Silencing Facility (MSF)

Several real estate agreements affect CNM land use:

- CNM administers submerged lands through a Cooperative Agreement with the U.S. Army Corps of Engineers (No. DACA09-4-00-0001). These constitute approximately 120 acres of rocky intertidal area (tide pools) on the west side of the monument. The area extends seaward 300 yards from the MLLW, and from the monument boundary with the PLWTP on the north to a point 300 yards east of the Point Loma Lighthouse.

- The Presidential Proclamations which expanded the monument also retained the right of DOD to continue to use CNM lands:

  > "The land... shall be subject... to the right of the Department of Defense to retain, for such length of time as required by it, the use of roads and utilities now being used by it, and the right to require that no activity will be conducted within the monument that would interfere with defense activities being conducted in the vicinity thereof."

- An Interagency Agreement between the NPS and the Navy (SUBASE), designates a portion of the land described in PLO 5234 as a buffer zone (explosive arc). Since the buffer zone precludes the "use" of the old maintenance building, the agreement provides a replacement structure within NBPL (new maintenance building). The building can be used for storage and other purposes, and persons can come and go from the site but they cannot stay in the area for long periods of time on a regular basis.

- Walking access to the Bayside Trail is provided by U.S. Navy license (N6871192RP02P73) for use of portions of Battery Humphrey's Road and Sylvester Road. This trail is a remnant of Sylvester Road on the Submarine Base.

The NPS has issued a Special Use Permit to the City of San Diego for the construction, use, and maintenance of Cabrillo Road in exchange for access to the PLWTP. The City has sought a change in the location of the right-of-way due to heavy coastal erosion near the current entrance to the wastewater treatment plant.

Table 3-3 summarizes land uses of the major government landholders of Point Loma.

*Table 3-3. Land uses of major landowners of Point Loma. Source: U.S. Navy 2002.*

| Landowner | Land Use |
|---|---|
| Naval Submarine Base San Diego (SUBASE) | SUBASE occupies approximately 325 acres (and 99 acres in the water) from the Point Loma ridge to San Diego Bay, mostly unstable hillsides with more than 25 percent slope. Of the existing land area, 114 acres are currently developed for operations, training, administration, housing, storage, and shops, while the remaining 180 natural acres are not suitable for development due to steepness of the terrain, or they function as necessary buffers between ordnance storage and handling points on SUBASE and all public access routes and facilities. These zones, known as Explosive Safety Quantity Distance (ESQD) arcs, minimize the risk to the public in the event of an explosive accident. Another constraint to development on SUBASE is the electromagnetic interference (EMI) free zone surrounding the deperming facility. |
| Space and Naval Warfare Systems Center (SSC) | SSC, one of the Navy's principal research, development, test, and evaluation centers, occupies the largest portion of land of the seven major tenant commands, with almost 600 acres in four locations: Topside, Bayside, Seaside, and South Tip. Approximately 176 acres are currently developed, while the remaining 435 acres are comprised primarily of maritime succulent scrub and chaparral. Approximately 277 acres of in-water resources are off SSC lands. SSC facilities include storage areas, research laboratories, and public works shops. SSC Bayside provides tide pool parking, waterfront access, and berthing capabilities for SSC's research activities, such as the marine mammal program. |
| Fleet Combat Training Center, Pacific (FCTCPAC) | FCTCPAC occupies 94 acres, plus 41 acres of in-water resources. Its facilities support training, operations, administration, and supply and storage. Development is limited to approximately 35 percent of the 94 acres because the undeveloped slopes exceed 20 percent. These slopes serve as an electronic warfare signal test range. |
| Fleet Industrial Supply Center (FISC) | The FISC property (191 acres) is mainly developed with fuel tanks and support facilities, but supports steep, vegetated hillsides of coastal sage scrub and chaparral. |
| Magnetic Silencing Facility (MSF) | MSF (21 acres, including 1.4 acres of submerged) includes underwater sensor ranges which measure the distortion in the earth's magnetic field surrounding each ship which passes over the ranges. It is this distortion or electromagnetic anomaly, which could set off magnetic mines or allow the ship's detection. Non-developed portions of the property are restricted for development as part of an EMI free zone. |
| U.S. Coast Guard (USCG) | The Ballast Point Coast Guard Station occupies 2.8 acres adjacent to MSF and SUBASE where operations buildings support berthing for Coast Guard ships. The Coast Guard's lighthouse at the southwestern tip of Point Loma was built in 1891. The 8.7-acre parcel on which the lighthouse and associated buildings sit ("the Point Loma Annex") bisects SSC's South Tip area of use. |
| Department of Veterans Affairs (DVA) | DVA is a burial ground that existed on Point Loma prior to 1847, and became an Army Post cemetery in the 1860s. It became the Fort Rosecrans National Cemetery in 1934, and more than 80,000 veterans are buried here. The 71-acre site is a designated California State Historic Landmark Number 55. |
| City of San Diego Metropolitan Wastewater | MWWD's facility (42 acres) is located on the west side of Point Loma, between CNM on the south and SSC Seaside on the north. The main sewer interceptor from the City of San Diego runs the length of Point Loma to the plant, as does the solid waste (sludge) pipeline from Point Loma to the Metropolitan Biosolids Center at MCAS |

| Landowner | Land Use |
|---|---|
| Department (MWWD) | Miramar. The Plant was opened in 1963 and treats up to 190 million gallons of wastewater per day from a 450-square-mile area. |
| Cabrillo National Monument (CNM) | The 160 acre CNM commemorates the first time that a European expedition set foot on what later became the west coast of the United States. On September 28, 1542, Juan Rodríguez Cabrillo landed at San Diego Bay. His accomplishments were memorialized on October 14, 1913 with the establishment of CNM. |

# 3.2 Utilities and Infrastructure

More than 550 acres, or 37.4 percent, of the Point Loma federal properties are developed or landscaped (see Table 12). Examples of infrastructure on NBPL include public access routes, buildings for operations, training, administration, housing, classrooms, storage, and shops; fuel tanks and support facilities; ordnance storage and handling points with ESQD safety zones; research laboratories; public works shops; waterfront access and berthing capabilities; an open air pool known as the Transducer Evaluation Center (TRANSDEC) for testing hydrophones; and underwater sensor ranges that measure the distortion in the earth's magnetic field surrounding each ship that passes over the ranges.

The Ballast Point Coast Guard Station operates a lighthouse and support buildings. Fort Rosecrans National Cemetery, managed by the DVA, is a landscaped cemetery and is designated as California State Historic Landmark Number 55. The landscaped cemetery also unofficially serves as a major ridge-top fuelbreak.

Facilities at CNM include a visitor center complex comprised of a view building, auditorium, exhibit room, administration building, scenic overlook with the statue of Cabrillo, and 300-vehicle parking area; the Old Point Loma Lighthouse and assistant keeper's quarters; the Whale Overlook shelter; entrance station; the 25-vehicle Ocean View parking area; a restroom building constructed in the 1930s near the lighthouse; the "old" maintenance building used for storage and the museum storage facility; 21 concrete, metal and wood US Army WWI and WWII era barracks and battery commander's stations, searchlight shelters and power generating stations; 44-vehicle Tide Pool parking area; 13-vehicle Coast View parking area; 30-vehicle Sea Cove parking area; and a "new" maintenance building on Navy land. The Navy built this new maintenance building for the NPS on its land after construction of the Submarine Base torpedo magazine and repair facility placed the "old" maintenance building within the ESQD arc. The monument also contains trails, roads, and overlooks.

# 3.3 Socioeconomics

The Navy and NPS lands are home to several billion dollars worth of infrastructure and provides a vital economic base for the San Diego economy both in Navy employment and in visitor days spent at CNM. Dense residential development adjoins Navy property to the north. The average price of a single-family home purchased on Point Loma in 2003 was $674,750 (San Diego Union Tribune Zip Code Chart http://www.dqnews.com/ZIPSDUT2003.shtm accessed July 7, 2004). These prices reflect the desirability of Point Loma as a place to live, and the fact that there is no more room for new development without a re-designation of land use on properties currently protected from development. Refer to Table 3-4 for a summary of relevant demographic data from the 2000 census for the two zip codes adjacent to NBPL.

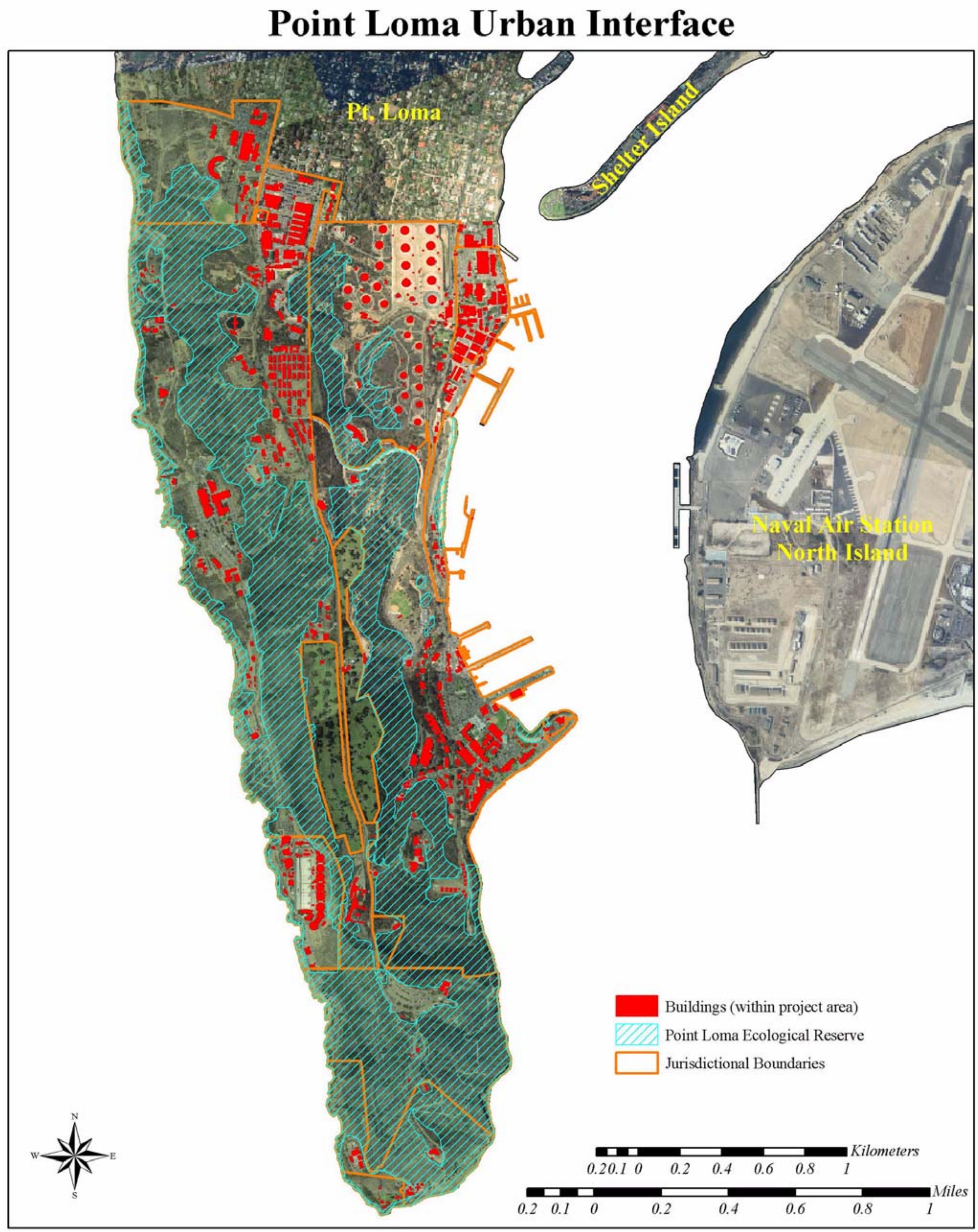
*Table 3-4. 2000 Census data from zip codes adjacent to the federal properties on Point Loma.*

| Zip Code* | 92106 | 92107 |
|---|---|---|
| Total Population | *18900* | *26987* |
| Median Age | *39.2* | *34.6* |

| | | |
|---|---|---|
| Total Households (occupied housing units) | *7378* | *13536* |
| Median Household Income | *60879* | *43260* |
| Employment (Civilian) | *10406* | *3789* |
| Employment (Military) | *1544* | *0* |
| Total acres | *6184.2* | *1860.3* |
| Developed acres | *5485.6* | *1841.1* |
| Vacant Developable acres | *28* | *17.9* |
| Constrained/Unusable Land acres | *670.6* | *1.4* |
| Residential Density (housing units per residential acre) | *7.6* | *14* |

*92106 covers the residential portion of Point Loma, including Peninsula, La Playa, Roseville, Fleetridge, and portions of the Midway area. 92107 covers the Ocean Beach community.

Throughout the County of San Diego, it is common to see homes, businesses, and industries built further and further into wildland environments. This trend is creating an expanded wildland-urban interface, where structures are located next to large stands of native vegetation. Because of their location, these structures have become highly vulnerable to wildland fire. Firefighting in these areas is complicated by having to address both structural and wildland fire issues, and is typically focused on protecting buildings and saving lives. None of the natural habitats on Point Loma are far enough from existing buildings to be considered out of the wildland-urban interface. The interspersion of structures and natural habitats is shown on Map 3-3.




*Map 3-3. Interface of urban and natural habitats on Point Loma.*

## 3.4 Recreational and Scenic Values

The cultural and natural resources within the CNM and on adjacent intertidal areas administered through cooperative agreements provide outstanding recreational opportunities for an average of 1.1 million annual visitors. Visitors are attracted by opportunities to see, photograph, and study a historically restored 19th century lighthouse, tide pools, coastal sage scrub habitat (by way of the Bayside Trail), remnants of a WWII coastal defense system, and the scenic views of the City of San Diego, its natural harbor, the coast of Mexico, the Pacific Ocean, and off-shore islands. During the winter, visitors come to watch the annual migration of Pacific gray whales *(Eschrichtius robustus)* from their feeding grounds in Alaska in the Bering and Chukchi seas to their calving grounds in sheltered lagoons of Baja California. Visitors can sometimes observe several dolphin species, and occasional killer whales, from cliff-top vantage points. Point Loma also offers opportunities for visitors to enjoy bird watching.

The CNM is host to the annual Cabrillo Festival, which attracts up to 6,000 participants, and other special events such as the Kiwanis-sponsored non-denominational Easter Sunrise Service that attracts 400 participants, and the Naturalization Ceremony conducted annually by the Justice Department that attracts 600 new citizens and family members.

On NBPL, outdoor recreation activities such as walking, jogging, and bicycling are restricted to existing roadways or established trails in the naturally vegetated areas and the undeveloped beach areas. Other recreational facilities include baseball fields, several tennis courts, basketball courts, gymnasium, weight training facility, picnic areas, and exercise/jogging courses.

## 3.5 Public Health and Safety

The health and safety of the public and fire personnel are the first concern in any fire management plan. Current wildland fire management capability and responsibility on federal lands of Point Loma lies with the Federal Fire Department. FFD is generally the first responder on all federal properties and would be the Incident Commander in the event of a wildfire emergency. An exception is a medical emergency at the tide pools on Cabrillo, which is handled by the City of San Diego because they have Advanced Life Support (ALS) capability, and 911 medical calls are routed directly to the City. The first responder at the Wastewater Treatment Facility is also the City of San Diego rather than FFD.

The FFD falls under the Assistant Chief of Staff for Security and Force Protection for CNRSW, based in San Diego. The organizational chart for the FFD on Point Loma is depicted in Figure 1-1 in the JWFMP, p. 1-23. While the Federal Fire Department on Point Loma has only two engines, about seven engines are available within approximately 45 minutes. Also, two brush trucks are available from 32nd Street and from North Island for pre-suppression work.

The National Wildfire Coordinating Group (NWCG) is a national operational group designed to coordinate programs of the participating wildfire management agencies. It is made up of the USDA Forest Service; four USDI agencies including the NPS; and State forestry agencies through the National Association of State Foresters. Based on NWCG guidelines, a minimum of four wildland-trained firefighters are required on each engine that responds to a wildland fire. The current staffing at the Federal Fire Department does not meet standards of the NWCG for compliance with Federal Fire Policy.

If a wildland fire occurs on Point Loma it would be managed as a wildfire under Unified Command. Federal Fire would likely be the lead agency. Fire staff from the NPS would respond from Santa Monica Mountains NRA to be the other part of Unified Command. Through the use of a task order, CNM can order resources from the Cleveland National Forest (CNF) to conduct the operation and reimburse the CNF for their costs (agreement number is Forest Service 02-IA-11132543-21 and NPS # F00001-03-0011). Federal Fire has a similar agreement with the CNF (IA-5-92-02-005 May 15, 1993 between Commander Naval Base Coronado and CNF, and related Operating Plan signed August 17, 1994). In addition, Federal Fire can request resources from the City of San Diego consistent with the agreement between the two agencies. Through its Mutual Aid Agreement with the City of San Diego, FFD has access to a firefighting helicopter with a water bucket. The City of San Diego, through their local Office of Emergency Services (OES) coordinator, could activate OES resources under the California statewide master Mutual Aid Agreement. This is generally only used for time periods under 24 hours, as reimbursement to OES cities becomes a major issue for longer periods. If the City of San Diego ordered the resources they would pay the OES bill. If Federal Fire ordered, they would pay the bill for OES resources. CNM, as the minority landowner, would likely not order firefighting resources directly; therefore, CNM would not contribute payment except as part of a cost-sharing agreement negotiated after the fire. This cost-sharing agreement would likely proportion costs based on acres burned by jurisdiction.

There is currently no mutual aid agreement between NPS and FFD.

# 3.6 Natural Resources

## 3.6.1 Topography, Geology, and Soils

The severe topography of the peninsula creates distinct watersheds on the bay and ocean slopes, separated by the central spine of the landform, which rises to 460 feet above mean sea level. The deeply dissected terrain is cut by numerous natural drainages that channel runoff directly to the sea. Slopes of 40 to 75 percent are common. The rugged coastline is composed of eroding sandstone cliffs and characterized by wide rocky beaches, boulder fields, and small pockets of sandy beaches.

Point Loma is underlain by the Point Loma Formation that extends from northern Baja California to about Carlsbad, California. This formation is buried by recent sedimentary deposits, the lowest of which is the Pleistocene Cabrillo Formation composed of sandstone and conglomerates, visible at lower elevations. Above this is the more noticeable Bay Point formation of marine terraces and uplands formed from relictual beach dunes about 300 feet thick. The soils derived from this formation are loamy sands.

A primary concern regarding soils is accelerated erosion and sedimentation that could occur due to fire or fire management activities. High fire temperatures can create hydrophobic conditions on certain soil types, in which impermeable subsurface layers can slough off in one mass after a fire. Many of the Point Loma soils have a naturally high erosion hazard due to poorly consolidated sandstone and shale sediments and steep slopes. Considerable erosion is ongoing on the peninsula.

## 3.6.2 Water Resources, Including Regulated Waters and Wetlands

No freshwater sources were present on Point Loma until a dam was built in 1796 at the bottom of a ravine when Fort Guijarros was established on Ballast Point. There are no known ground water resources, natural seeps, or springs. The keepers at the Old Lighthouse depended on rain water stored in cisterns.

The City of San Diego is the major water supplier, and a City reservoir is located on Catalina Boulevard north of Fleet Combat Training Center, Pacific. Two additional large potable water reservoirs are located on the north side of Cabrillo Memorial Drive, one north of the Fort Rosecrans National Cemetery, and the other south of Ashburn Road where it joins Cabrillo Memorial Drive.

Wildfires create conditions conducive to erosion and can increase sedimentation of water bodies. The waters surrounding Point Loma are sensitive to sedimentation. They are considered Essential Fish Habitat (EFH) under the Magnuson-Stevens Fishery Conservation Management Act (as amended on October 11, 1996) (MSFCMA), due to the presence of eelgrass and estuary conditions of San Diego Bay, and kelp beds on the Pacific Ocean side. This Act requires the delineation of EFH by regional fishery management councils with assistance from the National Oceanic and Atmospheric Administration Fisheries Service

(NOAA Fisheries). The MSFCMA requires federal action agencies to consult with the Secretary of Commerce and NOAA Fisheries regarding any proposed action authorized, funded, or undertaken by the agency that may adversely affect EFH identified under the Act. In letters dated 29 March 2000 and 4 April 2000, NOAA Fisheries and the Navy reached agreement that the existing consultation/environmental review process is functionally equivalent to the required NEPA consultation.

Jurisdictional wetlands or waters on Point Loma, as defined under Section 404 of the Clean Water Act, are those in the surrounding San Diego Bay and Pacific Ocean waters and immediately adjacent to them. The primary fire management-related concern to these waters is sedimentation that could occur after a significant wildfire, or any other fire management-related action that exposes bare ground.

## 3.6.3 Plant Communities and Fire

Point Loma not only evolved as an island but also functions to some extent today in an insular setting. It is fairly isolated from other significant stands of natural vegetation by both geography and development, and its maritime climatic influence allows for unique vegetation assemblages. Several plant communities on Point Loma are rare or restricted in distribution outside the Point. In addition, much of the vegetation is distinctive in that it contains a large succulent component (cacti and other plants with succulent stems).

The plant communities identified in Table 3-5 are based on Holland (1986). Nomenclature for plant species follows Hickman (1993). Detailed plant community descriptions may be found in the Navy's INRMP (U.S. Navy 2002) and NPS' Resource Management Plan and Vegetation Management Plan (CNM 1998 and 1995 with updates).

While the historical fire regime is not known specifically, it can be assumed that fire was present and regulating the composition and structure of plant communities, and therefore wildlife habitats, to some degree. The fire regime can have significant effects on biota either through the lack of significant fire over an extended period or from fires that occur at an intensity, pattern, or interval to which the biological communities or individual species have not adapted. Actual effect on the community depends on not only the nature of the fire regime, but how it interacts with other natural processes at the landscape, community, and species scales. Because the modern environment is altered by many irreversible changes, the resilience of Point Loma's plant communities and species to today's fire regime may be different than they were under the fire regime of a few hundred years ago.

The following paragraphs summarize fire and other management concerns related to the plant communities of Point Loma.

### *Fire Concerns in Southern Maritime Chaparral*

Ecologically, maritime chaparral is differentiated from interior chaparral by having greater exposure to summer fog, higher humidity, and milder temperatures, all of which help to alleviate the drought stresses experienced by inland communities. This may potentially lead to adaptations to different disturbance regimes such as fire (Van Dyke *et al.* 2001). Maritime chaparral on Point Loma differs from that of more northerly locations on the central California coast in that it is not dominated by species of the genus *Arctostaphylos* species, many of which are narrowly endemic (Van Dyke *et al.* 2001).

*Table 3-5. Plant communities of Point Loma (acres) based on vegetation surveys in 1993. Nomenclature for communities is based on Holland (1986) with revisions suggested by Oberbauer (1996). Land cover types for ASW and FITCPAC were digitized by RECON from a January 2001 aerial photograph. Nomenclature for plant species follows Hickman (1993).*

| Fuel Type / Plant Community | Naval Base Point Loma (acres) | Cabrillo National Monument (acres) | Other Ownership (acres) | Total (acres) |
|---|---|---|---|---|
| ***Low shrublands*** | ***602.5*** | ***132.1*** | ***15.7*** | ***750.3*** |

| | | | | |
|---|---|---|---|---|
| Southern coastal bluff scrub | 36.1 | 14.5 | 3.1 | 53.7 |
| Maritime succulent scrub | 275.6 | 86.3 | 12.4 | 374.3 |
| Diegan coastal sage scrub | 118.3 | 23.0 | 0.2 | 141.5 |
| Diegan coastal sage scrub/southern maritime chaparral | 55.3 | 0.6 | <0.1 | 55.9 |
| Southern maritime chaparral | 116.2 | 5.7 | <0.1 | 121.9 |
| Maritime succulent scrub/southern maritime chaparral | 1.0 | 2.0 | 0 | 3.0 |
| ***Woodlands and Forests*** | ***18.3*** | ***0.2*** | ***0*** | ***18.5*** |
| Torrey pine forest | 1.2 | 0 | 0 | 1.2 |
| Eucalyptus woodland | 17.1 | 0.2 | 0 | 17.3 |
| ***Others*** | ***610.2*** | ***25.5*** | ***109.2*** | ***744.9*** |
| Southern Foredunes | 1.6 | 0 | 0 | 1.6 |
| Ruderal | 91.0 | 2.8 | 7.0 | 100.8 |
| Cultivated/landscape | 109.6 | 3.8 | 7.2 | 120.6 |
| Cemetery | 0 | 0 | 65.2 | 65.2 |
| Developed | 382.6 | 15.5 | 27.2 | 425.3 |
| Intertidal | 25.4 | 3.4 | 2.6 | 31.4 |
| ***TOTAL*** | ***1231.0*** | ***157.8*** | ***124.9*** | ***1513.7**** |

**This acreage total differs slightly from that in Table 3-1 due to differences in the two GIS layers used for each calculation and to rounding of numbers.*

Throughout its range, maritime chaparral occurs in a matrix of coastal sage scrub and oak woodland. Herbaceous species are restricted to canopy openings and as a result are uncommon in mature chaparral but can dominate after a fire. Post-fire emergence of these species is largely from dormant seeds in the soil, as well as from bulbs, rhizomes, and tubers. A second pulse of annual herbs often occurs within 5 years of a fire (S. Keeley 1977), probably corresponding to the first above-average annual rainfall. As the community ages, it becomes increasingly dominated by a few species of tall, vigorous crown sprouters (Lloret and Zedler 1991, Van Dyke *et al.* 2001). In areas where oaks or other tree species are located in proximity to mature chaparral, the chaparral shrubs can act as “nurse plants” for tree seedlings which may eventually overtop and kill their hosts (Callaway and D’Antonio 1991). Chaparral is generally believed to be resilient to fire return intervals ranging from between 20 to 150 years, with average natural return intervals of 50 to 70 years at least in inland situations (Minnich 1983, Davis and Michaelson 1995, Conard and Weise 1998, Mensing *et al*. 1999).

Evidence of ecological changes due to the long fire-free period on Point Loma includes both historical observations of species assemblages that differ from the present, and modern observations of community dynamics. Historically, for example, William Emory made observations that suggest a different composition of the plant community than exists today which may be related to fire regime. He noted the dominance of yerba santa (*Eriodictyon* sp.), which today grows mainly along roadsides or in disturbed areas. He also observed other shrubs which formed dense thickets such as chamise (*Adenostoma fasciculatum*), bushrue (*Pitavia dumosa*, know called *Cneoridium dumosum*), a species of scrub oak (Quercus sp.), and buck brush (*Ceanothus rigidus*, now called *C. cuneatus*), which is no longer present on the Point (Zedler *et al.* 1995).

Modern observations show that the population of wart-stemmed ceanothus (*Ceanothus verrucosus*), a major component of the chaparral community, is decreasing on Point Loma while the lemonade berry *(Rhus integrifolia)* population is increasing (Zedler *et al.* 1995). Wart-stemmed ceanothus is the only fire-dependent chaparral species occurring prominently on Point Loma, although not all species in the chaparral have been evaluated for fire dependencies. It is an obligate seeder that requires a hot fire to germinate its long-lived seeds residing in the soil in order to perpetuate itself since the mature plant is killed in fires. Zedler and his collaborators found that wart-stemmed ceanothus shrubs also propagated by layering and sprouting on Point Loma, but not at a rate that will affect population dynamics. Fire is the only mechanism that will increase the above ground population of this rare shrub. However, there is no imminent danger of losing the species since the rate of above ground population loss is slow and there is an abundant seed bank.

Evidence of the ecological consequences and fire management implications of the long fire free interval on Point Loma's aging chaparral stands comes from a recent seed bank study (Cummins 2003). Eight native plant species not previously known to occur on CNM were discovered, four of which have fire following characteristics. The last four on the following list also were not documented from anywhere on Point Loma before the recent seed bank study.

- Fire poppy (*Papaver californicum*), endemic to southern and central California in areas that have experienced recurrent fires for years;
- Coastal lotus (*Lotus salsuginosus*), seeds respond to heat stimulation;
- Everlasting nest-straw (*Stylocline gnaphaloides*);
- San Diego Bird's-foot-trefoil (*Lotus hamatus*);
- Purple everlasting (*Gnaphalium purpureum*), may be a fire-follower;
- Venus looking-glass *(Triodanis perfoliata*), found on burns and disturbed slopes;
- Polycarp (*Polycarpon depressum*);
- Arctic pearlwort (*Sagina procumbens*).

Some sites did not contain any species that are particularly restricted to the post-burn flora. The first two species in the above list, *L. salsuginosus* and *Papaver californicum*, are obligate fire-followers and are unlikely to have had any reproduction during the interfire period. Cummins expects to find more undocumented species after a fire of any substantial size because only a small portion of CNM soils were surveyed. Some of the fire management implications of the results of the seed bank study are:

- A portion of the flora is stored in the soil seed bank and is unexpressed in the standing vegetation; the flora has additional unknown species that are present in the seed bank which would be expressed following any large fire (given that their seeds survive);
- The dominant shrubs and trees of the historic southern maritime chaparral are present in the existing flora or the seed bank;
- Prescribed fire is unnecessary to prevent extinction of wart-stemmed ceanothus which will persist in the seed bank for many years after the death of the parent plants, but it may allow its enhanced expression;
- Populations of wart-stemmed ceanothus are present in the seed bank in areas where no adult plants occur; and
- Some non-native invasive species are abundant in the seed bank even when adult plants have been removed and therefore have the potential to re-establish following fire, given that their seeds survive.

### *Fire Concerns in Diegan Coastal Sage Scrub*

Coastal sage scrub is dominated by low-growing shrub species, many of which are highly combustible and are often highly adapted to fire. While there are about 50 widespread sage scrub species, more than half of the 375 species encountered in sage scrub flora are rare within the habitat range, with presumably small distribution ranges (Westman 1981). Herbaceous species (plus seedlings) tend to occupy gaps in the shrub canopy where they can sometimes occur at high densities (F. Davis *et al*. 1989, Rice 1993, Tyler 1995 in Keeley 2000). However, the highest densities of herbaceous annuals appear in the first growing season following a fire, with a second pulse of abundance in stands 15-25 years old (Westman 1981). Apart from site differences, the most likely explanation of a second resurgence of herbs (most of which are not the same as the post-fire herbs) is the gradual immigration of less abundant or less readily dispersed herb species to the site over time.

Within 20 years post-fire the cover of legumes and vines has all but disappeared. Symbiotic nitrogen-fixing organisms are virtually absent from stands which have not burned in 20 years or more (Westman 1981). Mature stands are typically highly dominated by one or very few species, due at least in part to the shade intolerance of the herbaceous understory and to reduced levels of soil nitrogen (Westman 1981). With the exception of a few scattered herbaceous individuals, the understory is barren. It is not uncommon to find areas of one hectare or more dominated by one or two shrub species. The dominant shrubs often die within 25–35 years on sites which have not burned in 60 yr or more. At 40 years, the stand diversity is much reduced, and annuals have completely disappeared, though they may remain viable within the seed bank.

As part of a larger study assessing vegetation trend across coastal San Diego County that looked at 78 plots originally sampled in 1931, Taylor (*pers. comm.* 2003) compared the historical vegetation records of two plots from 1931 on the Point Loma Peninsula with plots established and sampled in 2000. He attempted to establish the new plots as close as possible to each of the historical plots, matching slope, aspect, and elevation. One of the original plots at CNM is now beneath the visitor center parking lot, so the two new plots were placed in nearby extant vegetation. This site is described as a gentle south-facing slope. The other historical plot was located upslope from the Magnetic Silencing Facility on the eastern slope of the peninsula on NBPL. The new plots associated with the Navy site are believed to be within 10 meters of the original location.

Both sites sampled in 2000 had lower percent cover of *Artemisia californica* than had been recorded on the 1931 plots. While cover of *Rhus integrifolia* was similar in both sampling periods at the Cabrillo site, it was notably higher in 2000 at the Navy site, and it has been increasing at other sites on Cabrillo National Monument (Zedler *et al*. 1995). Data for *Ceanothus verrucosus* are less clear. At the Cabrillo site, *Ceanothus verrucosus* cover was lower in the 2000 plots than in the 1931 plots, but slightly higher at the Navy site. *Eriogonum fasciculatum* was much higher in 2000 at the Cabrillo site, but not at the Navy site. *Lotus scoparius*, a disturbance dependent species, while absent at the Cabrillo site in 1931, had lower cover values at the Navy site in 2000 than in 1931. *Hazardia squarrosa*, while present in 1931 on the Cabrillo site, was not observed in 2000. Grasses, which covered 38% of the Navy site in 1931, were apparently absent in 2000.

A number of species that were absent from the plots sampled in 1931 were detected in the plots sampled in 2000. A number of species found in the plots sampled in 2000 were new to the plots. For the Cabrillo site these included *Cneoridium dumosum, Dudleya edulis, Encelia californica, Salvia mellifera, Eriophyllum confertiflorum, Rhamnus crocea,* and *Euphorbia misera.* Of these, *Euphorbia misera* experienced the greatest increase. The Navy site also showed an increase in recorded species, including *Ceanothus verrucosus, Cneoridium dumosum, Encelia californica, Salvia mellifera, Baccharis sarothroides,* and *Carpobrotus edulis.*

Shrubs recruit seedlings immediately after fire but also recruit in gaps of unburned coastal sage scrub stands. Gap-creating agents vary, but animals, especially small mammals, are important in creating and maintaining gaps (DeSimone and Zedler 1999). In coastal areas, most sage scrub species resprout from below ground root crowns, although there can be substantial seedling germination (White 1995). This is not the case in inland areas where there is little or no regeneration from sprouting and virtually all recovery is dependent upon seed germination. Low-intensity fires will stimulate sprouting of dominants, but hot fires suppress crown-sprouting, and consequently promote the herb flora (Westman 1981). Invasive weeds are a localized problem on habitat edges.

Nesting coastal California gnatcatchers have not been reported from Point Loma since 1915 (Quon and Haas 2001). However, there are sightings of individuals, presumably dispersing young, on a fairly regular basis. Coastal sage scrub is very fragmented, but animals are likely co-use maritime succulent scrub. Animals with sedentary life cycles that are dependent on herbaceous or suffrutescent shrubs (those that are woody only at the base and that are generally short-lived) of a more open habitat condition could be at risk from prolonged absence of fire as the shrub canopy fills in.

***Fire Concerns in Maritime Succulent Scrub***
Fire concerns in this community overlap with that of Diegan coastal sage scrub. Stem succulents are concentrated here, along with species more common elsewhere in coastal sage scrub. Cacti and other succulents resist burning but recover slowly (vegetatively) once burned. They are more resilient to low-intensity fires, or long intervals without fire. Sensitive and rare cacti and succulents should be protected from high-intensity fires. Lack of fire may benefit survivability, but canopy closure and shade are also detrimental to adults. Shade may benefit seed germination. California sagebrush is expected to reduce in total cover due to long fire-free periods, and this appears to be occurring on Point Loma (R. Taylor, pers. comm., based on comparing two 1931 and 2000 vegetation plots). Low-intensity fires stimulate re-sprouting of dominants, but hot fires suppress crown-sprouting and may kill succulents, while promoting the herb flora. Animals with sedentary life cycles and dependent on herbaceous or suffrutescent shrubs of a more open habitat condition may be at risk. Erosion and invasive weeds are also concerns.

***Fire Concerns in Southern Coastal Bluff Scrub***
It is unlikely that fire will affect this community due to its very open condition and low fuels. Succulent species resist burning but recover slowly once burned. They are generally not present in the seed bank. They are resilient to low-intensity fires, or long intervals without fire. Sensitive and rare cacti and succulents should be protected from high-intensity fires if their numbers and area of the population is small. This community is disturbed by erosion and invasive weeds such as hottentot fig *(Carpobrotus* spp.*)* and crystal ice plant *(Mesembryanthemum* spp.*)*.

***Fire Concerns in Southern Foredunes***
Introduction of invasives may eventually allow a fire to carry when it normally would not, but coastal position and low fuels currently make fire very unlikely to occur here. This community is disturbed by non-natives such as ripgut grass *(Bromus diandrus)*, soft chess *(B. hordeaceus)*, hottentot fig, and acacia.

***Fire Concerns in Torrey Pine Forest***
Torrey pine stands have a high fuel load that burns in stand-replacing crown fires. They establish seedlings after fire. They have no adventitious-bud root crown and the cones have reduced serotiny (fire dependence) compared to inland species, apparently adapted to long intervals without fire or to low-intensity fires.

***Fire Concerns in Eucalyptus Groves***
Some species of eucalyptus are invasive and should be controlled. On Point Loma, these groves are nesting habitat for herons of several types. Herons and their nests are protected under the Migratory Bird Treaty Act. Eucalyptus groves are very flammable and should not be near structures.

***Fire Concerns in Intertidal Habitat***
Any fire impacts would be indirect due to potential sedimentation. In general, there is a regional threat to intertidal areas in southern California related to human harvesting of invertebrates and trampling.

***Fire Concerns in Developed/Landscaped Areas***
A rich variety of horticultural species are planted on developed grounds of Point Loma that exemplify the peninsula’s mild climate. Specific problems with regard to fire are created by the use of flammable species too close to structures built with flammable materials. For example, Washington palm can burn explosively and is often ignited by ember-laden winds. Some horticultural species can also be invasive.

## 3.6.4 Wildlife Populations and Fire Concerns

Point Loma is considered to be a major sensitive plant and wildlife resource of regional significance due to the quality, abundance, and diversity of habitats and its coastal location. A comprehensive species list is provided in Appendix C of the JWFMP, and profiles of the known sensitive species are available in the NBPL INRMP (U.S. Navy 2002).

The effects of fire on wildlife populations are either "direct" or "indirect." Direct effects include injury and mortality due to direct exposure to the fire. Indirect effects are caused by the alteration or destruction of habitat utilized by wildlife within the perimeter of the fire (Walter 1977). Most animals are able to escape the lethal effects of fire by selecting an insulated micro environment (burrows, riparian areas) or by rapidly emigrating from the area of the fire. Therefore the majority of the effects is indirect, a result of alterations in the vegetation structure and temporary loss of habitat. These alterations include the removal of favorable nesting sites, disappearance of host and forage plants, and loss of protective vegetation cover. Additionally, the loss of vegetation also results in changes in the biophysical milieu, altering temperature, wind, incident radiation, and soil moisture among other parameters that make up a microhabitat. The following passages discuss species groups of interest.

***Terrestrial Mammals***

Thirty terrestrial mammal species have been recorded on Point Loma. Nomenclature for mammals follows Jones *et al*. 1982. Commonly detected species include northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*), deer mouse (*Peromyscus maniculatus*), California vole (*Mycrotus californicus*), cactus mouse (*Peromyscus eremicus*) and western harvest mouse (*Reithrodontomys megalotis*). Gray foxes (*Urocyon cinereoargenteus*) were recently observed during studies on Point Loma conducted by Fisher and Brown (2001). Gray foxes and coyotes were documented in a carnivore scat and tracking project (Soulé and Crooks 1996).

In 1997, a survey of bat species of NBPL identified western mastiff bats (*Eumops perotis californicus*), Mexican free-tailed bats (*Tadarida brasiliensis*), and myotis (*Myotis* spp.) foraging over the area (Brown and Berry 1997). Some species have been received by rehabilitators apparently from Point Loma that were not detected in these surveys. They are the Mexican long-tongued bat (*Choeronycteris mexicana*) and pocketed free-tailed bat (*Nyctinomops femorosaccus*). The U.S. Geological Survey conducted a bat survey under contract with the NPS (Stokes *et al.* 2003). The report mentions that three species were found historically on the peninsula: the hoary bat (*Lasiurus cinereus*), the western red bat (*Lasiurus blossevillii*) and the California myotis (*Myotis californicus*). During the 2002 survey, four species were detected: the western red bat, the big brown bat (*Eptesicus fuscus*), the Mexican free-tailed bat and the big free-tailed bat (*Nyctinomops macrotis*).

***Birds***

Point Loma is located at a convergence point along the Pacific migratory bird flyway and more than 350 bird species have been recorded in the area. Nine bird species known to be resident or migrants are listed by either federal or state agencies as threatened or endangered. Almost all native bird species are also covered by the Migratory Bird Treaty Act (MBTA).

While not considered sensitive, a species group that may require special management consideration on Point Loma is herons. This is because they nest in trees that pose a fire hazard to nearby, occupied wooden structures. Few great blue heron (*Ardea herodias*) breeding colonies occur in San Diego County. In the 1970s, great blue herons established a nesting colony on SUBASE in two separate eucalyptus groves. Since 1980, these herons have dispersed and colonies now occur at several locations on SUBASE and MSF. In 1990, they started nesting at MSF, at SSC in 1994, and at FISC in 1995. In 1991, 49 active nests were documented on Point Loma (Platter-Rieger 1991). Black-crowned night herons *(Nycticorax nycticorax)* also began nesting at SUBASE in the 1970's, and in 1980 Platter-Rieger (1991) estimated 100 active nests on Point Loma. As many as 166 nests (in 1990) have been documented on the Point. Presently, this species is not nesting at SUBASE (U.S. Navy 2002), but has been observed nesting on NBPL in the fig trees (*Ficus* sp.) near Building 1 on SSC Bayside. Black-crowned night herons are also known to roost and nest near MSF.

***Reptiles and Amphibians***

Nomenclature follows Collins 1997. Fisher and Brown (2001) searched throughout Point Loma and compiled a seasonal inventory of all the reptile and amphibian species they encountered. The NPS has continued the inventory initiated by the U.S. Geological Survey, and is monitoring the reptile and amphibian species populations at 17 sampling arrays located throughout the peninsula. Twelve of the 19 species of reptiles and amphibians that were recorded historically on the peninsula are still being detected. Species commonly captured included southern alligator lizards (*Elgaria multicarinatus*), western fence lizards (*Sceloporus occidentalis*), and side-blotched lizards (*Uta stansburiana*). Seven snake species are also present on the peninsula (Appendix C of the JWFMP). The Pacific slender salamander and western spadefoot toad *(Spea hammondii)* are the only amphibians that have been documented recently on Point Loma.

***Terrestrial Invertebrates***

Almost 300 terrestrial insect species were identified on NBPL during 1993 and 1994 surveys by Bruyea Biological Consulting and Barnes Enterprises personnel. One rare species, the wandering skipper butterfly (*Panoquina errans*), is known to occur on the beach north of MSF (Platter-Rieger 1996), and is tied to salt marsh vegetation.

## 3.6.5 Sensitive Wildlife and Plant Species

***Sensitive Wildlife***

Table 3-6 lists wildlife species known or with potential to occur on Point Loma that have a recognized sensitivity status (derived from NPBL INRMP, U.S. Navy 2002). Profiles of many of these may be found in the NBPL INRMP. Map 3-5 shows known locations of sensitive wildlife and plant species on Point Loma.

*Table 3-6. Sensitive wildlife species of Point Loma. This list does not include some records from Appendix F, Table 3 of the 2002 INRMP because we could not differentiate between present and historical observations.*

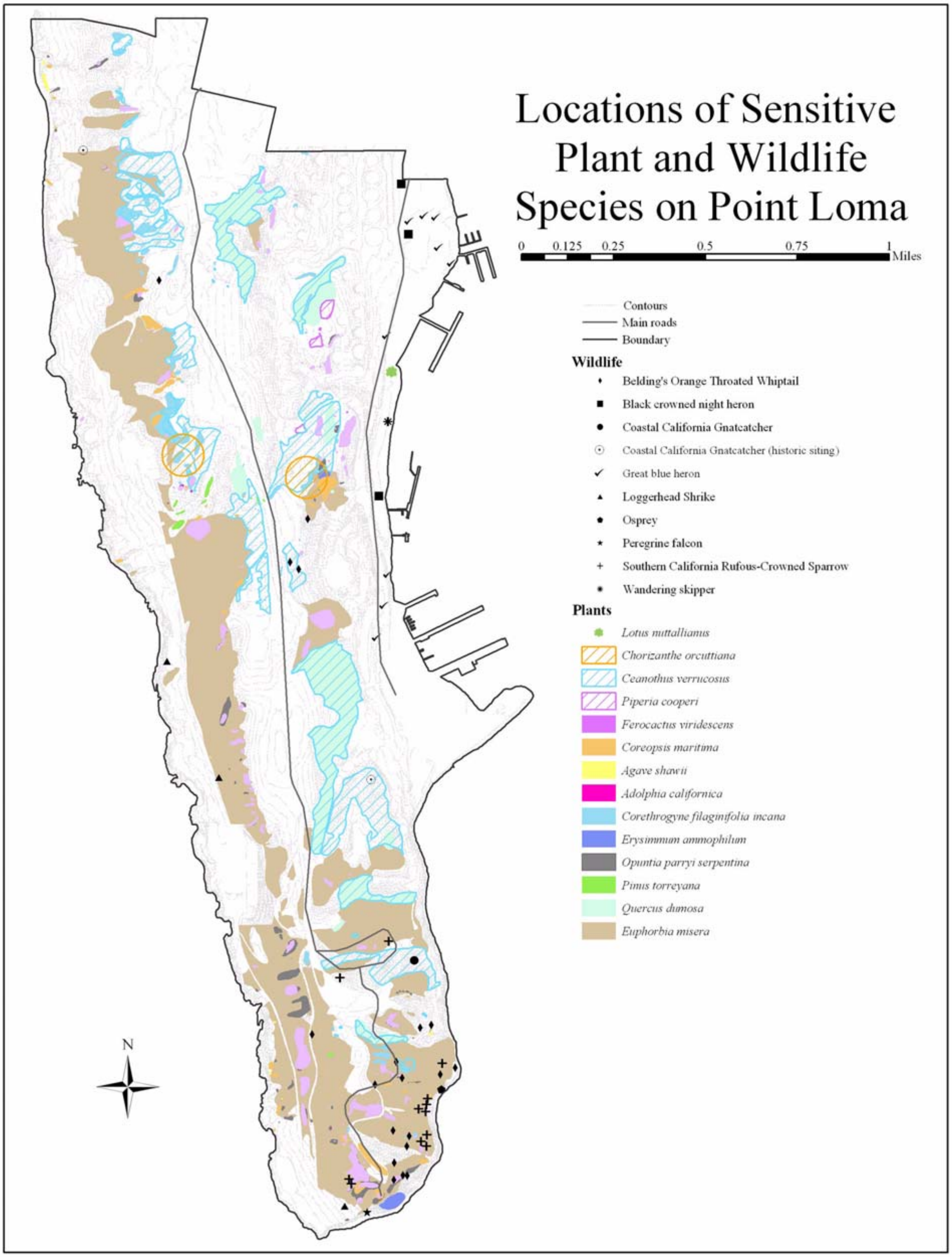
| Scientific name | Common name | Foraging/ Resident/ Migratory/ Breeding | Sensitivity status | Comment |
|---|---|---|---|---|
| **REPTILES & AMPHIBIANS** | | | | |
| *Anniella pulchra* | Silvery legless lizard | R | FSC, CSC, NPS sensitive | Expected to occur in sandy habitats throughout NBPL. Known from Point Loma Nazarene College and La Playa |
| *Cnemidophorus hyperythrus beldingi* | Belding's orange-throated whiptail | R | CSC, NPS sensitive | Known from NBPL |
| *Cnemidophorus tigris multiscutatus* | Coastal western whiptail | n/a | | extirpated from Cabrillo |
| *Crotalus ruber ruber* | Northern red diamond rattlesnake | n/a | | extirpated from Cabrillo |
| *Diadophis punctatus similis* | San Diego ring-neck snake | R | NPS sensitive | |
| *Lichanura trivirgata rosafusca* | Coastal rosy boa | n/a | FSC | extirpated from Cabrillo |
| *Eumeces skiltonianus interparietalis* | Coronado skink | n/a | CSC | extirpated from Cabrillo |
| *Phrynosoma blainvillei* | San Diego horned lizard | n/a | CSC | extirpated from Cabrillo |
| *Salvadora hexalepis virgultea* | Coast patch-nosed snake | R | CSC | |
| *Scaphiopus hammondii* | Western spadefoot toad | R | FSC, CSC | |
| **BIRDS** | | | | |
| *Accipiter cooperi* | Cooper's hawk | F | CSC | Some potential to breed on Pt. Loma |
| *Accipiter striatus* | Sharp-shinned hawk | F | CSC | Low potential to breed on Pt. |

| Scientific name | Common name | Foraging/ Resident/ Migratory/ Breeding | Sensitivity status | Comment |
|---|---|---|---|---|
| | | | | Loma |
| *Agelaius tricolor* | Tricolored blackbird | R | FSC, CSC | |
| *Aimophila ruficeps canescens* | Southern California rufous-crowned sparrow | R,B | CSC | |
| *Ammodramus savannarum* | Grasshopper sparrow | R | | |
| *Amphispiza belli belli* | Bell's sage sparrow | R,B | FSC, CSC | |
| *Aquila chrysaetos* | Golden eagle | F | CSC | Some potential to breed on Pt. Loma |
| *Ardea herodias* | Great blue heron | B | CDF Sensitive | Several nesting colonies known |
| *Buteo regalis* | Ferruginous hawk | M | FSC, CSC | |
| *Buteo swainsoni* | Swainson's hawk | M | FSC | Former nesting colony now extirpated |
| *Campylorhynchus brunneicapillus couesi* | Coastal cactus wren | R | CSC | |
| *Cerorhinca monocerata* | Rhinoceros auklet | R | CSC | |
| *Charadrius alexandrinus nivosus* | Western snowy plover | | FT, CSC | |
| *Chilidonias niger surinamensis* | Black tern | R | FSC, CSC | Breeding status unknown |
| *Circus cyaneus* | Northern harrier | F | CSC | Not expected to breed on Pt. Loma |
| *Egretta thula thula* | Snowy egret | | FSC | |
| *Elanus leucurus* | White-tailed kite | B | FSC | |
| *Empidonax traillii extimus* | Southwestern willow flycatcher | M | FE | Not expected to breed on Pt. Loma |
| *Eremophila alpestris actia* | California horned lark | B | CSC | Known to breed on southern end of Pt. Loma |
| *Falco mexicanus* | Prairie falcon | M | CSC | Not expected to breed on Pt. Loma |
| *Falco peregrinus anatum* | Peregrine falcon | B | CSC | Known to breed on southern tip of point |
| *Gavia immer* | Common loon | M | FSC, CSC | Observed, but breeding status unknown |
| *Haliaeetus leucocephalus* | Bald eagle | F | FT, SE | Not expected to breed on Pt. Loma |
| *Icteria virens* | Yellow-breasted chat | R | | Breeding status unknown |
| *Lanius ludovicianus* | Loggerhead shrike | R | FSC, CSC | Known to occur in several habitats |
| *Larus atriculla* | Laughing gull | unk | CSC | Known to occur, breeding status unknown |
| *Larus californicus* | California gull | M | CSC | Known to occur, breeding status unknown |
| *Laterallis jamaicensis coturniculus* | California black rail | n/a | FSC, ST | Extirpated from Point Loma |
| *Numenius americanus* | Long-billed curlew | M, R | FSC, CSC | Known to occur, breeding status unknown |
| *Nycticorax nycitocorax* | Black-crowned night heron | B | | |
| *Oceanodroma melania* | Ashy storm petrel | unk | FSC, CSC | Observed, but breeding status unknown |
| *Oceanodroma microsoma* | Black storm-petrel | unk | CSC | Observed, but breeding status unknown |
| *Pandion haliaetus* | Osprey | R | CSC | Breeding status on Pt. Loma unknown |
| *Passerculus sandwichensis beldingi* | Belding's savannah sparrow | SE | SE | |
| *Pelecanus erythrorhychos* | American white pelican | M | CSC | No nesting colonies reported from Point Loma |

| Scientific name | Common name | Foraging/ Resident/ Migratory/ Breeding | Sensitivity status | Comment |
|---|---|---|---|---|
| *Pelicanus occidentalis californicus* | California brown pelican | M | FE, SE | No nesting colonies reported from Point Loma |
| *Phalacrocorax auritus albociliatus* | Double-crested comorant | M | CSC | No nesting colonies reported from Point Loma |
| *Piranga flava* | Hepatic tanager | M | CSC | Breeding status unknown |
| *Piranga rubra* | Summer tanager | M | CSC | Breeding status unknown |
| *Polioptila californica californica* | Coastal California gnatcatcher | R | FT, CSC | |
| *Rhynchops niger* | Black skimmer | R | CSC | Known to occur, breeding status unknown |
| *Riparia riparia* | Bank swallow | R | FSC, ST | |
| *Sterna elegans* | Elegant tern | R | FSC, CSC | No known breeding sites on point |
| *Sterna nilotica vanrossemi* | Gull-billed tern | R | CSC | Breeding status unknown |
| *Toxostoma bendirei* | Bendire's thrasher | M | CSC | |
| *Vermivora virginiae* | Virginia's warbler | R | CSC | |
| *Vireo bellii pusillus* | Least Bell's vireo (nesting) | R | FE, SE | |
| **MAMMALS** | | | | |
| *Chaetodipus longimembris pacificus* | Pacific pocket mouse | unk | FE, CSC | Not detected in 1981 surveys |
| *Eumops perotis californicus* | Western mastiff bat | F? | FSC, CSC | Detected in 1997 |
| *Macrotus californicus* | California leaf-nosed bat | unk | CSC | Low potential to occur on Pt. Loma |
| *Neotoma lepida intermedia* | San Diego woodrat | unk | CSC | Some potential to occur on Pt. Loma |
| **INVERTEBRTATES** | | | | |
| *Panoquina errans* | Wandering skipper | | FSC | Known to occur at beach north of MSF |
| Status Codes: FE = Federal Endangered FT= Federal Threatened FSC= Federal Species of Concern FPT= Federally Proposed for listing as Threatened SE = California Endangered ST = California Threatened CSC = California Species of Concern CDF Sensitive= California Department of Forestry and Fire Protection classify these as species that warrant special protection during timber operations. | | | | |
| CNPS 1B = Rare or Endangered in California and elsewhere CNPS 2 = Rare or Endangered in California, more common elsewhere CNPS 3= Plants about which we need more information CNPS 4= Plants of limited distribution, a watch list | | | | |

### *Sensitive Plants*

A comprehensive list of plant species known to occur on Point Loma is provided in Appendix C of the JWFMP. Table 3-7, below, lists the plant species considered sensitive by the California Native Plant Society (CNPS) that have been identified on Point Loma (Map 3-4). The distribution data were originally collected by Ogden (now AMEC Earth and Environmental) in 1993. Mike Simpson of the San Diego State University updated the rare plant distribution maps for CNM in 1999. Plants may also be grouped by life form in order to understand their adaptation to fire and other environmental disturbance. This is shown for the sensitive species of Point Loma in Table 3-8.




*Map 3-4. Sensitive Plant and Wildlife Species on Point Loma.*

CNPS List 1B includes plants that are rare throughout their range and meet the requirements for state listing. Examples of plant species observed on NBPL that are CNPS List 1B species include aphanisma (*Aphanisma blitoides*), Nuttall's lotus (*Lotus nuttallianus*), and snake cholla (*Opuntia parryi*). Cliff spurge (*Euphorbia misera*), a species widely dispersed in maritime succulent scrub on Point Loma, is a CNPS List 2 plant, meaning it is rare in California. Shaw's agave (*Agave shawii*) is also a CNPS List 2 species, and Point Loma is one of its two locations in the continental U.S., although it is more common in Baja California, Mexico. Lewis's evening primrose (*Camissonia lewisii*) is a CNPS List 3 species, which includes plants for which insufficient information exists to assign them to another list or are taxonomically problematic. Seaside calandrinia (*Calandrinia maritima*), ashy spike-moss (*Selaginella cinerascens*), and San Diego County viguiera (*Viguiera laciniata*) are CNPS List 4 species, which is a watch list for plants of limited distribution. They are not rare from a statewide perspective, but their status should be regularly monitored to determine if changes are taking place.

Snake cholla (*Opuntia parryi serpentina*) and coast barrel cactus (*Ferocactus viridescens*) are also CNPS sensitive species. The population of velvet cactus (*Bergerocactus emoryi*) is one of three known populations in the continental United States. *Dudleya caespitosa* was recently discovered on Point Loma, well south of the formerly known range of the plant. Additionally, the rare lichen, false orchil *(Dendrographa leucophaea),* is found within CNM.

*Table 3-7. Sensitive plants and lichens of Point Loma. (This list does not include records from Appendix F, Table 3 of the 2002 INRMP due to difficulty in differentiating between present and historical observations on that list.)*

| Scientific name | Common name | Sensitivity status | Comment |
|---|---|---|---|
| **PLANTS** | | | |
| *Adolphia californica* | California adolphia | CNPS 2 | Clay soils in shrublands |
| *Agave shawii* | Shaw's agave | CNPS 2 | Coastal bluff scrub, coastal sage scrub |
| *Aphanisma blitoides* | Aphanisma | CNPS 1B | May be extirpated (Reiser 1994) |
| *Bergerocactus emoryi* | Velvet cactus | CNPS 2 | Sandy soils, dry bluffs, cliffs along coast |
| *Calandrinia maritima* | Seaside calandrinia | CNPS 4 | Coastal bluff scrub, sandy soils |
| *Camissonia lewisii* | Lewis' evening primrose | CNPS 3 | Coastal scrub, coastal dunes, grasslands. Reported on Point Loma by Beauchamp (1986). |
| *Ceanothus verrucosus* | Wart-stemmed ceanothus | CNPS 3 | Coastal sage scrub, southern maritime chaparral. Common on Point Loma. |
| *Chorizanthe orcuttiana* | Orcutt's spineflower | FE, SE, CNPS 1B | Coastal sage scrub and southern maritime chaparral; sandy places |
| *Chorizanthe procumbens var. albiflora* | Fallbrook spineflower | CNPS 2 | Chaparral, coastal sage scrub |
| *Coreopsis maritima* | Sea dahlia | CNPS 2 | Coastal bluff scrub, sea bluffs, maritime succulent scrub |
| *Dendrographa leucophaea* | Lichen--false orchil | | |
| *Dichondra occidentalis* | Western dichondra | CNPS 4 | Chaparral, coastal sage scrub, fire follower |
| *Euphorbia misera* | Cliff spurge | NPS sensitive, CNPS 2 | Coastal sage scrub, maritime succulent scrub, rocky slopes, coastal bluffs |
| *Ferocactus viridescens* | Coast barrel cactus | NPS sensitive, CNPS 2 | Dry hills, sandy to rocky areas, chaparral, coastal sage scrub, maritime succulent scrub |
| *Lepidium virginicum* var. *robinsonii* | Robinson's pepper grass | CNPS 1B | Coastal scrub, chaparral, dry soils. Reported in 1912 from Point Loma. Believed extirpated. |
| *Lessingia filaginifolia* var. *filaginifolia* | San Diego sand aster | CNPS List 1B | Coastal chaparral in sandy openings with chamise. Reported as substantially declining on Point Loma (Reiser 1994) due to expansion of facilities. |
| *Lotus nuttallianus* | Nuttall's lotus | CNPS 1B | Coastal dunes, coastal sage scrub, beaches, urban weedy areas |
| *Microseris douglasii* var. *platycarpa* | Small-flowered microseris | CNPS 4 | Coastal sage scrub, inland clay soils |
| *Nemacaulis denudata* var. *denudata* | Coast woolly-heads | CNPS 1B | Coastal dunes, beaches, coastal strand |
| *Opuntia parryi serpentina* | Snake cholla | NPS sensitive | Chaparral, coastal sage scrub, sandy places and dry slopes, canyons |
| *Orobanche parishii* ssp. *brachyloba* | Short-lobed broomrape | FSC, CNPS 1B | Coastal bluff scrub, coastal dunes; parasitic on Isocoma |

| Scientific name | Common name | Sensitivity status | Comment |
|---|---|---|---|
| *Pinus torreyana* ssp. *torreyana* | Torrey pine | CNPS 1B | Chaparral; sandstone |
| *Piperia cooperi* | Chaparral rein orchid | CNPS 4 | Coastal sage scrub, southern maritime chaparral, maritime succulent scrub |
| *Quercus dumosa* | Nuttal's scrub oak | CNPS 1B | Coastal chaparral, coastal sage scrub; sandy/clay loam |
| *Viguiera laciniata* | San Diego County viguiera | CNPS 4 | Chaparral, coastal sage scrub, dry slopes below 2500 ft |
| Status Codes: FE = Federal Endangered FT= Federal Threatened FSC= Federal Species of Concern FPT= Federally Proposed for listing as Threatened SE = California Endangered CSC = California Species of Concern CDF Sensitive= California Department of Forestry and Fire Protection classify these as species that warrant special protection during timber operations. | | | |
| CNPS 1B = Rare or Endangered in California and elsewhere CNPS 2 = Rare or Endangered in California, more common elsewhere CNPS 3= Plants about which we need more information CNPS 4= Plants of limited distribution, a watch list | | | |

*Table 3-8. Classification of sensitive herbaceous species by life forms, including lichens, and their fire adaptation. Classification is based on Zedler (1995) [in Kalen et al.], Keeley and Keeley (1984) and Keeley et al. (1985).*

| Species | Wildland Fire Adaptation | Potential Fire Management Approaches |
|---|---|---|
| Herbaceous perennials with underground storage structures such as a bulb, tuber, rhizome, or large tap root. These plants are normally dormant when a fire passes through, so are not directly affected, but benefit from nutrient flush, canopy opening, and other aspects of altered competitive status. Generally obligate resprouters. | | |
| *Coreopsis maritima* sea dahlia | Fleshy tap root, dormant when most fires occur. | No special fire management needed. |
| *Dichondra occidentalis* Western dichondra | Rhizomatous perennial herb considered a fire follower in both chaparral and coastal sage scrub. Shade tolerant. Should benefit from fire. | No special fire management needed. |
| *Orobanche parishii* ssp. *brachyloba* beach or short-lobed broomrape | Root parasite on shrubs such as Isocoma menziesii. Typically found on sandy sites near the ocean. One known site near Ft. Rosecrans. | Avoid burning coastal bluff scrub, coastal dunes. All populations should be fully protected with adequate buffers since is nearly extirpated from San Diego County (Reiser 1994). Survey any prescribed burn site in advance. |
| *Piperia cooperi, Piperia elegans,* and *Piperia unalascensis* chaparral orchids | Rhizomatous herbs, dying back each winter. Local extinction may occur if soil seed bank becomes exhausted or canopy condition unfavorable. Primarily on poorly drained sandstone and sandy soils in openings in coastal sage scrub, southern maritime chaparral, maritime succulent scrub. Piperia yadonii in maritime chaparral of Monterey county is federally endangered "due to disruption of natural fire cycles due to fire suppression" (32003 Federal Register / Vol. 67, No. 92 / Monday, May 13, 2002 / Proposed Rules). | Study to determine if regular openings are naturally maintained in chaparral sufficient to provide for this species without fire. Additional seed bank work could help determine if persists in seed bank. Keep available open canopy gaps in southern maritime chaparral especially on sandstone sites. |
| **Herbaceous Perennials Dependent on Seed for Propagation. Generally germinate well without treatment, but high temperatures are lethal (Keeley *et al.* 1985**) | | |
| *Sagina procumbens* Arctic pearlwort | Seed found but no plants on Point Loma (Cummins 2003). Common elsewhere on wet, gravelly, or sandy soil, sidewalk cracks, roadsides, waste areas. Sometimes sold as Irish moss. Generally known from Central and North Coast locations. | No special fire management recommended. |
| **Stem Succulents and Cacti** | | |
| *Dudleya caespitosa, D. edulis, D. lanceolata, D. pulverulenta dudleya*, Moran lady fingers, live-for-ever, chalk lettuce | Leaf succulence allows this genus to tolerate fire well. Canopy closure detrimental. Resprouts after fire. | If number and area of the population small, then protect from wild fire and fire management related activities. Consider fuel modification for protection. If ubiquitous or common, rely on resprouting ability. |
| *Yucca schidigera* Mojave yucca | Fire resistant. Resprouts after fire. Also expected to reproduce from non-refactory seed. Yuccas are common members of fire-prone environments. Shade intolerant, canopy closure detrimental. Persistent, long-lived, establishment independent of large-scale disturbance | No special fire management recommended. |
| *Agave shawii* Shaw's agave | Fire resistant. Shrubs here are low-growing and habitat is quite open. Propagation expected to be primarily vegetative. Is an abundant, sometimes dominant shrub of the northern Baja coast, growing by the many thousands (Reiser 1994), presumably in a fire-prone environment. | Moderate- to high-intensity fire should be avoided. |
| *Opuntia parryi* var. | Fire tolerant. Many prickly pears and chollas live in fire- | No management action necessary. |

| Species | Wildland Fire Adaptation | Potential Fire Management Approaches |
|---|---|---|
| *serpentina* snake cholla<br>*O. acanthocarpa*<br>buckthorn cholla<br>*O. basilaris*<br>beavertail cactus | prone environments. They tolerate fire, then sprout from the root crown and from surviving stems, taking advantage of open postfire condition. Moderate-severity fire likely to kill *Opuntia* spp. Mortality after a fire is often greater than 50%, but rarely total (USFS FEIS). On San Clemente Island, *Opuntia* sp. appear to increase after short-interval grass fires due to elimination of competitive grasses and shrubs (E. Kellogg, pers. obs.). | |
| *Ferocactus viridescen*s<br>coast barrel cactus | Fire tolerant. Grows in fire-prone environments such as chaparral at Miramar. Barrel cactus may reproduce from seeds only, which are dispersed by birds and rodents. No offsets were reported after fires in southern Arizona; growth was from the apical meristem only. Ferocactus species will often branch at the apex following injury to the terminal bud. Barrel cactus have a thick cortex that insulates the vascular tissue. The cortex thickens with age, so older individuals may be more resistant to fire than younger ones. Cacti often escape fire in refugia and in areas with fuels too sparse to carry fire. Cacti do not appear to store seed in soil seedbanks. Expected to decline if fire intervals are too short. | Avoid fire return intervals less than 15 years. Recovery period has been estimated at more than 15 years. (USFS FEIS). |
| *Bergerocactus emoryi*<br>velvet cactus | Moderate- or high-severity fire likely to kill. Repeated fires will likely result in species decline. | Avoid fire intervals of less than 15 years to avoid decline. |
| **Opportunistic Native Annuals (Zedler 1995). Usually colonize gaps in the canopy.** | | |
| *Lepidium virginicum* var. *robinsonii*<br>Robinson's pepper grass | Annual herb grows in canopy openings in chaparral and sage scrub. Typically found on drier sites. Reported in 1912 from Point Loma. | Ensure open canopy condition is available, control invasive weeds perhaps with fire. |
| *Microseris douglasii* var. *platycarpha* small-flowered microseris | Annual herb on clay lenses or mesic perennial grassland, open chaparral, sage scrub. Likely to benefit from some fire by canopy opening and altered competitive status. | Determine if regular openings or other habitat are naturally maintained sufficient to provide for this species without fire. Control invasive weeds. |
| *Chorizanthe procumbens* var. *albiflora*<br>Fallbrook spineflower | Found in sandy soil, often in association with sandy barrens or openings in chamise chaparral, coastal sage scrub, and occasionally grasslands. | Determine if regular openings or other habitat are naturally maintained sufficient to provide for this species without fire. Control invasive weeds. |
| *Chorizanthe orcuttiana*<br>Orcutt's spineflower | Fragmentation has rendered individual populations more susceptible to altered fire regimes. Its herbaceous annual habit will avoid most fire effects as long as they occur after seed dispersal, and fire could benefit it by controlling competing invasives. | Develop a plan based on whether regular openings or other habitat are naturally maintained sufficient to provide for this species without fire. Experiment on suitable sites where this species is currently absent to see if there is a response to fire. Control invasive weeds. |
| *Camissonia lewisii*<br>Lewis' evening primrose | Coastal scrub, coastal dunes, grasslands typically on beach bluffs, sandy or clay soils. Reported on Point Loma by Beauchamp (1986). Self-pollinated. Reported to be declining throughout its U.S. range. Control invasive weeds in grasslands near the beach. Maintain canopy openings in coastal sage scrub. | No special fire management recommended. Do not burn near coast due to erosion and sediment concerns. |
| *Aphanisma blitoides*<br>aphanisma | Coastal bluffs near the ocean and beach dunes. May be extirpated from Point Loma. However, on San Clemente Island, this succulent annual only appears in extremely favorable rain years, where it may be found in maritime succulent scrub and desert thorn communities (E. Kellogg, pers. obs.). Expected to be dormant during any wildfires. Control erosion, invasive weeds. | No special fire management recommended, but determine if sufficient canopy gaps are maintained without fire to provide for this species. |
| *Calandrinia maritima*<br>seaside calandrinia | Sandy bluffs near the beach and sandy openings in coastal sage scrub. Steep slopes with open chaparral may also include potential populations. Gaviota fine sandy loams are utilized on Point Loma. On San Clemente Island, this succulent annual appears in open conditions in extremely favorable rain years, where it may be found in maritime succulent scrub and desert thorn communities, as well as on rocky bluffs (E. Kellogg, pers. obs.). Expected to be dormant during any wildfires. | No special fire management recommended. Control erosion, invasive weeds. |
| *Polycarpon depressum* | Known from other locations on bluffs, gravelly or sandy soil, chaparral, fields, disturbed areas. Seed found but no plants on Point Loma. | No special fire management recommended. |
| *Lotus hamatus* crab lotus | Seed found but no plants on CNM. Known from firebreaks, disturbed sites, gaps in coastal sage scrub at other locations. | No special fire management recommended. |

| Species | Wildland Fire Adaptation | Potential Fire Management Approaches |
|---|---|---|
| **Pyrophyte Annuals (Keeley and Keeley 1984). Considered fire followers because they prefer charate (ashy burned material) as a seed germination stimulant and fire clears space that may previously have been occupied by competing species. They also have no special dispersal mechanism, so rely on local creation of canopy gaps to perpetuate themselves. Seed is expected to be long-lived.** | | |
| *Lotus salsuginosus* Alkali lotus or humble lotus | Seeds were found on CNM but no plants were previously known from the Park (but was documented on NBPL (U.S. Navy 2002); likely to have had little reproduction during the interfire period (Cummins 2003). Seeds respond to heat stimulation) (Keeley and Keeley 1982). | Prescribed fire would benefit the expression of this species. |
| *Phacelia distans* common phacelia *Lupinus succulentus* arroyo lupine | Species in these genera are generally considered pyrophytic. | Fire would benefit population expansion but these are fairly common species that appear able to maintain themselves at low levels without fire. No special fire management is recommended. |
| *Papaver californicum* fire poppy | Seeds were found on Cabrillo National Monument but no plants were previously known from CNM (but was documented elsewhere on Point Loma (U.S. Navy 2002); likely to have had little reproduction during the interfire period (Cummins 2003). | Prescribed fire would benefit the expression of this species. |
| Lichens | | |
| *Roccella fimbriata* orchil lichen | Coastal rocks and bark in full sun (Brodo *et al.* 2001). More abundant in Baja California. Lichens are highly flammable because they desiccate when relative humidity drops. | Protect from fire or burn experimentally only. Should survey in advance of experimental burns, and should be part of fire recovery evaluation. At least some stands should be protected so they can get as old as possible, so they can act as refugia and sites of inocula to perpetuate lichens (Bowler and Riefner 2003). |
| *Dendrographa leucophaea* false orchil | On rocks and shrubs on the southern California coast and Channel Islands (Brodo *et al.* 2001). Foliose lichens are highly flammable because they desiccate when relative humidity drops. | Protect from fire. Should survey in advance of experimental burns, and avoid locations where this lichen exists. Investigate site-specific benefit or harm from mechanical fuel reduction around populations. |

### *Federally Endangered Orcutt's spineflower*

Orcutt's spineflower (*Chorizanthe orcuttiana)*, listed as endangered by the United States Fish and Wildlife Service (USFWS) and CDFG, was discovered in 1997 on NBPL. Orcutt's spineflower is currently listed as endangered by both USFWS (November 6, 1996) and CDFG (listed in 1979 pursuant to the Native Plant Protection Act (chapter 10 section 1900 et seq. of the California Fish and Game Code) and California Endangered Species Act (chapter 1.5 section 2050 et seq. of the Fish and Game Code). CNPS also considers it to be rare and endangered (CNPS 2000). It was first described by Charles Parry in 1884 based on a specimen collected by Charles Orcutt at Point Loma, San Diego County, in the same year (Parry 1884).

*Chorizanthe orcuttiana* is a low, yellow-flowered annual of the buckwheat family (Polygonaceae). It is distinguished from other members of the genus by its prostrate form, campanulate three-toothed involucre and involucral awns that are hooked near the tip (Reveal 1989). This species is found on sandy soils derived from eroded coastal bluffs, within openings in chaparral and coastal sage scrub communities (Bauder 2000, CNPS 2000). Soil samples taken in the vicinity of existing populations indicate a sand fraction of about 90 percent, low organic matter and nitrate, and moderate acidity.

The Federal Register Listing (Vol. 61, No. 195 October 7, 1996) for Orcutt's spineflower considered disruption in natural fire cycles as potentially threatening this species. "Fragmentation has rendered individual populations more susceptible to fire events that may either occur too frequently or be suppressed too long to maintain a healthy southern maritime chaparral habitat." It was reportedly threatened by trampling because of its small size and its preference for open areas, which tend to attract foot traffic through otherwise dense chaparral vegetation, and by invasive weeds.

Only a few populations of Orcutt's spineflower exist, three of which are on Point Loma (Bauder 2000; O'Connor pers.com. 2004). The populations on NBPL include one on SUBASE, which was detected in 1997, one on SSC, which was observed in 1999, and one SSC just south of the FCTCPAC ballfield discovered in 2003. The Point Loma populations have been monitored since 1998 in accordance with a United States Fish and Wildlife Service (USFWS) permit (Bauder 2000). Another population is at Oakcrest Park in Encinitas (down to one individual plant in 2000), but one at Torrey Pines State Park has not been seen since 1987 (Bauder 2000). The Navy has funded an effort to expand and enhance the habitat of the population on its land by eradicating iceplant *(Carpobrotus edulis)* and other invasives from the known sites, and providing erosion control to prevent loss of topsoil (Soil Ecology and Restoration Group 2001). The project will also involve collecting seed for greenhouse germination and eventual outplanting.

Orcutt's spineflower is adapted to natural openings in chaparral. Its herbaceous annual life history will avoid most fire effects as long as the fire occurs after seed dispersal. The seeds germinate late in the fall after seasonal winter rains begin, and the single-seeded fruits (achenes) are produced late in the spring.

It would benefit management of this species to know if germination may be stimulated or affected detrimentally by fire. There have been no studies that looked at this directly. However, what we do know about the seeds was summarized by Bauder (2000). She had extremely low success in inducing germination; of 500 seeds in the trial, 28 germinated. X-rays of an unselected sample of the seed set showed that 57-59% of the involucres were filled with seeds. However, this does not necessarily indicate the percent of viable seeds. One possibility for such a low success rate is that the seeds needed to mature longer on the plant before their removal in June after the plant had dried.

Several methods to induce germination were tried, including imbibing, involucre removal, and cold stratification. Cold stratification has been shown to work in past germination experiments of other species, and was tried with some success in experiments run by Rancho Santa Ana Botanical Gardens. An unknown dormancy mechanism, such as a particular temperature sequence or chemical cue could also be necessary for germination. A study with a limited sample size suggested that the removal of the involucre facilitates germination. Seeds are contained tightly within the involucres, and are very difficult to remove by hand with dissecting needles. Seeds can retain viability for several years, and these results may indicate that it takes several years for the involucre to deteriorate enough for germination. It also could be that there is an unknown mechanism to remove the involucre. Metzger (1992) investigated this theory with a related plant *(Polygonum convolvulus).* He studied the effects of both sand abrasion and microorganisms in involucre removal, with no significant results. Neither Bauder, Metzger, nor Rancho Santa Ana Botanical Gardens investigated the role of fire in removing the involucre.

## 3.6.6 Invasives and Fire Effects

While most southern California plant communities are known to be fire adapted, under certain biophysical conditions fires can reduce the competitive ability of native species in favor of herbaceous non-natives. This shift can have severe consequences for community structure, function, and native biodiversity. On the other hand, prescribed fire can be an indispensable tool to eliminate invasives in the context of a restoration plan (Parson and Stohlgren 1989, Hastings and DiTomaso 1996, both as referenced in D'Antonio 2000). Cummins (2003) documented large seed banks of several invasive weeds and shrubs at Point Loma, which could lead to some areas becoming dominated or strongly influenced by invasives if they are competitive with seedlings and resprouts of native shrubs. Map 2-7 in the JWFMP, page 2-63 depicts the distribution of non-native weeds on NBPL, based on surveys in 2003 by Junak. CNM lands were not included in this survey.

The degree to which fire can influence community structure in Mediterranean shrublands depends most strongly upon the fire interval (Hobbs and Huenneke 1992, Keeley 2001, Zedler *et al*. 1983). The decline of canopy species allows invasive weeds to gain a foothold. Once established, these annuals increase the surface fuel load, creating a positive feedback loop that facilitates low intensity frequent fires that can drive the community structure toward a sustained non-native annual grassland.

### 3.6.7 Other Disturbance Processes That Interact with Fire Disturbance

Conservation of species and the ecological processes that support them is a primary goal of both U.S. Navy and NPS natural resource management. This may mean managing for an array of vegetation conditions and the interaction of disturbance processes rather than a simple, long fire-free regime. Hobbs and Huenneke (1992) reviewed the intermediate disturbance hypothesis, which suggests that species diversity within a given patch should be highest at intermediate frequencies or intensities of disturbance. They explained that any change in the historical disturbance regime of an ecosystem may alter species composition by reducing the importance of native species, by creating opportunities for invasive species, or both. They provided examples where the interaction between different disturbances has the largest effect. They concluded that "natural" disturbance regimes may be desirable but are often impracticable in the altered settings of contemporary reserves. Management decisions must now be made on what disturbance regime is required. This requires decisions on which species are to be encouraged or discouraged, as well as the disturbance regime that will achieve their specific conservation goals (Hobbs and Huenneke 1992). In addition, on Point Loma where just a small remaining fragment of a once larger system of coastal scrub/chaparral communities remains, we might choose to manage for higher diversity per unit area than what is thought to be "natural" to maintain elements once spread spatially and temporally through a larger system.

The consequences due to variations in the fire regime on Point Loma are impossible to foresee because we do not fully understand the range and extent to which certain organisms may depend on any given disturbance condition. Another reason is that other processes are at work in the natural systems of Point Loma besides fire regime. These additional processes may act at the landscape, community, or population scales. Examples include drought/El Niño cycles, inter-species competition that results in shifts in relative abundance of species groups, herbivory by native mammals, food chain dependencies, and dispersal and colonization. The following processes that are linked to plants and which interact with fire regime could be affected by the fire management actions.

- Population processes
  *Dispersal and germination of seeds*
  *Gene flow (seeds and pollen)*

- Community processes
  *Movement of seed dispersers*
  *Movement of pollinators*
  *Movement of herbivores, seed predators, and parasites*
  *Movement of mutualists (e.g. mycorrhizal fungi)*
  *Dispersal and colonization of invasive weeds*
  *Competition*
  *Herbivory*

- Landscape or coarser scale processes
  *Drought*
  *El Niño*
  *Global warming*
  *Habitat fragmentation and isolation*
  *Nutrient cycling*

The life histories of plants are dependent on processes at all these scales. Canopy gap-dependent species establishment is an example of a disturbance process that is not necessarily cued by fire. Very few plants are capable of dispersing to a fully occupied habitat and maturing without relief, at some stage, from the competition of surrounding established individuals (Zedler 1982). Grime (1979) explained some of the reasons for this pattern. Some species appear to require large gaps in which the effect of competition is minimal, while others are capable of establishment in small gaps in which only limited growth is possible before competition with established individuals becomes significant. Capacity to invade depends not only on a plant's stress tolerance and competitive ability (Grime 1979), but also on dispersal characteristics which determine the ability of a species to find all the available habitat. During long fire-free periods, openings created by senescent shrubs are the likely location where gap species become established.

There are also wildlife species that are dependent on gap plants, and there may be a much higher risk of extinction associated with wildlife than with plants. For example, the Palos Verdes blue butterfly *(Glaucopsyche lygdamus palosverdesensis)* was thought to be extinct on the Palos Verdes peninsula in coastal Los Angeles County, but was rediscovered in 1994. Like many moths and butterflies, the Palos Verdes blue is restricted in the number of different host plant species it can utilize. The larvae are adapted to the particular balance of nutritional components which their host plants provide. The Palos Verdes blue has two host plants, southern California locoweed *(Astragalus trichopodes* var. *lonchus),* and the more common deerweed *(Lotus scoparius)*. Both of these plants are known to be fire followers in a landscape that is essentially lacking in wildland fire today due to development.

This butterfly is an example of a species that has a much shorter life span than the plants upon which it depends. While the seeds of its host plants can remain viable in the soil seed bank for many decades, the diapausing pupae of the Palos Verdes blue may live only 3-5 years (R. Mattoni, *pers. comm.*). For organisms with extremely sedentary demographics such as this butterfly, long fire-free intervals combined with habitat loss and drought have been catastrophic.

### *The Fire Environment*

Understanding the impact of fire on the evolution of Point Loma vegetation and the ecological effects of fire on component species helps define fire management objectives that are consistent with ecological objectives. While "natural" fire regimes in southern California continue to be widely debated (Zedler 1995, Keeley and Fotheringham 2001, Minnich 2001), there is much that we can interpret about the natural regime based on a modern analysis of the fire environment and its cultural context before the arrival of Europeans. Point Loma has significant areas dominated by plant species that have evolved with fire or are fire dependent. Based on the presence of these species it can be assumed that fire has been a part of the peninsula's ecological development. However, the fire regime on Point Loma is different from more inland locations because climatic controls are different.

### *Climate*

The geographic position of southern California at mid-latitudes and its coastal setting has resulted in the development of a Mediterranean climate. For much of the year on Point Loma, the climate is typified by frequent early morning cloudiness with fog or a light drizzle, hazy afternoon sunshine, and daytime onshore breezes. The heaviest rainfall occurs in winter when the oceanic high-pressure center is at its weakest and at its farthest point south, allowing the fringes of mid-latitude storms to occasionally move through the area. The temperature regime is cool and maritime, with relatively little seasonal or daily fluctuation, and with little frost. Point Loma experiences average daily temperatures ranging from 46 to 68 degrees Fahrenheit, with the highest temperatures occurring in August and September. San Diego averages 10.1 inches of rain annually, but rainfall totals can vary greatly from year to year. Most of the rain falls from November through April, and summers are often completely dry. Daily humidity averages approximately 70 percent. Dry-season conditions are moderated by frequent fog associated with ocean waters that are cooler than the air in late spring and early summer. Prevailing northwest winds are moderated by the Pacific Ocean.

Temperature, relative humidity, and wind, among other factors, influence fire behavior. In southern California, extreme fire conditions exist from May through November throughout southern California. Dry, warm "Santa Ana" winds occur in the fall when vegetation is dry and soil protective cover is low. While average relative humidity decreases from April through August, mean maximum temperatures are reaching their annual highest levels. Prevailing winds at this time of year will tend to drive a fire from east to west. Point Loma's coastal location and geography partially eases the problem because the peninsula can pull in marine air during the day as land surfaces heat up, and create up-canyon breezes. At night, the breezes are drawn back down the canyons to the coast as land surfaces cool. Compared to inland portions of California, the fire hazard is generally lower in the summer on Point Loma because winds generally originate from the ocean and are more moisture-laden. Figure 2-4 on page 2-3 in the JWFMP illustrates the more moderate conditions that prevail on Point Loma when compared to inland locales.

***Aboriginal Use of Fire***

Understanding the context of human land use before and after European settlement sheds light on the role fire has played in the evolution of the local ecosystem since the beginning of the Holocene period (the most recent geologic age for our planet earth, including all time since the last glaciation, beginning about 12,000 years ago). The human dynamic started with the earliest Native American occupation, continued with European contact, Spanish colonization, American-period ranching, and military use beginning in the 20th-century.

To assess the probability that aboriginals ignited fires in the Point Loma vicinity, Zedler *et al.* (1995) summarized documentation of aboriginal burning in the area. Numerous accounts of intentional ignitions by native southern Californians exist (Lewis 1973). Jose Longinos Martinez, the first naturalist to visit California, wrote in 1792 (Simpson 1961 as cited in Zedler *et al.* 1995):

"In all New California from Fronteras northward the gentiles have the custom of burning the brush, this for two purposes: one for catching rabbits, two, so that with the first light rain or dew the shoots will come up which they call pelillo and upon which they feed like cattle when the weather prevents their seeking other food."

Early explorers noted a similar practice in the San Diego area. Crespi, an early Franciscan, journaled in 1769:

> "Thursday, July 20.--We set out about seven in the morning, which dawned cloudy, and taking the road straight to the north, we traveled by a valley about one league long, with good land, grassy, and full of alders. This passed, we ascended a little hill and entered upon some mesas covered with dry grass, in parts burned by the heathen for the purpose of hunting hares and rabbits, which live there in abundance" (Bolton 1927).

In 1774 Captain Fernando de Rivera wrote (cited in Burrus 1967 and Zedler *et al.* 1995):

> "From the west came a blaze burning the field; and even myself went out, not because of danger to the houses, but in order to save the fodder. We succeeded in putting it out. The heathen were in the habit of supplying this work through their bad custom. After harvesting their seeds, and having no other animals to care for than their bellies, they set fire so that new grass may grow and to catch rabbits in the confusion of the smoke."

Indians near the Mission San Diego de Alcala continued to actively burn vegetation in 1793 (Pyne 1982 as cited in Zedler *et al.* 1995). On Point Loma itself around 1827, Duhaut-Cilly accompanied a group of Indians on a large rabbit hunt (Duhaut 1929 as cited in Zedler *et al.* 1995), although no use of fire was mentioned.

So, while the use of fire for hunting purposes by indigenous tribes in southern California is widely documented (Lewis 1973, Timbrook *et al.*1982, and Bolton 1927 as quoted in Zedler *et al.*1995), there are no specific references to the use of fire by natives on Point Loma. There is no reason to suspect differentiated burning on the peninsula compared to the rest of southern California (Yatsko, pers. comm. 2003).

***Fire and Fuel Harvesting in the Mission and Rancho Periods***

In 1769 the San Diego mission was established, and this led to the removal of aboriginal residents from Point Loma. Then, in 1793 and as late as 1833, proclamations to prohibit the use of fire by the Indians were issued (Pyne 1982) due to increasing conflicts with European agriculture, livestock, and habitation.

Chaparral shrubs have been used for heating fuel since aboriginal times, and supplied the population of San Diego at least into the 1830s (Zedler *et al.* 1995). Richard Henry Dana noted when he stayed in San Diego that the Indians were sent out to collect shrub wood for fuel (Dana 1936). The surveyor/botanist William Emory also described this use of fuel:

> "On the San Diego Promontory [Point Loma] there is a dense and intricate growth of shrubbery, to which both the people of the town and from the shipping have for a long time resorted for fuel. The greater proportion is furnished by Eriodictyon, which is a large shrub of from eight to twelve feet in height, with a diameter of from two to four inches. The wood is very close-grained, but brittle, and is charged with a resinous matter, which causes it to burn readily, even when green. In this locality are also found the beautiful Ceanothus rigidus, Pitavia dumosa, Adenostoma fasciculata, and a species of scrub oak, all forming dense thickets" (Emory 1859, cited in Zedler *et al.* 1995).

It is believed that stands of toyon, lemonade berry, scrub oak, and manzanita may have been more prominent before the mid-1800s but were reduced for local hide tanning operations, firewood and construction, or by fires (Kelly and May 2001). Later, by the 1870s, the ridge area was reported as "...very meager, consisting of low, scrubby sagebrush" (Kelly and May 2001). Grazing by the livestock kept by operators of the lighthouse may have contributed to the openness of historic vegetation along the ridge of the peninsula.

Regionally, fire regimes changed when non-native species and domestic grazing animals were introduced to southern California during this period. Grazing animals are not thought to have had a direct impact on Point Loma except along the ridge as described above, but the non-native grasses that came with them did have a direct impact on the southern California landscape. Aggressive, colonizing grasses and forbs, mostly annuals, probably took permanent hold during periods of drought and heavy grazing, as occurred in the late 1800s (e.g. Burcham 1956). These species are most evident on Point Loma along roadsides, in grasslands and shrub interspaces, where the majority of species commonly visible are non-native annuals. In the first few years after a fire in coastal sage scrub, these annual grasses may provide a continuity of fuel that otherwise did not exist, and may change the modern fire regime even in this plant community that evolved with fire. The grasses provide light, flashy fuels that may extend the conditions under which shrubs will ignite, which can lead to a shorter fire return interval in coastal sage scrub. Compounding the change, shorter return intervals may alter the intensity at which fires burn.

***Recent Fire History (1890 to Present)***

The peninsula has a long history of settlement and almost all recorded fires are thought to be human caused. Climate, vegetation, paleo-ecological evidence and recorded fire history all indicate that the natural regime is one of infrequent small fires, and even less frequent large fires that consumed all the vegetation on the Point in a single event.

During investigations by Zedler *et al.* (1995), several small, historical fires were documented on Point Loma, and at least two additional fires are known to FFD (C. Smith, pers. comm.) and to CNM (T. DiMattio, pers. comm.). Fire incident reports are only filled out by FFD if a firefighting asset was used to respond to the fire. The known fire history is summarized in Table 3-9. Shrub stem-dating (Zedler *et al.* 1995) identified that there were additional fires besides the ones documented by historical anecdotes or photographs. In addition, firebreaks were plotted on a 1942 Fort Rosecrans Reservation Topography Map, and are shown on Map 2-1 of the JWFMP.

*Table 3-9. Documented fires on Point Loma (Zedler et. al.1995; Smith pers. comm., DiMattio, pers. comm.).*

| Approximate Date | Mapped? | Description |
|---|---|---|
| 1890-1912 | No | Recorded in national archives for quarantine station near La Playa, north of Ballast Point. Fire threatened the station and prompted the operators to remove the brush around the building. In 1903 the San Diego Union reported a fire set by a tourist on Point Loma threatened military buildings at Fort Rosecrans. This may have been the same fire as reported in the national archives. |
| 1891-1897 | Yes | 1899 photos show this a portion of this fire. The northern boundary of fire could not be determined. (CNM Archives Cat 979.498 acc 15) |
| 1894-1898 | Yes | 1899 photos show this fire (CNM Archives Cat 979.498 acc 15) |

| | | |
|---|---|---|
| 1912-1925 | No | Two fires were detected by determining the age of wart-stemmed ceanothus shrubs, which were estimated by ring counts to have germinated in 1912 and 1925. Fire boundaries could not be determined. |
| 1917-1963 | Yes | Ground evidence of burned lumber, stems, construction materials on eastern portion of CNM. Fire most likely occurred prior to 1940. |
| 1970-1980 | No | Two fires are known from about 1980 or earlier (C. Smith, pers. comm.), although record of precise location is not available. The largest was about 100 acres, starting on the coastal slope and contained at the top of the hill. The other was started by catalytic converter, probably in the late 1970s. It burned about 20 acres. |
| 1978-1979 | Yes | Started by catalytic converter. It burned about one-half acre along the Whale Road, and was quickly suppressed by CNM staff, as recalled by Park Superintendent. |

***Fire Type***

Fires in shrublands like those found on Point Loma are typically crown fires that burn primarily through the canopy of the vegetation, in contrast to a surface-fire regime such as is expected in grassland or in forest vegetation types (Keeley and Fotheringham 2001). Crown fires in shrublands are higher intensity fires, but not all shrubland communities exhibit the same fire characteristics. For example, coastal sage scrub has a lower total biomass than does chaparral (i.e. shrub height and stem density are lower), and is generally more open, and so tends to burn at lower intensity.

***Fire Season and Fire Size***

Fires occur from summer to winter in southern California. However, extreme fire hazard conditions commonly occur in late summer and fall due to dry vegetation and desiccating, high velocity winds coming from the northeast known as Santa Ana winds. Although temperatures on Point Loma are more moderate than in inland areas of San Diego County and humidities are higher, the Santa Ana winds can result in high fire danger spikes on the Point as well as elsewhere in the County. These conditions foster a regional pattern of large fires that eventually burn themselves out after many weeks following ignition, with variable impacts on the landscape depending upon the intensity at which they burn (Moritz 1997, Weise *et al.* 1997, Keeley 2001). In the past, most or all of the vegetation on Point Loma may have burned in single fire events during such conditions, and this is still possible in today's fire environment.

***Ignition Sources***

Documented fires on Point Loma appear to have been caused by automobiles or other human origin. Future fires are likely to also have a human origin, such as a flare or firework shot from a boat and landing on vegetation, or sparks generated by construction or landscape maintenance equipment. Also, illegal aliens sometimes land on the Point and, and in other locations, have been known to start campfires which get out of control.

Low-elevation coastal areas have the lowest natural fire frequencies in southern California due, in part, to the rarity of lightning strikes (Malanson and O'Leary 1982, Keeley 1982, Minnich 1993), although they are not absent (M. Wells as cited in Keeley 2002). While there are no recorded lightning-caused fires for Point Loma, both lightning associated with winter frontal systems and summer convective storms occur along the southern California coast, and lightning in the coastal areas peaks in September, close to when Santa Ana conditions occur (Keeley 2002). Lightning fires are documented on nearby Santa Catalina Island. Prior to organized fire suppression, infrequent Santa Ana wind-driven fires likely resulted from lightning ignitions that occurred weeks earlier and "held over" as slow burns or smoldering fires, flaring up when winds increased and fuel moisture dropped (Minnich 1987, Keeley *et al.* 1999). Santa Ana wind-driven fires may also have occasionally carried into the Point Loma area from the Palomar and Laguna Mountain Ranges that lie to the northeast (J. Keeley, pers. comm.). Nonetheless, fires on Point Loma are thought to have occurred at a very low frequency, and lightning-ignited fires are a possibility but not a high probability on Point Loma.

***Rate of Spread***

The largest and most destructive wildfires spread at extremely rapid rates which overwhelm the ability of firefighters to control them. Expected rates of spread can be modeled (see Section 2.2.2), but specific models for Point Loma are lacking and examples from inland areas may not relate well to this coastal environment (R.Montague, pers. comm., Anderson 1982, Andrews et al.2003). The published fuel models most applicable to Point Loma show that a wildfire burning under extreme conditions (more than 10 mph wind speeds when fine fuel moisture (grasses) is less than six percent) and driven by high velocity Santa Ana winds (up to 60 miles per hour) would be little influenced by vegetation structure or fuel loads. The spread of a fire under such conditions would instead be regulated by the interaction of winds and topographic features (Radtke *et al.*1982, Turner and Romme 1994, Keeley *et al.* 1999). Thus, under extreme weather conditions, fires could move rapidly over the peninsula from northeast to southwest, exhibiting extensive lateral spread. The vegetation mosaic would play only a limited role in controlling this movement. The peninsula could be completely burned over by a fire in one hour (see Section 2.2.4).

***Fire Spread Pattern***

Recent studies suggest that large fires are a natural part of the fire regime of southern California, and not a result of modern fire suppression practices (Keeley and Fotheringham 2001). This is for the same reasons described above regarding the extremely hazardous conditions that occur in the fall in southern California. Point Loma is believed to be no exception to this pattern. However, many fires are driven by fuels alone rather than extreme weather, and such fires tend to remain small and more controllable. Such fuel driven fires have been the pattern for Point Loma within the recorded fire history (see Section 2.1.4), but large fires that moved onto the peninsula are likely to have been part of the fire regime before records were kept.

The realization that fuel loads do little to affect fire size during extreme weather conditions has instigated a debate about long-institutionalized practices of mosaic burning to reduce the age class of existing vegetation. This practice is intended to provide firefighters a better opportunity for wildfire suppression due to the reduced flame lengths that result from younger vegetation. However, the practice of creating age-class mosaics to manage fire spread has shown only a limited ability to prevent the spread of wind-driven fires, and 100 years of aggressive suppression activity has not increased the occurrence of these large fires (Radtke *et al.* 1982, Dunn 1989, Davis and Michaelsen 1995, Moritz 1997, Conard and Weise 1998, Keeley *et al.* 1999, Mensing *et al.* 1999). Proponents of this argument say that cost-effective fuel treatment should occur only at strategic locations in the wildland-urban interface (Keeley 2002), which includes all of Point Loma (see Chapter 3). It is important to note that this argument is focused on extreme weather conditions, not on fuel-driven fires which more typically occur in the summer rather than fall months, and require fire containment under more moderate weather scenarios.

***Fire Intensity and Severity***

Fire intensities (measured as the rate of thermal energy production) in coastal sage scrub are expected to be moderate but can depend on a highly complex relationship between topography, vegetation mosaics, and exposure to winds. Fire severity (effects of the fire on the ecosystem) is expected to be low to moderate, since most of the dominant shrub species are resprouters that can regenerate quickly after a fire. However, many stem succulents can be seriously impacted or killed by fire. Stem succulents are common in the maritime succulent scrub plant community on the peninsula, which occurs mostly on the west side.

Fire intensities in southern maritime chaparral are expected to be moderate to high, depending on shrub composition and fire weather. Fire severity (actual damage to resources) is expected to be low even under high fire intensities (Keeley 2003) in this fire-adapted community.

***Fire Frequency and Return Interval***

Chaparral is generally believed to be resilient to fire return intervals ranging from 20 to 150 years (Keeley 2002), with average natural return intervals of 70 years in inland sites (Minnich 1983, Davis and Michaelson 1995, Conard and Weise 1989, Mensing *et al.* 1999). Specific locations may have shorter or longer intervals, depending upon local conditions, and within chaparral landscapes in general fire intervals are extremely variable (Zedler et al 1995). Aside from aboriginal burning, Point Loma has had much longer fire return intervals than are typical of more inland San Diego County, presumably due to frequent fog, higher humidities, and higher moisture levels of cured fine fuels.

Evidence collected by aging the stems of shrubs on Point Loma and on examining other fire records supports long intervals. An Island cherry tree (Prunus ilicifolia ssp. lyonii) was aged to when the missions were established in the 1700s, but had what was believed to be a fire scar from about 70 years ago (Zedler *et al.* 1995). It is speculated that the areas capable of supporting stands of wart-stemmed ceanothus, but where no plants exist today, may have a fire free interval of at least 144 years, the date the lighthouse was established (Zedler 1995). As of the establishment of the lighthouse there are no memories or records of large fires on Point Loma. In addition, there are no descriptions of the vegetation on Point Loma at the time the lighthouse was constructed.

Following construction of the lighthouse there is evidence of several smaller, high-intensity fires that occurred where two stands of wart-stemmed ceanothus currently exist (Zedler 1995). These two stands are 77 years old and 90 years old as of July 2003, which suggests no high intensity fire has entered these stands in the last 77 to 90 years.

## 3.6.8 Air Quality

***Criteria Pollutants***

If experimental or prescribed fires are to be considered on Point Loma, then air quality concerns must be addressed. The San Diego Air Basin (SDAB) is in serious non-attainment for the federal ozone O3 standard, and in non-attainment for the state PM10 (particulate matter less than ten microns) and ozone standards. These are public health and safety concerns, though ozone in particular is also a pollutant with significant ecological consequences. Of the air quality related values to be considered in this environmental assessment, the production and management of PM-10 is the most significant.

The same atmospheric processes that create a desirable climate of warm, sunny days can also lead to poor air quality. Specifically, a strong seasonal inversion layer (where a layer of warm air overlies a layer of cool air) preventing air at different altitudes from mixing and trapping pollutants near the surface. Inversions effectively inhibit the dispersion of pollutants, resulting in a temporary (seasonal) degradation of air quality. Air quality in the San Diego Air Basin (SDAB) is impacted not only by local emissions but also by pollutants transported from other areas. In particular, ozone ($O_3$) and ozone precursor emissions transported from the South Coast Air Basin (located to the north) affect air quality within the SDAB. While the impact of pollutant transport is particularly important on days with high ozone concentrations, transported emissions are not solely responsible for the ozone problem in the San Diego area, as research has indicated that emissions from the SDAB are great enough on their own to cause violations of ozone standards (California Air Resources Board [CARB] 2003, County of San Diego Air Pollution Control District 2000). Table 3-10 shows the federal and state ambient air quality standards to which activities on Point Loma are held.

*Table 3-10. Federal and California ambient air quality standards (Air Resources Board 2001).*

| Pollutant | Averaging Time | Federal Standard | California Standard |
|---|---|---|---|
| Ozone | 1-hour | 0.12 ppm | 0.09 ppm |
| Carbon Monoxide | 1-hour<br>8-hour | 35.0 ppm<br>9.0 ppm | 20.0 ppm<br>9.0 ppm |
| Nitrogen Dioxide | 1-hour<br>annual | ---<br>0.05 ppm | 0.25 ppm<br>--- |
| Sulphur Dioxide | 1-hour<br>24-hour<br>annual | ---<br>0.14 ppm<br>0.03 ppm | 0.5 ppm<br>0.05 ppm<br>--- |

| | | | |
|---|---|---|---|
| PM10 | 24-hour<br>annual | 150 ug/m3<br>50 ug/m3 | 50 ug/m3<br>30 ug/m3 |

ppm = parts per million, ug/m3 = micrograms per cubic meter.

Automobiles and other on-road vehicles (mobile sources) represent the greatest source of emissions in the SDAB. Major topographical features (e.g., the Cuyamaca Mountains) impact the transport and diffusion of pollutants by hindering their eastward movement. This, in conjunction with the shallow inversion layer and high pollution emissions results in generally poor air quality in the SDAB, which is similar to the air quality of most of coastal southern California. Other sources of emissions at Point Loma include civilian, military, and commercial vehicles; ships; tactical support equipment and vehicles; ground support equipment; small stationary sources; and ongoing construction activities. Table 3-11 summarizes representative air quality data from a monitoring station located at 12th Avenue in San Diego, the nearest monitoring station to Point Loma. Federal $O_3$ standards have not been exceeded over the past five years at this location, while the more stringent state $O_3$ standards have been exceeded three times within the last five years (CARB 2003). Over the past five years, the federal PM10 standard has not been exceeded and the state PM10 standard has been exceeded 22 times (CARB 2003).

*Table 3-11. Summary of representative air quality data from a monitoring station located at 12th Avenue in San Diego, the nearest monitoring station to Point Loma (Data Source: Calif. Air Resources Board, 2003).*

| Air Quality Indicator | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|
| Ozone (O3) | | | | | | |
| Peak 1-hour value (ppm) | 0.098 | 0.091 | 0.118 | 0.098 | 0.090 | 0.075 |
| Days above federal standard (0.12 ppm)a | 0 | 0 | 0 | 0 | 0 | 0 |
| Days above state standard (0.09 ppm)c | 1 | 0 | 1 | 1 | 0 | 0 |
| **Particulate Matter less than 10 microns in diameter (PM10)** | | | | | | |
| Peak 24-hour value (mmg/m3) | 48 | 69 | 65 | 66 | 85 | 139 |
| Days above federal standard (150 mmg/m3) | 0 | 0 | 0 | 0 | 0 | 0 |
| Days above state standard (50 mmg/m3)c | 0 | 4 | 6 | 5 | 7 | 11 |
| **Carbon Monoxide (CO)** | | | | | | |
| Peak 8-hour value (ppm) | 4.84 | 4.64 | 4.59 | 4.85 | 3.54 | 3.88 |
| Days above federal standard (9.0 ppm) | 0 | 0 | 0 | 0 | 0 | 0 |
| Days above state standard (9.0 ppm) | 0 | 0 | 0 | 0 | 0 | 0 |
| **Sulfur Dioxide (SO2)** | | | | | | |
| Peak 24-hour value (ppm) | 0.011 | 0.008 | 0.010 | 0.012 | 0.007 | 0.008 |
| Days above federal standard (0.14 ppm) | 0 | 0 | 0 | 0 | 0 | 0 |
| Days above state standard (0.04 ppm) | 0 | 0 | 0 | 0 | 0 | 0 |
| **Nitrogen Dioxide (NO2)** | | | | | | |
| Peak 1-hour value (ppm) | 0.094 | 0.122 | 0.117 | 0.098 | 0.102 | .111 |

| Air Quality Indicator | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|
| Days above state standard (0.25 ppm) | 0 | 0 | 0 | 0 | 0 | 0 |
| [a]SDAB is in non-attainment ("serious") for the federal O3 standard.<br>[b]SDAB is in non-attainment for the state PM10 and ozone standards.<br>ppm = parts per million by volume; mg/m3 = micrograms per cubic meter. | | | | | | |

### *Regional Haze Regulations for Cabrillo National Monument*

Cabrillo National Monument is *not* in a Class I airshed for regional haze. The Clean Air Act defines certain federal areas as mandatory Class I airsheds, such as particular national parks (over 6000 acres), wilderness areas (over 5000 acres), national memorial parks (over 5000 acres), and international parks that were in existence as of August 1977. Because of evidence that fine particles are frequently transported hundreds of miles, all 50 states, including those that do not have Class I areas, participate in planning, analysis, and in many cases, emission control programs under the regional haze regulations. The same pollution that causes haze also poses serious health risks, especially for people with chronic respiratory diseases (http://www.epa.gov/ttn/ oarpg/t1/fact_ sheets/hazefs2.pdf).

The Environmental Protection Agency (EPA), the federal agency responsible for enforcing the Clean Air Act, recognizes that all types of fire (wildfire, prescribed fire, etc.) contribute to regional haze, and there is a complex relationship between what is considered a natural fire versus a human-caused fire. For example, the increased use of prescribed fire in some areas may lead to particulate emission levels lower than those that would be expected from a catastrophic wildfire. Given that in many instances the purpose of prescribed fires is to restore the natural fire cycles to ecosystems, the EPA works with state and federal land managers to develop enhanced smoke management plans that minimize effects of fire emissions on public health and welfare (http://www.epa.gov/ttn/oarpg/t1/fact_ sheets/hazefs2.pdf).

CNM maintains a visibility monitoring camera in order to interpret changes in visibility conditions for the public.

## 3.7 Cultural Resources

Point Loma has a rich cultural heritage spanning aboriginal, Spanish, Mexican, and American periods of occupation of the peninsula. In this Fire Plan, all National Register-eligible properties are considered, as well as other properties or resources that represent the history of the area, even if they are not eligible for listing. A map of cultural resources (confidential, not for public distribution) on Pt. Loma is presented in Appendix D of the JWFMP.

### *Archeological Resources of Point Loma*

Most archeological areas found to date appear to be aboriginal habitation sites with shellfish and related remains. Approximately 43 sites are known all across Point Loma, covering approximately 95 acres.

### *Historical Resources on Point Loma*

There are a number of significant historical resources located throughout Point Loma, including:

- Cabrillo National Monument Historic District and the Cabrillo statue;
- Old Point Loma Lighthouse;
- Fort Rosecrans Historic District;
- Fort Rosecrans National Cemetery, California State Historic Landmark Number 55;
- Eligible historic district in Keniston report;

- Fort Rosecrans Coastal Defense Structures; and
- Museum storage building at NPS.

Cabrillo National Monument was established to commemorate the discovery of the west coast of the United States by Europeans and to remember Juan Rodriguez Cabrillo. The monument's cultural resources are interpreted while celebrating an overriding theme of man's relationship to the sea. The Cabrillo statue is a cultural resource and important icon for the local Portuguese-American community and the Portuguese government. The Old Point Loma Lighthouse, built in 1854, was one of the first of eight lighthouses built along the west coast and is the Point Loma landmark most familiar to San Diegans. The NPS has restored and refurnished the lighthouse to its 1880s appearance because photographic and narrative evidence for that period (1875–1891) is abundant.

Located throughout Point Loma are the remaining elements of the Fort Rosecrans Coastal Defense System and the Point Loma Military Reservation representing the greatest concentration and broadest range of American military history on the Pacific Coast south of San Francisco (Kelly and May 2001). These elements include a wide variety of emplacements, such as artillery positions, bunkers, and support facilities that made up part of the San Diego harbor defense network during World Wars I and II. The CNM Historic District contains 21 of these Coast Defense System structures. Two others were added after the recent transfer of land from the Navy to NPS.

Kelly and May (2001) list several potential Historic Districts that could be proposed among the historic resources on Point Loma that currently are not included under National Register guidelines. These include an expansion to the Fort Rosecrans District for structures added under the Grover Cleveland Administration, during the Great Depression, and in the 1940's; structures related to a Naval Coaling Yard and Supply Station; early Fuel Depot structures; a Navy Radio and Sound District; and a "Cold War" Naval Electronics Laboratory.

### *Fire Management and Cultural Resources*

Some archeological sites have fragile site surfaces that are currently protected by shrubs, which prevent erosion and trampling by people. Exposure of these sites by fire could degrade them. Certain of the historic resources are wooden structures or contain exposed burnable components. Many of these are also inhabited buildings, where survivable space management and suppression response is already at the highest priority level. The NPS museum storage facility is not inhabited but contains valuable artifacts.

The JWFMP contains a copy of the CNRSW San Diego Metro Programmatic Agreement, executed February 23, 2003. It also provides locations of cultural resources to the Federal Fire Department. For the Navy, compliance with section 106 of the National Historic Preservation Act (16 U.S.C. 470s) is governed by Stipulation 10D of this agreement. An excerpt relevant to a fire emergency is:

> "In the event that natural disasters, fires, spill events or other emergency events occur, CNRSW may take actions that may affect historic properties without consultation to protect life safety, stabilize any involved historic properties, and prevent further damage to property, consistent with 36 CFR 800.12. Emergency response work will be undertaken in a manner to avoid or minimize effects on historic properties to the extent possible. Should historic properties be discovered during emergency repair or response activity, work in the immediate area of the property will cease if CNRSW has determined that a work stoppage at the site will not impede emergency response activities. As early as possible given the nature of the emergency, CNRSW will provide telephonic or email notification of the emergency to the SHPO and other appropriate parties to the PA. Notification will include the steps being taken to address the emergency, the discovered property and its apparent significance, and a description of the emergency work and potential effects on the discovered property. Within 30 calendar days following this notification, CNRSW will provide SHPO and other parties to the PA as appropriate a written report documenting the actions taken to minimize effects, present status and planned treatment of the property."

# 4.0 Environmental Consequences of Proposed Action and Alternatives

This Chapter describes the potential effects each alternative would have on the environment. The range of alternatives constitutes various combinations of the available fire management techniques that are feasible and effective in the fire environment of the Point Loma peninsula.

- Proposed Action – JWFMP with Enhanced Suppression Guidance, 50-foot Survivable Space Fuels Management, and Experimental Use of Prescribed Fire for Ecological Benefit
- Alternative 1 – Same as Proposed Action but with 100-foot Survivable Space Fuels Management as Prescribed in Most Local San Diego jurisdictions.
- Alternative 2 – Same as Proposed Action but without Prescribed Fire for Ecological Benefit
- Alternative 3 – No Action (Current Program), Suppression Only

For each resource topic the impacts associated with each type of fire management action proposed in the alternatives is evaluated. The impact analysis also evaluates whether resources might suffer impairment. Impairment is not a NEPA issue but instead relates to the National Park Service Organic Act (1916). Impairment that is prohibited by the Organic Act is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Nonetheless, an impact is less likely to constitute impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values.

According to National Park Service Policy, “An impact would be more likely to constitute an impairment to the extent that it affects a resource or a value whose conservation is: a) Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park; b) Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or c) Identified as a goal in the park’s general management plan or other relevant National Park Service planning documents.”

Similar to the NPS requirement, and in keeping with the principal mission of DOD installations to ensure the preparedness of the U.S. Armed Forces, Navy policy mandates that natural resource management actions shall permit no net loss of the capability of the installation’s lands to support the military mission while providing for conservation and rehabilitation of natural resources.

Table 4-1 summarizes the effect each alternative would have on each resource topic. Impacts are evaluated by analyzing changes in the structure and composition of the vegetation in the dominant plant community types. The thresholds of significance for the type and duration of impact are as follows:

***Type of Impact***

| | |
|---|---|
| Adverse: | Moves the system away from the natural range of variability for vegetation structure and species composition. |
| Beneficial: | Moves the system toward the natural range of variability for vegetation structure and species composition. |

***Duration of Impact***

| | |
|---|---|
| Short-term: | Transitory, 2-5 years |
| Long-term: | Irreversible, 50-100+ years |

*Table 4-1. Comparison of environmental effects of the Proposed Action, Alternative 1, Alternative 2, and No-Action*

*Alternative.*

| **Resource Topic** | **Proposed Action** | **Alternative 1, 100-foot Survivable Space** | **Alternative 2, No Prescribed Fire** | **Alternative 3, No-Action (Current Program), Suppression Only** |
|---|---|---|---|---|
| Designated Land Use in PLECA | - | -- | - | 0 |
| Other Land Use | ++ | ++ | ++ | 0 |
| Utilities and Infrastructure | ++ | ++ | ++ | - |
| Socioeconomics | 0 | 0 | 0 | 0 |
| Recreational and Scenic Values | - | -- | - | 0 |
| Education and Outreach | ++ | + | + | 0 |
| Public Health and Safety | ++ | ++ | ++ | -- |
| Cultural Resources | + | - | + | - |
| Soils, reduce risk due to fire | + | + | + | - |
| Soils, reduce risk due to fuels management | - | -- | - | 0 |
| Water Resources | 0 | - | 0 | 0 |
| Plant Communities | + | - | - | - |
| Wildlife Populations | + | - | - | - |
| Sensitive Plants | + | - | - | - |
| Sensitive Wildlife | + | - | - | - |
| Prevent Spread of Invasive Species | - | -- | - | + |
| Air Quality | 0 | 0 | 0 | 0 |
| ++ mostly beneficial effects<br>+ some beneficial effects<br>0 no effects | - some adverse effects<br>-- mostly adverse effects | | | |

## 4.1 Impacts Common to All Alternatives

All alternatives require complete suppression of wildfires, which is essential to protecting human life and property in an intermixed wildland-urban interface. Suppression involves some level of fire management, which generally includes fire detection, suppression, monitoring, and potentially backburning to protect human life and structures. Depending on location and time of year, these operations may cause temporary impacts to individual recreational experiences. Impacts include: 1) noise from aircraft and other power equipment such as mowers and pumps, and 2) temporary closures of roads, trails, or facilities to protect visitors from direct exposure to fire. Smoke from fires may restrict visibility and impact viewsheds, or otherwise become a nuisance. The health impacts to visitors and personnel from smoke would be insignificant given the relatively short duration of the average visit and the ability of visitors to leave.

Suppression also provides some ecological benefit by ensuring that the age class of vegetation is sufficiently long and not so uniform that it affects biodiversity, if fires can be kept small and “patchy.” Fires in fire-adapted plant communities help to shape and renew the vegetation and wildlife habitats that are integral parts of many recreational pursuits in CNM. Fires may also create unique visitor experiences and educational opportunities. The effects of some fires may provide positive visitor experiences, by facilitating the germination of seeds of fire-dependent species and stimulating wildflower displays.

All alternatives involve continued vegetation management required for fire management or other reasons. This includes cutting vegetation to an eight-inch height for a 30-foot distance (0.28 acres) along the northern NBPL boundary fenceline, which is a security requirement to allow for visibility to detect intruders. It also includes maintaining non-vegetated areas or mowing around fuel tanks and locations where explosives are stored. Most of these areas are already paved; so natural habitats are no longer present. Where vegetation is managed for height, the result is persistence of low-growing species, usually non-native grasses and forbs, some of which are weedy species.

## 4.2 Land Use

NEPA requires identification of potential conflicts with local, state, and other federal land use planning, policies and regulations. Table 4-2 compares the four alternatives with respect to acreages affected in the Point Loma Ecological Conservation Area (PLECA).

*Table 4-2. PLECA acreages affected by proposed actions in the JWFMP, compared to alternatives. Total acreages are reported (these are bolded), then separate acreages for each jurisdiction.[1]*

| Action in PLECA | Proposed Action | Alternative 1 | Alternative 2 | No Action |
|---|---|---|---|---|
| **Experimental Burn Plots** | **0.89**<br>0.89 (CNM) | **0.89**<br>0.89 (CNM) | **0** | **0** |
| **Maximum Acres Impacted in PLECA if All Treatment Areas Around Structures can be reduced to 50-ft Buffer** | **8.2**<br>1.15 (CNM)<br>6.51 (NBPL)<br>0.53 (Other Jurisdictions) | | **8.2**<br>1.15 (CNM)<br>6.51 (NBPL)<br>0.53 (Other Jurisdictions) | **0** |
| **Maximum Acres Impacted in PLECA With 100-ft Survivable Space Buffer** | | **34.6**<br>4.36 (CNM)<br>27.6 (NBPL)<br>2.6 (Other Jurisdictions) | | **0** |
| **Maximum Acreage Affected in PLECA by Roadside Fuel Management Assuming a 10-foot Zone and All Areas Treated Without a Site-Specific Inventory** | **12.9**<br>3.15 (CNM)<br>9.5 (NBPL)<br>0.25 (Other jurisdictions) | **12.9**<br>3.15 (CNM)<br>9.5 (NBPL)<br>0.25 (Other jurisdictions) | **12.9**<br>3.14 (CNM)<br>9.5 (NBPL) | **0** |

[1] There is overlap between the roadside fuel management area and the survivable space buffer around structures. For the 100-foot buffer, this totals about 0.12 acres for CNM; 1.9 acres for NBPL; and 0.24 acres for other jurisdictions. For the 50-foot buffer, this overlap totals 0.05 acres CNM, 0.84 acres NBPL, and 0.23 acres for other jurisdictions.

Potential land use impacts resulting from the Proposed Action are based on the level of use and sensitivity of areas affected by the action.

In general, land use impacts would be significant if they:

**Proposed Action:** The mechanical fuels management required under this alternative will result in a change in land use in certain wildland areas along roads and around high-value structures to a fuels management buffer zone. Some of these lands are currently designated part of the PLECA. Excluding the overlap between building and road buffer zones, the combined roadside and building buffers would affect between 4.2 (50-ft building buffer) or 7.4 acres (100-ft buffer) at CNM. On NBPL, this would total between 15.2 (50-ft building buffer) or 34.9 acres (100-ft buffer). There are 890 total acres of natural terrestrial habitat (excluding intertidal, landscaped, cemetery, developed) on Point Loma, and 668 acres of this is in the PLECA.

The result would be a fuel modification zone that would include areas within 30 to 50 feet measured horizontally from the edges of structures; however, the extent to which vegetation management is needed to create survivable space is based on site-specific conditions and may not be uniform for all structures. Highly flammable vegetation, such as California sagebrush, *(Artemisia californica),* buckwheat *(Eriogonum fasciculatum),* sage species *(Salvia* spp.*),* and chamise *(Adenostoma fasciculatum)*, is an important part of the sensitive habitats on Point Loma and presents a fuel management challenge. Within appropriate fuel management zones around structures, these species would be shortened to four - six inches in height. All other vegetation within fuel management zones would be pruned to a height of not greater than 24 inches. If vegetation is very dense, it may be thinned so that the spacing between shrubs is 2.5 times their height. All invasive shrubs or trees, such as acacia, eucalyptus and myoporum, are to be removed during fuel reduction/treatment, and weed control would be performed annually to prevent the accumulation of thatch from invasive weeds.

The determination of actual fuel management distances will be made following a building-by-building assessment from the building assessment team and would require the written approval of the landowner. The team will consist of botanist or plant ecologist, structural engineer, and fire behavior specialist. This will allow site-specific avoidance and minimization measures to be taken based on:

1. Sensitive habitat for endangered or threatened species, or any species that is a candidate for listing as an endangered or threatened species by the state or federal government.
2. The conservation or scenic value of the adjacent vegetation.
3. Whether the structure is occupied by people, or is a contributing feature to, or listed on the National Register of Historic Places.
4. Whether the structure is constructed of fire resistant materials.
5. The value of the building and its contents.
6. The structure’s location with respect to burnable vegetation and the fire threat.

Other recommended minimization or monitoring measures included in the JWFMP are:

- Planting managed areas, where appropriate, to low-growing, native, fire resistant plants to reduce the need for annual maintenance and the risk of spreading invasive weeds. To avoid potential weed invasion as a result of survivable space fuel treatments, the status of weeds will be monitored, and an annual weed abatement plan is prepared. Monitor all fuel modification zones for the presence of serious invasive plants, and eradicate those that appear.
- For CNRSW and NPS to minimize and avoid unnecessary fuel treatment, jointly develop a format for critiques of mechanical treatment projects, including a consistent means of cost accounting for the treatments.
- Consult with the appropriate Navy or NPS cultural resources staff prior to any vegetation modification.
- For the Navy and NPS to cooperate with the City of San Diego to improve outreach methods to inform residents about appropriate fuel modification techniques; the importance of improving native species; the importance of limiting non-natives that increase fuel load; the importance of preserving slope vegetation; and appropriate structure siting to limit the size of the required fuel modification zone.

The effect on other land uses on the peninsula would be beneficial and long-term due to increased safety and protection of infrastructure values.

The chances of achieving fire suppression quickly are increased with a fuel modification zone along public paved roads, since flame lengths will be shorter there. Also, a palette of low-stature, fire-resistant native plants would be managed for along road margins, so that the roads function better as firebreaks. The JWFMP adopts a strategy of using existing roads and trails for fire lines and managing fire ignitions rather than introducing new ones.

Each public paved road should be evaluated on a case-by-case basis for fuel management distances, conservation concerns, the risk of ignitions in that location, hazardous fuel condition, nearby structures, and the effectiveness of the road would serve in stopping a fire. New and existing roadways would have a 10-foot buffer where vegetation will be thinned and managed for shorter-stature, less flammable plants. Exceptions are upon approval by the Fire Authority Having Jurisdiction for Navy land and the superintendent, Cabrillo NM for NPS land.

The effects on land use in the PLECA would be similar to that for survivable space fuels management. The Roadway Fuel Modification Zones may be reduced based on criteria similar to that for survivable space, provided it does not impair access for firefighting vehicles. To reduce the need for annual maintenance and the risk of spreading invasive weeds, roadsides should be planted to low-growing, native, fire resistant plants that are part of that habitat type from seed gathered from Point Loma. Since example plantings of such native, fire-resistant plantings in natural environments are lacking, and there is concern about fostering the spread of invasive species and the cost of annual weed abatement, we recommend a demonstration project be implemented on both Navy and NPS lands before undertaking a new maintenance program for all roads.

The 0.89 acres (0.36 hectares) to be burned within the PLECA would result in a long-term, beneficial effect to natural resources and land use, by helping develop a fire regime that controls catastrophic losses and fosters natural biodiversity and protection of sensitive resources.

**Alternative 1, Same as Proposed Action but with 100-foot Fuels Management:** This Alternative would have a greater negative effect on land use designations than the Proposed Action due to the increased acreage of conservation lands affected in the PLECA and in other areas supporting native habitats in their natural condition.

**Alternative 2, Same as Proposed Action but without Prescribed Fire for Ecological Benefit:** The effects on land use for Alternative 2 are the same as that for the Proposed Action, except that experimental burns would not occur, so this long-term benefit to natural resources in the PLECA would not be implemented.

**Alternative 3, No Action:** No Effect. Under this alternative, no fuels management would be conducted within the PLECA, so there would be no buffer zones within which vegetation is managed to reduce fuel load.

## 4.3 Utilities and Infrastructure

**Proposed Action:** The Proposed Action reduces the potential for loss of human life and infrastructure values through enhanced suppression guidance and fuels management. It would permit firefighters to concentrate on suppressing a wildland fire and will lessen their need to focus on structure protection and evacuating people during a fire.

**Alternative 1, Same as Proposed Action but with 100-foot Fuels Management:** The beneficial effects of fuels management would be the same under this alternative as the Proposed Action.

**Alternative 2, Same as Proposed Action but without Prescribed Fire for Ecological Benefit:** The beneficial effects of fuels management would be the same under this alternative as the Proposed Action.

**Alternative 3, No Action:** There is no current management of fuels near above-ground utilities and infrastructure except as routine maintenance requirements affect ground fuels, and fire-safe requirements associated with other Navy policies related to safety and security which require management of wildland vegetation. Security requirements for a clear zone along the perimeter fence lines are designed to provide visibility to detect intruders (OPNAVINST 5530.14C (Navy Physical Security, 1 May 2001), and OPNAVINST 5530.13B (Physical Security Instruction for Conventional Arms, Ammunition, and Explosives, 5 July 1994 incl. CH-1 of 2 June 1999)). In addition to the above security needs, vegetation clear zones are also required for safety reasons in areas with magazines for storing ordnance. These requirements for managing vegetative fuels are in Naval Sea Systems Command Ordnance Pamphlet 5, Volume 1 “Ammunition and Explosives Safety Ashore Regulations for Handling, Storing, Production, Renovation and Shipping.” Vegetation may be no higher than 18 inches atop of and within 50 feet of the toe of ordnance storage magazines. Finally, and also to reduce the risk of fire, fuel storage tank areas at the Fleet Industrial Supply Center (FISC) Fuel Depot are maintained with mandatory clear zones as dictated in DOD 4140.25-M (DOD Management of Bulk Petroleum Products, Natural Gas, and Coal).

While the above provides fire-safe zones around the most hazardous infrastructure, this leaves other assets more vulnerable to effects of wildfire than the other alternatives. Their protection while suppressing a wildfire would be a lower priority than human safety in this densely populated area.

## 4.4 Socioeconomics

NEPA considers “impacts to the human environment” to include any effects of federal actions on the social and economic well-being of communities and individuals. The management actions proposed within the JWFMP would not generate new jobs and income within the local community; however, some fire personnel may come from outside the area on a temporary basis to assist NPS or Federal Fire staff with a fire or fuels management. This impact would be negligible to communities surrounding the federal properties; therefore, it is eliminated from further analysis.

## 4.5 Recreation and Scenic Values

Except for specific instances where the public is invited or land is leased, NBPL is not open to the public. The Proposed Action would cause temporary minor (slightly perceptible and localized) impacts to recreational opportunities on CNM. All the alternatives have the potential to cause short-term localized negative impacts to recreational use, but these impacts would be transient. Alternatives that restore and maintain more of the natural ecosystem to a naturally functioning state will provide the best quality environment for visitors, as well as optimize opportunities for educational and scientific pursuits.

**Proposed Action:** Recreation and scenic values would be affected the same as stated above, under “common to all,” except that select small areas of CNM would experience experimental fire and vegetation would be affected by fuels management along roads and around structures, which would have a minor, long-term affect on recreation and scenic values.

Fuels management will result in less dense and lower-stature vegetation next to public roads and around structures. These zones will no longer be examples of mature native habitats and the on-going maintenance of these zones will reduce their visual value. A higher likelihood of smaller rather than larger fires with proactive fuels management would result, and may provide positive visitor experiences, facilitating seed germination of fire-dependent species and stimulating wildflower displays, without converting all vegetation to a young age class at once. Avoiding the introduction of new fire lines that could cause an excessive proliferation of trails prevents additional impact to recreation.

Potential impact to scenic resources is minimized by avoiding burns during high use periods at CNM, such as holiday weekends. Management activities will meet or exceed adopted visual quality objectives of

NPS. No distinct edge between treated and untreated areas will be evident. Impacts of experimental burns on recreational and scenic values would be transient, taking the form of a road closure to implement fire operations, and minimized by avoiding weekends. The experimental fires would in the longer term create unique and enhanced opportunities for visitor experiences, and educational or scientific opportunities. Enhanced diversity expressed in the plant community would increase scenic values. The adverse perception of fire as "damaging" is minimized by an emphasis on environmental interpretation of fire ecology, including at prescribed ecological fire sites to show beneficial uses of fire.

This alternative would have fewer negative impacts on recreational use than Alternative 3 due to more rigid control over timing and placement of ignitions. Over the long term, random and aggressive suppression actions would be reduced as more federal lands are managed in strategic locations for fuel loads. This would reduce the possible duration and number of closures and larger smoke events.

**Alternative 1, Same as Proposed Action but with 100-foot Fuels Management**: Recreation and scenic values would be diminished more under this than other alternatives including the Proposed Action due to the increased area treated around structures and along roads. These will no longer be examples of native habitats in their natural condition.

**Alternative 2, Same as Proposed Action but without Prescribed Fire for Ecological Benefit:** The effect on recreational and scenic values would be the same under this alternative as under the Proposed Action, except that there would be no enhanced recreational, interpretive, or scientific activities resulting from experimental burns.

**Alternative 3, No Action:** Fires are expected to be larger under this alternative, and there is a higher risk of a fire that burns the entire Point Loma peninsula. This could be detrimental in the short term because of road and visitation closure after a large fire, but the lack of proactive fuels management could result in longer-term closures after a wildfire than other alternatives where the random nature of ignitions and fire size is managed.

## 4.6 Education and Outreach

**Proposed Action:** Education would benefit under the Proposed Action by preserving the native vegetation of NBPL and CNM where it could be used to teach about fire ecology and demonstrate to visitors and staff appropriate fire safe landscape techniques. The fuel modification techniques proposed preserve native species; avoid non-native plants that increase fuel load; use appropriate natives in landscaping; minimize use of irrigation; preserve slopes; and foster appropriate structure siting to limit the size of the fuel modification zone. The education or community outreach measures that effectively reduce fire ignitions will provide a significant benefit by reducing fire frequency.

**Alternative 1, Same as Proposed Action but with 100-foot Fuels Management:** There is no difference between Alternative 1 and the Proposed Action with regard to education and outreach.

**Alternative 2, Same as Proposed Action but without Prescribed Fire for Ecological Benefit:** Education and outreach would benefit similarly under this alternative compared to the Proposed Alternative, except that there would not be an opportunity to provide insight into fire as a natural ecosystem process to staff and the public.

**Alternative 3, No Action:** The expected impacts of this alternative are the same as impacts as Alternative 2.

## 4.7 Public Health and Safety

The health and safety of the public and fire personnel would be affected in varying degrees under all alternatives. There are two major concerns related to health and safety. One is the actual danger of fire caused injuries or fatalities – firefighters, visitors, or residents becoming trapped and burned by fire, or injuries that are indirectly caused by the fire, such as injury or death from falling rocks and trees, or losing balance and falling. The other is smoke inhalation, either by firefighters on the fireline or by the public in areas away from the fire. Due to the presence of a flammable landscape, natural and human ignition sources, and hot, dry summers, no alternative eliminates the health risk of smoke for firefighters, visitors, personnel, or communities. Unwanted wildland fires will occur and produce smoke under all alternatives. Alternatives that allow more control over the timing, placement, and conditions under which fires burn will be more successful at minimizing smoke impacts over the long term.

**Proposed Action:** While there is no history of death or injury to visitors or personnel directly caused by wildland fire on Point Loma, the potential for injuries or fatalities exists. Potential impacts to health and safety of firefighters and others are prevented by improved wildfire suppression, policies that keep firefighter safety as a first priority during incidents, providing adequate survivable space as a highest priority for community safety, developing and communicating evacuation plans, improving coordinated education and notification procedures. The strategy of the JWFMP is to contain wildland fires within easily defended borders, and separate urban interface areas from natural fuel complexes, both to protect the urban interface areas from wildland fires and to protect wildlands from fire starts in the urban interface. This alternative increases the survivability of human life and protects human health in the event of a wildfire, reduces the risk of a large fire, and allows more control over the timing, placement, and conditions under which fires burn.

The experimental burn projects will be managed under conditions and constraints consistent with the Air Pollution Control District's regionally permissive burn days that allow for good convection and upper-level air transport, which will maintain smoke emissions below the legal thresholds as defined by the State of California and the Environmental Protection Agency. To accomplish this, smoke impacts will be managed and minimized according to requirements contained in the Smoke Management Plan appended to the JWFMP. The minimum 48-hour notice provision to residents and compliance with burn days would avoid any problems. The planned plot burns would not produce enough smoke to impact airport operations at Lindbergh Field or Naval Air Station North Island. Smoke sensitive areas are also identified in advance, and burn plans will be developed to carry smoke away from smoke sensitive areas. Smoke-sensitive areas include Point Loma Nazarene College, Fort Rosecrans National Cemetery, and Point Loma residential areas.

The JWFMP program works to reduce long-term threats to public safety by reducing hazardous fuels with the use of mechanical fuel reduction around developments and along public paved roadways where people could become trapped by fire.

**Alternative 1, Same as Proposed Action but with 100-foot Fuels Management:** There is no difference between this and the Proposed action for protecting public health and safety, based on fuel models described in the JWFMP.

**Alternative 2, Same as Proposed Action but without Prescribed Fire for Ecological Benefit:** Similar to the Proposed Action, this alternative increases the survivability of human life and protects human health in the event of a wildfire, reduces the risk of a large fire, and allows more control over the timing, placement, and conditions under which fires burn.

**Alternative 3, No Action:** The No-Action alternative is expected to result in potentially larger and more damaging wildfires than Alternatives 1 and 2. This alternative does not provide as effective control of wildfire spread, so homes, facilities, and human life and health are at greater risk. Since wildland fires on

Point Loma are expected to take place when firefighting resources are scarce, the City of San Diego helicopter may not be available, and the entire peninsula could burn within one hour under extreme fire danger conditions. The current staffing at the Federal Fire Department does not meet standards of the National Wildfire Coordinating Group for compliance with Federal Fire Policy. Also, this alternative is not compliant with Federal Fire Policy because there is no wildland fire management plan.

Under the conditions of a major wildfire on Point Loma, structures that lack survivable space or resistance to fire cannot be safely protected. Wildfire property losses cannot be reduced by increasing the size of the mobilization efforts, changing the initial speed of the fire or by changing the climatic conditions or the local geography of existing structures. The only realistic protection for existing structures is to assure there is an adequate defensible space and structural integrity. It is equally important to locate new structures away from geographically indefensible locations.

## 4.8 Cultural Resources

The National Historic Preservation Act, as amended in 1992 (16 USC 470 et seq.); the National Environmental Policy Act; the Navy's San Diego Metro Programmatic Agreement, and the NPS Cultural Resource Management Guideline (1994), and Management Policies (2001) required the consideration of impacts on cultural resources listed on or eligible for listing on the National Register of Historic Places. The undertakings described in the JWFMP are also subject to section 106 of the National Historic Preservation Act, under the terms of the 1995 Programmatic Agreement among the NPS, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers.

**Proposed Action:** Known cultural sites will receive enhanced protection through various measures identified in the JWFMP. Under the JWFMP, cultural resource protection is integrated into the strategic planning of all fire suppression operations and pre-fire activities such as fuels management, flammable tree removal, and experimental burns. Since the use of bulldozers to create fire lines during suppression is not anticipated, impacts to cultural resources may be due only to fuels management, water drops, or to the fire itself.

- Cultural resources will be identified on a regularly updated map available to Federal Fire Department. This map will also help facilitate the exchange of information between the natural and cultural resource programs of the Navy, CNM, and FFD. Through the use of the Incident Command System and at the annual preparedness meeting (see JWFMP Section 3.4.6), the cultural resources map will be reviewed by both NPS and CNRSW staff. Fire personnel will receive a cultural resource protection briefing from the cultural staff of each landowner.

- Due to the nature of fire suppression and the need to protect life and property, it may not always be possible to avoid sensitive cultural resources. An affected area will be examined by a qualified archaeologist as soon as possible to determine if any cultural resources were impacted. Any post-fire rehabilitation activity that occurs in areas mapped with cultural resources will also be cleared by the appropriate landowner's cultural resource staff.

- Fuel modification to create survivable space is called for in some areas on Naval Base Point Loma mapped as archaeological sites. A review of these sites by CNRSW and funded for 2004 may result in boundary adjustments or even removal of some sites from protected status. Regardless, all planned fuel modification projects on U.S. Navy lands that fall within areas currently defined as an archaeological site must first undergo review by the CNRSW Archaeologist.

- A NPS cultural resource specialist should approve the location and practices associated with experimental burn plots in advance of the burns.

- In the preservation of historic structures and museum and library collections, every attempt will be made to comply with national building and fire codes. When these cannot be met without significantly impairing a structure's integrity and character, the management and use of the structure will be modified to minimize potential hazards, rather than modify the structure itself.
- When warranted by the significance of a historic structure or a museum or a collection, adequate fire detection, warning, and suppression systems will be installed. 'Pre-fire plans' will be developed for historic structures and buildings housing museum or library collections designed to identify the floor plan, utilities, hazards, and areas and objects requiring special protection. This information will be kept current and made available to FFD personnel.

**Alternative 1, Same as Proposed Action but with 100-foot Fuels Management:** This Alternative would result in an increased chance of damaging cultural resources due to the increased acreage treated.

**Alternative 2, Same as Proposed Action but without Prescribed Fire for Ecological Benefit:** The effect of this alternative on cultural resources would be the same as the Proposed Action, except that no experimental burns would need to be approved by cultural resources staff.

**Alternative 3, No Action:** This alternative provides no opportunity for fire-related cultural resource protection, except where there is overlap between the resource and fire suppression priorities, such as when historic structures are occupied by people. There are also no guidelines provided to FFD for protecting archeological resources in wildland areas during suppression or when pre-fire management activities are implemented.

## 4.9 Topography and Soils

Soils are affected directly by the burning of organic material in the top layers of the soil horizon; and indirectly by removing vegetation that stabilizes soils on slopes. Both Navy (as stated in the INRMP for NBPL) and NPS policies (Special Directive 91-6) require the consideration of impacts on topography and soils. Soil types within Point Loma are highly erosive and subject to post-fire flash flooding, therefore, this is considered a relevant impact topic.

**Proposed Action:** The proposed action could result in both beneficial and adverse effects on soils. JWFMP implementation is expected to result in smaller fires, and so reduce the potential for large soil erosion events due to fire. Potential impacts are avoided by improving wildfire suppression; by reducing hazard zones modification requirements through a building-by-building assessment; by recommending improved siting of structures away from habitat edges; by avoiding fire line construction during suppression; by the small size of ecological prescribed fires; and by using existing roads and trails for fuelbreaks. The Fire Plan objective for soil erosion due to fire is that erosion will not exceed the rate of soil formation, about one ton per acre per year, and sedimentation due to fire will not affect water quality of surrounding ocean and bay waters. If any of these occurs, then action will be taken to prevent further damage. Soil erosion monitoring is conducted associated with fuels modification and the experimental prescribed burns.

The fuels management activities could result in short-term ground exposure and therefore increase erosion potential. However, the fuels management protocols call for thinning and very little clearing. Low-growing, fire-resistant, native ground covers are preferred.

Possible impacts to soils and topography from fire suppression are reduced by the use of Minimum Impact Suppression Tactics, and would be followed up with appropriate burned area rehabilitation of any effects of the suppression action.

**Alternative 1, Same as Proposed Action but with 100-foot Fuels Management:** This alternative would result in slightly more short-term ground exposure and therefore increased erosion potential than the

Proposed Action due to the increased acreage treated.

**Alternative 2, Same as Proposed Action but without Prescribed Fire for Ecological Benefit:** The effect of this alternative on soils and topography would be the same as the Proposed Action, except that no experimental burns would occur.

**Alternative 3, No Action:** Minor and/or short-term increases in soil erosion or mudslides could result from the natural effects of a large fire on Point Loma. In addition, fire suppression without MIST or rehabilitation guidelines could result in localized losses.

## 4.10 Water Resources

Navy and NPS policies require protection of water resources consistent with the Clean Water Act. Increased erosion following a fire, planned or unplanned, may affect water quality within and outside of the federal properties of Point Loma; therefore, it is considered a relevant impact topic. Extreme fire conditions and resulting high-intensity fire can adversely impact water quality through the creation of hydrophobic soils, massive sheet erosion, sediment flows into ponds and drainages, or sediment plumes into sensitive marine habitats. Alternatives that promote revegetation and soil stabilization will decrease unnatural runoff, non-point source pollution, and flooding that can impact both freshwater bodies and the ocean.

**Proposed Action:** The potable water supply of these properties is provided by the City of San Diego and no alternative will affect this source of water. No activities were determined to increase pollution of natural water resources, including the effects of fire management on Point Loma's jurisdictional wetlands and surrounding ocean and bay waters. Similar to measures described above for protecting soils, the proposed action is expected to result in smaller fires, and so reduce the potential for large sedimentation of water resources due to fire. Potential impacts are avoided by improved wildfire suppression; the expected smaller fire sizes; by the small size of ecological prescribed fires; and the use of existing roads and trails for fuelbreaks. The Fire Plan objective for water quality is that sedimentation due to fire will not affect water quality of surrounding ocean and bay waters.

The fuels management activities could result in short-term ground exposure and therefore increase sedimentation potential. However, the fuels management protocols call for thinning and very little clearing. Low-growing, fire-resistant, native ground covers are preferred.

Possible impacts to water resources from fire suppression are avoided by the use of Minimum Impact Suppression Tactics, and would be followed up with appropriate burned area rehabilitation of any effects of the suppression action.

**Alternative 1, Same as Proposed Action but with 100-foot Fuels Management.** This alternative would result in slightly more short-term ground exposure and therefore increased sedimentation potential than the Proposed Action due to the increased acreage treated.

**Alternative 2, Same as Proposed Action but without Prescribed Fire for Ecological Benefit:** The effect of this alternative on water resources would be the same as the Proposed Action, except that no experimental burns would occur.

**Alternative 3, No Action:** This alternative would maintain the current program of wet and dry season monitoring and GIS record keeping under the Navy's current National Pollutant Discharge Elimination System permit, and other laws and regulations to protect water resources with which the Navy and NPS currently complies. The potential for larger fires under the current program results in a potentially adverse but minor effect on natural water resources.

## 4.11 Plant Communities

Several plant communities on Point Loma are rare or restricted in distribution outside the peninsula: Southern Coastal Bluff Scrub; Maritime Succulent Scrub; Diegan coastal sage scrub; Southern Maritime Chaparral; and Southern Foredunes. In addition, much of the vegetation is distinctive in that it contains a large succulent component (cacti and other plants with succulent stems).

Impacts on plant communities are evaluated by analyzing changes in the structure and composition of the vegetation in the dominant plant community types. The thresholds of significance for impact intensity are as follows:

| | |
|---|---|
| *Negligible:* | Imperceptible or undetectable effects upon vegetation. |
| *Minor:* | Slightly perceptible and localized effects. |
| *Moderate:* | Measurable change in plant community structure and composition; changes in ecosystem processes (e.g. fire, nutrient cycling, hydrology) on a localized level. |
| *Major:* | Substantial change in plant community structure and composition; changes in ecosystem processes (e.g. fire regime, nutrient cycling, hydrology) on a landscape scale. |

**Proposed Action:** The Proposed Action results in some benefits to plant community structure and diversity due to better fire management, limiting the amount of vegetation potentially burned at one time, and some adverse but minimized effects of fuels management. The latter could affect up to 20 acres (not including roadside fuels reduction), of approximately 890 total acres of natural terrestrial habitat. The acreage affected by roadside fuel management of up to 10 feet along public, paved roads is not included because it is very localized and impossible to quantify before a site-specific inventory. About 45 acres would need to be surveyed for potential need.

The effect on the plant communities due to fuels management would be adverse, long-term, and minor. The adverse effect would be a type conversion of dense to thinned, shorter-stature vegetation. These effects would be avoided or minimized once the criteria established in the JWFMP are applied. The result would be cut vegetation clipped into four-inch lengths and left on the site as mulch, not to exceed four inches in depth, at the discretion of the CNRSW Botanist for Navy land, and the Chief, Natural Resource Science for CNM. Some cut material may introduce invasive weeds, so may not be approved to be left on site. A combination of 30 feet of irrigated green space in developed areas or thinning (still allowing for lawn, groundcovers, bedding plants, low perennial shrubs, bulbs, and perennial grasses), pruning of the most flammable species of native vegetation to a height of four to six inches, and thinning for a distance of 50 feet from the edge of all structures would adequately provide for the survivability of the structures from radiant heat. The spacing between shrubs left behind should be about 2-1/2 times their height. Trees would be left if they are limbed up and the vertical distance between the nearest shrub and the lowest fuel layer of tree branches is 10 feet. Separation of tree canopies would be 10-30 feet depending on slope. Certain species would be shortened to four to six inches in height in the fuel management zone because of their flammability. These are: California sagebrush *(Artemisia californica)*, buckwheat *(Eriogonum fasciculatum),* sage species *(Salvia* spp.*)* and chamise *(Adenostoma fasciculatum).* All invasive shrubs or trees would also be removed during fuel treatment regardless of their flammability. The determination of actual fuel management distances would be made based on a building-by-building assessment.

Flammable tree removal when landscape trees are too close to burnable structures is not conducted without replacement planting. Since some trees near historic structures may be considered part of the historic landscape, consultation under NHPA Section 106 consultation, or compliance with the Navy’s San Diego Metro Programmatic Agreement on cultural resources would ensue. This consultation cannot take place at present because the significance of the trees in the cultural landscape has not been concluded, and the details of tree removal, spacing, and replacement trees have not been worked out sufficiently to analyze the action. The migratory bird breeding season would be avoided if this action were to take place.

By conducting experimental burns, the Proposed Action reduces risk to ecological values by providing critical information required for long-term planning and management of sensitive natural resources, by diversifying the fire regime under controlled conditions, managing for canopy gaps and some younger age classes of vegetation that will benefit certain species, allowing for scientific study of unknown fire dependencies on the peninsula, and increasing the probability that all classes of natural resources are protected, consistent with the mission of both NBPL and CNM. Without the addition of knowledge from these experimental burns, Alternative 2 and the No Action Alternative would result in a uniform fire regime (fire exclusion) that depends upon some future random, unplanned ignition to regenerate fire-dependent species, and could risk the extirpation of some species from the Point Loma peninsula.

Both the Proposed Action and Alternatives 1 and 2 would reduce the potential for the loss of human life and valuable infrastructure by seeking more assured access to the City of San Diego's helicopter or other helicopter asset, and implementing the mechanical reduction of hazardous fuels for survivable space near buildings, and within up to 10 feet of roads. The minor loss of vegetation that would result from the creation of survivable space would be far outweighed by the enhanced protection against the loss of human life and infrastructure that it provides.

**Alternative 1, Same as Proposed Action but with 100-foot Fuels Management:** Both the Proposed Action and Alternatives 1 and 2 would reduce the potential for the loss of human life and valuable infrastructure by implementing the mechanical reduction of hazardous fuels for survivable space near buildings, and within up to 10 feet of roads. However, the additional acreage of vegetation affected by the 100-foot survivable space around buildings is about 40 more acres, totaling albout 68 acres in all. This is about 9% of the natural vegetation of the JWFMP area, or 5.5% of PLECA lands. Based on fire behavior models, this additional loss of vegetation is unnecessary and would not significantly contribute to fire protection of structures or human life. The minor loss of vegetation that would result from the creation of survivable space would be far outweighed by the enhanced protection against the loss of human life and infrastructure that it provides.

**Alternative 2, Same as Proposed Action but without Prescribed Fire for Ecological Benefit:** This alternative has similar effects on plant communities as the Proposed Action, except that no experimental burns will be conducted. It does not provide the critical information necessary for long-term resource management planning that would be gained from experimental burns in the Proposed Action. The creation of survivable space only, without the benefits derived from the experimental burns, could result in the significant long-term losses of ecological values. Over time, there is the potential to lose components of the plant community through death of the vegetation and seed bank (due to age, herbivory, disease, or other factor), and through competition that leads to taller, canopy-dominant species. There may be unknown dependencies of wildlife and other organisms on younger or more open stages of the plant community that are also at risk.

**Alternative 3, No Action:** Fire's role as a natural disturbance agent would continue to be limited by the suppression of all wildfires. Diversity of plants and habitats would very slowly diminish. The peninsula would be more vulnerable to loss of all vegetation in one fire event under the No Action alternative. Similar to Alternative 2, the current program does not provide the positive benefits and critical information needed for long-term resource management planning that would be derived from experimental prescribed burns. However, this alternative is less damaging to sensitive communities, in the shorter term, since no fuel modification around structures would be conducted. There would potentially be a much greater potential risk to public safety and valuable infrastructure because of lack of survivable space.

## 4.12 Wildlife Populations

**Proposed Action:** The Proposed Action would result in habitat modification in fuel management buffer zones, and a more controlled and scientifically-informed fire regime. The result would be a net benefit to wildlife. The effect of habitat modification for fuels management could be considered long-term, adverse, and minor on wildlife habitat and populations that depend on dense shrubs or trees on habitat edges, or that may use the flammable native California sagebrush, California buckwheat, sage species, and chamise on these edges. Other species that require a younger or more diverse age structure of vegetation, such as a more open canopy, may benefit. Overall, adverse effects of fuels management can be minimized, and may affect the 20 acres around buildings out of the 890 total acres of natural terrestrial habitat. (The acreage affected by roadside fuel management along public, paved roads for up to 10 feet is not included because it is localized and impossible to quantify before a site-specific inventory. About 45 acres would need to be surveyed for potential need.) The affected acres tend to be lesser quality, since they are already adjacent to human activity. About 17% of these acres are mapped as disturbed or as native communities with a significant disturbance element (refer to Table 2-1). Disturbance of intact, large habitat parcels would be avoided by not building new fire lines that would result in fragmentation, and by modifying fuels only on existing edges.

The Proposed Action also results in better fire management that could limit fire sizes. This protects Essential Fish Habitat of bay and ocean waters surrounding Point Loma from sedimentation, which would most likely result from large fires. It also protects wildlife from a catastrophic loss of habitat in a situation where it is difficult for some to emigrate across urban barriers to other locations. Wildlife persistence and recovery could be substantially altered by the combined effects of fragmented habitats and fire due to: 1) the local disappearance (extinction) of some species in burned habitat fragments; 2) the inability of some species to respond to and recover from fire because escape routes are blocked and there is reduced chance of recolonization; and 3) frequent fire in fragmented areas may facilitate the movement of invasive species into natural systems, impacting native biota. Each of these effects is exacerbated by large, intense fires and by increased fire frequency. Although there is virtually no quantitative data on the interactive effects of habitat fragmentation and wildfire on wildlife populations, wildfire suppression is interpreted as generally beneficial to the degree that it limits the amount of area burned at short intervals, which would have the greatest potential to make habitat unsuitable for wildlife.

Flammable trees that are too close to burnable buildings will be removed and not replaced. Since some trees near historic structures may be considered part of the historic landscape, consultation under NHPA Section 106 consultation, or compliance with the Navy's San Diego Metro Programmatic Agreement on cultural resources would ensue. The migratory bird breeding season would be avoided for this action to take place.

Results of the experimental burns would help manage for gap-dependent wildlife and those that depend on a younger or more open canopy condition. Impacts to wildlife from experimental burns would be adverse, short-term, and minor due to mortality in a small number of species and beneficial, moderate, and long-term with regard to habitat.

### Alternative 1, Same as Proposed Action but with 100-foot Fuels Management

This alternative would affect about 68 acres around structures. Of these potentially affected acres, approximately 22 acres are currently mapped as disturbed. An additional 9 acres are mapped as various types of native vegetation but containing a significant element of disturbance. Approximately 34.5 acres of the area affected by this alternative are within the PLECA, including 3.8 acres mapped as having some level of existing disturbance.

**Alternative 2, Same as Proposed Action but without Prescribed Fire for Ecological Benefit:** This alternative has similar effects on wildlife as the Proposed Action, except that no experimental burns would be conducted. It does not provide the critical information necessary for long-term resource management planning that would be gained from the experimental burns in the Proposed Action. The creation of survivable space only, without the benefits derived from the experimental burns, could result in the significant, long-term loss of wildlife. Over time, there is the potential to extirpate wildlife species for which the abundance and distribution of gaps within the shrub canopy is important.

**Alternative 3, No Action:** The current program may be resulting in slowly diminishing habitat quality for some wildlife. For organisms with extremely sedentary demographics, long fire-free intervals combined with habitat loss and droughts have been catastrophic in other locations. While the effects of fire exclusion on all wildlife are not well known, the current vegetation's age, canopy closure, increased dominance by taller species, and portions of the flora residing only in the soil seed bank due to their need for fire stimulation or open canopy conditions, may be affecting certain species to the detriment of those that depend on other conditions.

Under the No Action alternative, the peninsula is also more vulnerable to loss of all vegetation in one fire event, with impacts similar to those described under Alternative 2.

## 4.13 Sensitive Plants

**Proposed Action:** The effect on sensitive plants under the JWFMP is a net benefit that is moderate and long-term. In the fuel management zones, effects on vulnerable plants are avoided by avoiding those locations. This includes avoiding the locations of the only plant within the Point Loma Ecological Reserve that is protected under the Endangered Species Act: Orcutt's spineflower *(Chorizanthe orcuttiana*).

The experimental burns are intended to lead to an appropriate fire management program to support the full range of sensitive plants and biodiversity of Point Loma. There are 25 plant species identified as sensitive on Point Loma. The JWFMP contains five objectives specifically designed to provide for the future of these plants:

- Seek persistence of native plant community structure such that the full range of species composition and structural diversity that was present before Europeans arrived is present or potentially present in the seed bank, while controlling the introduction and spread of invasive weeds.
- Over the long term, restore the above- and below-ground plant and animal communities to a condition such that the species diversity and density of a reference condition (as this can be surmised based on long-term monitoring plots and historic data) are self-sustaining.
- Ensure that disturbance processes (fire, drought-El Niño cycles, animal burrowing, invasive species introduction, etc.) function together to achieve the goal of ecological conservation and sustainability.
- Provide sufficiently long inter-fire period, at least 40 years in southern maritime chaparral, for obligate-seeding species to establish sufficient seedbank to replace their populations when a burn occurs.
- Ensure that lichens and other species dependent upon older stands have refugia for recolonization after disturbance such as fire.

Wildfire suppression operational damage that could destroy sensitive species or habitat is avoided or minimized by pre-fire Incident Command consultation and annual updates of sensitive species locations. To the maximum extent feasible, the location of sensitive habitats to be avoided are identified in advance and provided to the FFD and NPS.

Finally, the NPS and Navy are prepared under the JWFMP to monitor any sensitive plant populations that experience wildfire in order to develop basic information on fire effects in these species. Basic information on species response to fire should be collected through literature review and field observation and shared through the PLECA Working Group. Fire response information should be incorporated into the sensitive species database as part of the Navy's and NPS' individual inventory and monitoring programs.

The net result is that the JWFMP increases the probability that the diverse needs of all the sensitive plants and wildlife are provided for.

**Alternative 1, Same as Proposed Action but with 100-foot Fuels Management.** The effect on sensitive plants would be potentially greater because of the increased likelihood of accidentally cutting a sensitive plant due to the increased acreage to be treated to reduce fuels.

**Alternative 2, Same as Proposed Action but without Prescribed Fire for Ecological Benefit:** With no experimental burns planned to increase understanding of how to provide for the future of the full range of sensitive plant requirements, including those more-or-less dependent on fire for their establishment, there is a long-term risk of extirpating these species. With respect to fuels management activities, this alternative carries the same effects as the Proposed Action.

**Alternative 3, No Action:** The current program carries risks to sensitive plants as fire exclusion results in increasing age of the vegetation. There is evidence that the plant communities of Point Loma are changing due to an extended fire-free period, but it is not known if the current fire-free interval is outside the norms of the "natural" fire regime, and if any animal or plant has been permanently lost from the peninsula as a result. Certain species are decreasing in their amount of surface cover, while others are increasing. Lemonadeberry, a species that recruits during fire-free periods, is increasing. Wart-stemmed ceanothus, considered a sensitive species and fire-dependent, is decreasing in abundance, and wedgeleaf ceanothus has apparently disappeared from the peninsula, based on accounts from the 1800s. Catalina cherry is missing (or may be missing since we have no personal knowledge of its continued presence) from the flora, probably for other reasons than the long fire-free interval, such as historic harvesting for fuel needs of local people and industry. California sagebrush may be decreasing in cover. Within any chaparral stand, certain herbaceous natives are present only in the seed bank. While some of these changes are probably induced by human activity, the major changes have occurred naturally as a result of competition for resources and stand age without fire. Shifts in species abundance and cover are expected to continue toward taller canopy dominants and decreases in shorter-lived species of smaller stature. Herbaceous understory species and gap components are also expected to continue. There may be future effects on wildlife or microbiota that cannot be assessed because they are not known at this time.

The wildfire risk to succulent species in the maritime succulent scrub flora are likely outweighed by the risk of closure of the shrub canopy, erosion, or exposure to unplanned wildfires that burn on their own terms rather than within conservation objectives. Within similar plant communities in Baja California, which has a history of more frequent fires than does Point Loma, these same species of succulents remain abundant. They are also more common in inland coastal sage scrub areas where fire frequencies are higher than at Point Loma. Given their location, mostly outside of southern maritime chaparral and in open sage scrub or maritime succulent scrub, they are not exposed to any special risk if fires are not overly hot.

## 4.14 Sensitive Wildlife

The USFWS considers Point Loma to be a major wildlife resource of regional significance due to the quality, abundance, and diversity of habitats and its coastal location. A comprehensive species list is provided in Appendix C of the JWFMP. The number of sensitive species is partly due to the fact that Point Loma not only evolved as an island but also functions to some extent today as an insular setting. It is fairly isolated from other significant stands of natural vegetation by both geography and development, and its maritime climatic influence allows for unique vegetation assemblages.

**Proposed Action:** The JWFMP results in a net benefit to sensitive wildlife that is minor and long-term. In the JWFMP, 62 sensitive species with the potential to occur on Point Loma have been identified. Of these, 22 are birds of the immediate coastline or offshore, five are believed extirpated, six are tied to specialized habitats not affected by this project (salt marsh, riparian, or dunes), and nine are raptors. The remaining 17 include two mammals, three herptiles, and 12 birds that could be affected by this project. Some would benefit from the open condition of the habitat modifications in the survivable space zones. These include raptors, the grasshopper sparrow, and the California horned lark.

Possible damage to wildlife or habitat due to fire suppression operations is minimized by pre-fire Incident Command consultation and annual updates of sensitive species locations. To the maximum extent feasible, the location of sensitive habitats are identified in advance and provided to the FFD and NPS.

Potential wildfire and suppression operations that could exacerbate habitat fragmentation are avoided by the lack of fuels management activity except on habitat boundaries, so contiguous, large blocks of natural habitat remain intact. Fire prevention and suppression techniques are used to reduce the probability of large-scale, catastrophic wildfires in natural areas. The lack of data available to evaluate impacts due to the interaction between fire regime and habitat fragmentation is ameliorated by the recommendation for experimental burns and supporting research projects. Research is recommended on the role and significance of the current long fire-free intervals as a potential extinction mechanism in fragmented habitats.

As part of the building-by-building assessment, individual sites would be assessed for the presence of habitat for special status species. Site specific recommendations for protecting sensitive resources would be incorporated into planning and implementation, and the project would proceed if there were a determination of no adverse affect of special status species.

To improve health and safety and reduce impacts to native habitats, appropriate zoning is recommended that limits the construction of new facilities in areas that lack safe ingress and egress due to mid-slope road location, length of access, or heavy fuel load.

The only federally listed animal species that may be affected by fuels management is the coastal California gnatcatcher *(Polioptila californica californica).*There could be a negative effect on key habitat elements of the coastal sage scrub and maritime succulent scrub that support the dispersing California gnatcatcher juveniles due to the thinning and cutting back of California sagebrush and California buckwheat from the survivable space and roadside buffer zones. The affected area would be about 30 acres (15 in the PLECA), if the fuel management recommendations are fully implemented. This constitutes 5 percent of the total area of these plant communities.

Nesting coastal California gnatcatchers have not been reported from Point Loma since 1915. However, there are sightings of individuals, presumably dispersing young, on a fairly regular basis. Coastal sage scrub is very fragmented, but animals are likely co-use maritime succulent scrub. The specific habitat patch where gnatcatchers are recorded would be avoided with respect to fuels management. The impact of fuels management around structures and along roads will result in a lesser chance of the catastrophic loss of the entire habitat in a single fire. The loss of these habitat elements for use by the dispersing juvenile gnatcatchers is outweighed by the increased protection of public health and safety, and by the increased probability that the diverse needs of all the sensitive wildlife are provided for through implementing the JWFMP.

The NPS and Navy are prepared under the JWFMP to monitor any sensitive wildlife populations that experience wildfire in order to develop basic information on fire effects for these species.

**Alternative 1, Same as Proposed Action but with 100-foot Fuels Management.** The affected area would be about 68 acres (34 in the PLECA), if the fuel management recommendations are fully implemented. This constitutes 9 percent of the total area of these plant communities.

**Alternative 2, Same as Proposed Action but without Prescribed Fire for Ecological Benefit:** This alternative has similar effects on wildlife as the Proposed Action, except that no experimental burns would be conducted. Survivable space fuels reduction without a plan to provide for sensitive wildlife species and their habitat requirements could result in significant long-term losses. This alternative does not provide the positive benefits and critical information needed for long-term resource management planning that would be gained from experimental burns compared to the Proposed Action. Over time, there is the potential to extirpate wildlife species for which the abundance and distribution of gaps within the shrub canopy is important.

**Alternative 3, No Action:** The current program contains no program to protect sensitive wildlife from the possible impact of catastrophic fire. While the effects of fire exclusion on all sensitive wildlife are not well known, the current vegetation's increasing age, amount of closure of the canopy, increased dominance by taller species, and portions of the flora residing only in the soil seed bank due to their need for fire stimulation or open canopy conditions, it may be affecting certain species to the detriment of those that depend on other conditions.

## 4.15 Invasive Species

**Proposed Action:** The Proposed Action results in some benefits to plant community structure and diversity due to better fire management and limiting the amount of vegetation potentially burned at one time. There are also some adverse effects due to increasing the potential for invasive species with fuels management. The effect on invasive species management due to fuels reduction could be adverse, long-term, and minor. The adverse effect would be an increase in the potential for invasive weeds by opening up the plant canopy. The most likely place where this would occur would be along roads, which act as corridors for weeds. It is much less likely to occur in survivable space zones where vegetation is thinned and converted to lower-stature types. These effects would be minimized once the criteria established in the JWFMP are applied, as follows:

- Removing all invasive shrubs and trees regardless of their flammability during fuel treatment.
- Determining the actual fuel management distance through a building-by-building survey.
- Planting managed areas, where appropriate, with low-growing, native fire resistant plants to reduce the need for annual maintenance and the risk of spreading invasive weeds.
- Avoiding potential weed invasion resulting from survivable space fuel treatments, monitoring the status of weeds, and producing an annual weed abatement plan. All fuel modification zones should be monitored for the presence of serious invasive plants, and these plants eradicated as part of a weed management plan. Species known to be aggressive invaders of wildland areas should be recommended for control as part of the mechanical fuel treatment activity.
- Minimizing and avoiding unnecessary fuel treatment. CNRSW and NPS would jointly develop a format for critiques of mechanical treatment projects, including a consistent means of cost accounting for the treatments.
- Adopting a strategy of using existing roads and trails for fire lines and managing fire ignitions rather than introducing new ones, as noted in the JWFMP.
- Reducing unnecessary clearing. Each public road would be evaluated on a case-by-case basis for fuel management distances, conservation concerns, the risk of ignitions in that location,

hazardous fuel condition, nearby structures, and the effectiveness of the road in stopping a fire.

**Alternative 1, Same as Proposed Action but with 100-foot Fuels Management.** The adverse effects on invasive species of this alternative are much greater due to the greater acreage thinned than that for the Proposed Action.

**Alternative 2, Same as Proposed Action but without Prescribed Fire for Ecological Benefit:** This alternative has similar effects on invasive species management as the Proposed Action, except that no experimental burns would be conducted. This alternative does not provide the positive benefits and critical information needed for long-term invasive species planning that experimental burns could provide, compared to the Proposed Action. However, not conducting experimental burns would reduce the potential for invasive weeds to infest burned areas.

**Alternative 3, No Action:** The current program includes invasive species management, but does not provide for fuels management around structures and along roads to protect human life and infrastructure. As a result, the areas along public paved roads and around buildings would not be as susceptible to infestation by invasive weeds as they would after having been subjected to fuel modification.

## 4.16 Air Quality

The smoke and ash created from fires can impact air quality within a region, especially if burning is frequent and intense. The federal 1963 Clean Air Act (42 U.S.C. 7401 et seq. as amended), stipulates that federal land managers have a responsibility to protect air quality values (including visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse air pollution impacts. Air quality would be affected in the short-term during any type of fire; therefore, it is analyzed as a relevant impact topic.

Section 176 of the Clean Air Act requires any action on the part of a federal agency in an area considered nonattainment for air quality standards to conform to the state's efforts to attain and maintain these standards. Point Loma is within the San Diego Air Pollution Control District which is currently in nonattainment for ozone and $PM_{10}$ according to state standards and in nonattainment for ozone by federal standards.

The Environmental Protection Agency's General Conformity Rule (40 CFR Part 93, Subpart B), effective January 31, 1994, implements the statutory provisions of Section 176(1) of the Clean Air Act which prohibits federal agencies from conducting activities that contribute to new or existing violations of National Ambient Air Quality Standards, or delays in timely attainment of these standards. A federal agency's actions may be declared exempt or clearly *de minimis*, and thus the General Conformity Rule is not applicable. Clearly *de minimis* emissions include continuing and recurring activities, routine maintenance and repair, administrative and planning actions, land transfers, and routine movement of mobile assets (such as vehicles). Table 4-3 lists the *de minimis* thresholds for nonattainment pollutants in the SDAPCD. Emergency response actions are exempt from the General Conformity Rule. The Rule only applies to federal actions in designated nonattainment or maintenance areas.

*Table 4-3.* De minimis *thresholds for SDAPCD nonattainment pollutants.*

| Pollutant | Threshold (tons/year) |
|---|---|
| Carbon Monoxide | 100 |
| Volatile Organic Compounds (VOCs) | 50 |
| Nitrogen Oxides (NOX) | 50 |

**Proposed Action:** The JWFMP outlines routine fuels management activities and small projects that would result in minor and insignificant emission increases. Small projects, such as fuels management using hand tools, invasive weed control using "weed-whackers," and planting drought-tolerant plants may require the use of mechanical equipment. Fire-related monitoring projects would require the use of vehicles to transport personnel, and so would routinely add travel-related emissions to the air. The use of diesel or gas equipment for the above-mentioned projects would be short-term and temporary, and are considered routine and thus clearly *de minimis* under the General Conformity Rule. They are consistent with the General Conformity Rule in that emissions from proposed activities are already accounted for in California's emissions budget as described in the State Implementation Plan.

The proposed emissions are clearly less than the *de minimis* levels, and consequently, the Proposed Action is exempt from a conformity determination. There would be no measurable change to health risks for any person from emissions produced by actions in the JWFMP. A Record of Non-Applicability (RONA) is provided in Appendix B.

*Table 4-4. Estimated emissions from activities that could occur beyond clearly de minimis levels of General Conformity Rule for project activity over one year. Values are from the California Environmental Quality Act (CEQA) air quality handbook (SCAQMD 1993). Diesel truck emissions assume a total of 120 miles traveled per year each at 35 mph.*

| Activity | Carbon Monoxide (CO) | Nitrous Oxides ($NO_x$) | Sulfur Oxides ($SO_x$) | Particulate Matter ($PM_{10}$) | Volatile Organic Compounds (VOC) | Reactive organic gases (ROG) |
|---|---|---|---|---|---|---|
| Gas Mower (Wheeled Tractor) 8 hrs/day, 5 days/week, 4 weeks | 0.762 tons | 0.034 tons | 0.001 tons | 0.002 tons | 0.028 tons | |
| Heavy Duty Diesel Truck | 0.0003785 tons | 0.0024925 tons | 2.42295E-05 tons | 4.64187E-05 tons | -- | 8.41658E-05 tons |

For the experimental burns, fires are expected to affect local air quality minimally for a very short period of time on the burn day, with air quality quickly returning to normal afterwards. Tests indicate that, on average, 90 percent of smoke particles from wildland and prescribed fires are PM10, and 70 percent are PM 2.5. With particulate matter being the primary air pollutant, and its effects usually localized in the vicinity of the burn, no significant long term impact to human health is expected. Short term localized effects to residential areas can be serious in terms of particulate matter and visibility; however, these burns are far too small to have this effect.

The National Wildfire Coordinating Group Fire Effects Guide (http://fire.fws.gov/ifcc/monitor/EFGuide/air_quality.htm 31 May 2001) provides a quantified range of particulate matter pollutants per ton of vegetation consumed. Particulate matter is the most important category of pollutants from wildland fire, because it reduces visibility and can absorb and transmit harmful gases. Particles vary in size and chemical composition, depending upon fireline intensity and the character of the fuels. Proportionately larger particles are produced by fires of higher fireline intensity (longer flames) than are found in low intensity and smoldering combustion fires (Ward and Hardy 1986 in USDA Forest Service and Johns Hopkins University 1989). The amount of particulate released when burning sagebrush/grass fuel types averages 45 pounds per ton (22.5 g/kg), mixed chaparral ranges from 24 to 30 pounds per ton (12 to 15 g/kg) (Hardy 1990). Emission factors for particulate matter less than 2.5 microns in diameter (PM2.5) range from 9 to 32 pounds per ton (4.5 to 16 g/kg) for prescribed fires in the Pacific Northwest, averaging about 22 pounds per ton (11 g/kg). The amount of smoke produced depends on the total amount of fuel consumed. For example, even though the emission factor for sagebrush is higher than that for chaparral or pinyon-juniper, total smoke production from burning sagebrush is often lower because the total amount of fuel on a sagebrush site is generally less than on a chaparral dominated site.

As an added precaution, these effects are minimized with good smoke management planning and public notification. Any prescriptions implemented would require daily certification that the fire remains in prescription and an assessment of smoke dispersal considering wind patterns that disperse smoke from sensitive areas and fuel moisture conditions, which promote rapid burnout and good convection and upper air transport, to reduce air quality impacts. Coordination with the San Diego Air Pollution Control District and implementing burns only on regionally permissive burn days will ensure that air quality standards are not impaired by prescribed burning activities, and that burns are conducted on days that allow for good convection and upper-level transport. The planned plot burns would not produce enough smoke to impact airport operations at Lindbergh Field or Naval Air Station North Island. A smoke management plan will be made to include all potential measures and techniques to prevent or minimize adverse smoke events. Smoke-sensitive areas include Point Loma Nazarene College and Point Loma residential areas. There are no Class I airsheds on or near Point Loma for special smoke consideration.

Additional consideration of air quality is provided by monitoring clean air sensitivity indicators, such as visibility and lichens, to establish baseline conditions. Also, fuels management and the experimental burns are designed and implemented to meet or exceed adopted visual quality objectives of NPS.

**Alternative 1, Same as Proposed Action but with 100-foot Fuels Management.** The effects on air quality of this Alternative are the same as those for the Proposed Action.

**Alternative 2, Same as Proposed Action but without Prescribed Fire for Ecological Benefit:** The effects on air quality of this Alternative are the same as those for the Proposed Action, except that no experimental burns would be conducted.

**Alternative 3, No Action:** Under this alternative, no additional stationary or mobile emissions would be generated beyond those currently existing on Point Loma. Consequently, this alternative would have no effect on air quality.

## 4.17 Impairment

In addition to determining the environmental consequences of the proposed action and other alternatives, National Park Service policy (NPS 2001: *Management Policies,* Section 1.4) and Director's Order 12, "Conservation Planning and Compliance," require that potential effects be analyzed to determine whether or not proposed actions would impair the resources or values of the parks in which they take place.

The fundamental purpose of the national park system, established by the Organic Act in 1916, and reaffirmed by the General Authorities Act in 1976, as amended, is to conserve park resources and values, which includes those of CNM. National Park Service (NPS) managers must always seek ways to avoid, or minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws give NPS management the discretion to allow *impacts* to the resources and values under their stewardship when necessary and appropriate to fulfill the purposes of the park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the NPS this discretion, it is limited by statutory requirements that the NPS must leave resources and values unimpaired unless a particular law directly and specifically provides otherwise.

Impairment that is prohibited is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources and values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact on any park resource or value may constitute impairment. An impact would be most likely to constitute impairment if it adversely affected a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the legislation or presidential proclamation that established the park
- Key to the natural or cultural integrity of the park or to opportunities to enjoy it
- Identified as a goal in the park's general management plan or other relevant National Park Service planning document

Impairment may not result from NPS activities in managing CNM, visitor activities, or activities undertaken by the cooperating association, contractors or others operating in the national monument. In this "Environmental Consequences of Proposed Action and Alternatives" section, a determination on impairment has been made. The NPS does not analyze recreational values/visitor experience (unless impacts are resource-based), socioeconomic values, health and safety, or national monument operations for impairment. The following process was used to determine whether the alternatives had the potential to impair park resources and values:

1. The presidential proclamation that established Cabrillo National Monument in 1913 and the two proclamations that enlarged it in 1959 and 1974, the monument's 1996 general management plan and 2005 -2008 strategic plan, and other relevant background materials were reviewed with regard to the park's purpose and significance, resource values, and resource management goals.
2. Management objectives specific to resource protection goals at the monument were identified.
3. The context, intensity and duration of impacts relative to each affected resource or value for each alternative were determined.
4. An analysis was conducted to determine if the magnitude of an impact reached the level of "impairment" as defined by NPS Management Policies.

Based on the analysis of the effects that each alternative would have on the resources and values being conserved at CNM, including the No Action (Current Program) alternative, implementation of the Proposed Action would not result in any adverse, long-term impacts to Land Use, Utilities and Infrastructure, Socioeconomics, Recreation and Scenic Values, Education and Outreach, Public Health and Safety, Cultural Resources Topography and Soils, Water Resources, Plant Communities, Wildlife Populations, Sensitive Plants, Sensitive Wildlife, Invasive Species or Air Quality. Since there would not be any significant, long-term, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in CNM's establishing presidential proclamation, or those which expanded the monument, (2) key to the natural or cultural integrity of the monument or to opportunities for enjoyment of the park, or (3) identified as a goal in the monument's 1996 general management plan or other relevant NPS planning documents, there would be no impairment of park resources or values under the Proposed Action -- Implement the Joint Wildland Fire Management Plan with Enhanced Suppression, 50-foot Survivable Space Fuels Management, and Experimental Use of Prescribed Fire for Ecological Benefit.

# 5.0 Cumulative and Other Impacts

## 5.1 Cumulative Effects Analysis

This chapter analyzes whether the proposed action in combination with other projects occurring in the vicinity may together have an additive effect on the environment.

Council on Environmental Quality regulations (40 CFR § 1508.7) implementing the procedural provisions of NEPA define cumulative effects as:

“The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions.”

In order to analyze cumulative effects, a region should be identified for each project considered. Because the area and magnitude of impacts in the JWFMP are positive or quite minor (or minimized such that there is no net change), it is deemed appropriate to limit the scope of cumulative impact analysis to public lands of the Point Loma peninsula.

The following projects are in various stages of implementation on the peninsula.

- ***South Access Road Protection Project on CNM lands.*** This City of San Diego project proposes modifications to Gatchell Road to protect it from erosion and ensure long-term access to the Point Loma Wastewater Treatment Plant. An Environmental Assessement has been drafted on the project. The environmentally preferred alternative, and the one preferred by CNM, involves constructing a bridge at the location of the sea cove, with temporary, short-term impacts to about 0.12 acres. The construction zone would be re-landscaped with natives after project completion. Other alternatives considered by the City include using a retaining wall or riprap, but these affect more acres with permanent, minor impacts to habitat and the plant community. The city has put this project on indefinite hold.
- ***Tidepool Parking Lot Modification.*** The Tidepool Parking Area at CNM currently does not provide a safe drop off/turn around zone for school buses. A re-design is in the planning stages which could involve expanding the parking lot northward into previously-disturbed but recovering habitat. The total area affected would be less than one acre.
- ***Naval Base Point Loma INRMP Implementation Projects.*** Several projects are currently funded that implement recommendations of NBPL’s INRMP. These include invasive species management, an Erosion Control Plan, a Vegetation Management Plan, and a survey for California gnatcatchers.
- ***Various projects associated with Department of Veterans Affairs’ Fort Rosecrans National Cemetery.*** Projects associated with expansion of the Cemetery are on federal land and covered under separate NEPA documentation. Therefore, they are not addressed in this EA or cumulative effects analysis.

No significant, negative cumulative impacts have been identified for the Proposed Action addressed in this EA when combined with any of the above projects.

The INRMP projects were designed to protect and enhance the natural resources on Point Loma while helping to conserve regional plant and wildlife populations. They generally enhance and build on the ecological goals of the JWFMP. The two CNM projects are expected to result in no significant impact after avoidance and minimization measures are fully implemented.

These projects were previously reviewed for conflict with existing natural resource management, including the construction projects, through separate NEPA documents. Therefore, cumulative impacts with the No-Action Alternative has been addressed during the approval process for each project. In addition, the implementation of all alternatives of the JWFMP would comply with the General Conformity Rule of the Clean Air Act (Sec. 176c), because previously established time lines for attaining air quality standards will still be enforced and neither alternative would cause or contribute to any new violations of air quality standards in the region. Consequently, no significant cumulative impacts to air quality would result from the implementation of any of the alternatives.

## 5.2 Irreversible and Irretrievable Effects of the Proposed Action

NEPA requires an analysis of significant irreversible effects. Resources that are irreversibly or irretrievably committed to a project are those that are utilized on a long-term or permanent basis. This includes the use of non-renewable resources such as metal, fuel, and other natural or cultural resources. Human labor would be considered a non-renewable resource because once labor is expended it cannot be renewed. These resources are considered irretrievable because they would be utilized for a project when they could have been used for other purposes.

The end-product of fuels management or experimental burns themselves would not result in any irreversible and irretrievable effects. Implementation of the proposed JWFMP would result in a minor irreversible and irretrievable commitment of certain non-renewable resources. Fuels management, weed control, experimental fire application, and long term monitoring, for example, associated with the JWFMP would result in an irretrievable commitment of fossil fuels for vehicles and equipment, and other resources, such as human labor. These commitments of resources are neither unusual nor unexpected, given the nature of the JWFMP, and are generally understood to be tradeoffs, which benefit natural, cultural, and public resource values if the JWFMP is implemented. These long-term impacts associated with the Proposed Action that are considered irreversible have been discussed in greater detail in Chapter 4 of this EA

## 5.3 Short-Term Use Versus Long-Term Productivity

This section provides a discussion of the relationship between local short-term uses of the human environment by the Proposed Action, and the maintenance and enhancement of long-term environmental productivity. The Proposed Action is the implementation of the JWFMP. As described in this EA, the JWFMP would not result in any long-term negative effects on the environment of Point Loma. As a result, the Proposed Action would not result in any environmental impacts that would permanently narrow the range of beneficial uses of the environment, or pose long-term risks to the health or safety of personnel working and residing on Point Loma. In fact, the proposed JWFMP enhances long-term protection of natural resources, infrastructure, and public safety on Point Loma.

# 6.0 List of Environmental Assessment Preparers

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- Preparation of Environmental Assessments for Integrated Natural Resources Management Plans.
- Development of approximately 30 Integrated Natural Resources Management Plans.
- Development of Wildland Fire Management Plans for military installations and other Open Space (Reserves), including fire studies projects.
- Preparation of Biological Assessments for impacts on more than twenty endangered species in various environments.
- Development and Implementation of long-term ecological trend monitoring plans and surveys, rare plant and endangered species surveys, restoration plans and projects, erosion control plans and projects, and wetland delineations.
- Development of integrated training and land use management plans.

# 7.0 Reviewers and Persons Consulted

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# Appendices

# Appendix A: Acronyms

**Acronyms, Abbreviations,and Terms Used**

| | |
|---|---|
| ASW | Anti-Submarine Warfare Base |
| CARB | California Air Resources Board |
| CDFG | California Department of Fish and Game |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| CNM | Cabrillo National Monument |
| CNPS | California Native Plant Society |
| CNRSW | Commander Navy Region Southwest |
| COMPACFLT | Commander US Pacific Fleet |
| DO | Director's Order |
| DOD | Department of Defense |
| DON | Department of Navy |
| DVA | Department of Veteran's Affairs |
| EA | Environmental Assessment |
| EFH | Essential Fish Habitat |
| EIS | Environmental Impact Statement |
| EPA | Environmental Protection Agency |
| ESQD | Explosive Safety Quantity Distance |
| ESA | Endangered Species Act |
| F&ES | Fire and Emergency Services |
| FCTCPAC | Fleet Combat Training Center, Pacific |
| FDRS | Fire Danger Rating System |
| FFD | Federal Fire Department |
| FISC | Fleet Industrial Supply Center |
| FITCPAC | Fleet Industrial Training Center Pacific |
| FMU | Fire Management Unit |
| FONSI | Finding of No Significant Impact |
| GIS | Geographic Information System |
| GMP | General Management Plan |
| INRMP | Integrated Natural Resources Management Plan |
| JHA | Job Hazard Analysis |
| JWFMP | Joint Wildland Fire Mangement Plan |
| MBTA | Migratory Bird Treaty Act |

| | |
|---|---|
| MCAS | Marine Corps Air Station |
| MIST | Minimum Impact Suppression Tactic |
| MLLW | Mean Lower Low Water |
| MSF | Magnetic Silencing Facility |
| MSFCMA | Magnuson-Stevens Fishery Conservation Management Act |
| MWWD | Metropolitan Wastewater Department |
| NASNI | Naval Air Station North Island |
| NBPL | Naval Base Point Loma |
| NEPA | National Environmental Policy Act |
| NFDRS | National Fire Danger Rating System |
| NHPA | National Historic Preservation Act |
| NOAA | National Oceanic and Atmospheric Administration |
| NPS | National Park Service |
| NWCG | National Wildlife Coordinating Group |
| OES | Office of Emergency Services |
| OPNAV | Office of the Chief of Naval Operations |
| PA | Programmatic Agreement |
| PLECA | Point Loma Ecological Conservation Area |
| PLWTP | Point Loma Wastewater Treatment Plant |
| RMP | Resource Management Plan |
| SAIA | Sikes Act Improvement Act |
| SDAB | San Diego Air Basin |
| SDNHM | San Diego Natural History Museum |
| SHPO | State Historic Preservation Officer |
| SMMNRA | Santa Monica Mountains National Recreation Area |
| SMMZ | Santa Monical Mountains Zone |
| SSC | Space and Naval Warfare Systems Center, San Diego |
| SUBASE | Naval Submarine Base San Diego |
| TRANSDEC | Transducer Evaluation Center |
| USC | United States Code |
| USCG | US Coast Guard |
| USFS | US Forest Service |
| USFWS | US Fish and Wildlife Service |

# Appendix B: Record of Non-Applicability

Department of Defense
US Navy

Record of Non-Applicability

Point Loma, California
Joint Wildland Fire Management Plan

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Pursuant to Section 176 (c) of the Clean Air Act, as amended by the 1990 amendments; the General Conformity Rule at 40 CFR Parts 51 and 93; and the Chief of Naval Operations Interim Guidance on Compliance with the Clean Air Act Conformity Rule, the Department of Defense (DoD) determined that the majority of practices outlined in the Joint Wildland Fire Management Plan are exempt from conformity requirements. The plan outlines many routine activities that would result in no emission increase or an increase that is clearly *de minimis* such as routine fuels management activities and small projects that would result in minor and insignificant emission increases. Small projects, such as fuels management using hand tools, exotic weed control using "weed-whackers", and planting drought-tolerant plants may also require the use of mechanical equipment. Fire-related monitoring projects would require the use of vehicles to transport personnel, and so would routinely add travel-related emissions to the air. The use of diesel or gas equipment for the above-mentioned projects would be short-term and temporary, and are considered routine and thus clearly *de minimis* under the General Conformity Rule. They are consistent with the General Conformity Rule in that emissions from proposed activities are already accounted for in California's emissions budget as described in the State Implementation Plan. Consequently, the proposed action is exempt from the conformity determination requirements of the Environmental Protection Agency's conformity rule.

To the best of my knowledge, the information contained in the DOI's applicability analysis is correct and accurate and I concur in the finding that air emissions associated with the proposed action are below *de minimis* levels, are not regionally significant, and therefore do not require further conformity analysis or determination.

______________________________ __________________________

M. D. Patton Date
Captain, U. S. Navy
Commanding Officer
Naval Base Point Loma
Commander Navy Region Southwest