Final
Endangered Species Management Plan

for

Yadon's Piperia and Hooker's Manzanita

Presidio of Monterey and
Presidio of Monterey Annex
Monterey County, California

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APPROVAL PAGE

Approving Official:

INSTALLATION COMMANDER _____ Date _____

Reviewed by:

CHIEF, ENVIRONMENTAL DIRECTORATE _____ Date _____

STAFF JUDGE ADVOCATE _____ Date _____

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ACRONYMS AND ABBREVIATIONS

AR	Army Regulation
BLM	Bureau of Land Management
CEQA	California Environmental Quality Act
CNPS	California Native Plant Society
DENR	Directorate of Environmental and Natural Resources Management
DFG	California Department of Fish and Game
cm	Centimeter
ESA	Endangered Species Act of 1973
ESMP	Endangered Species Management Plan
FWS	U.S. Fish and Wildlife Service
HMP	Habitat Management Plan
HMU	Habitat Management Unit
NEPA	National Environmental Policy Act
POM	Presidio of Monterey

EXECUTIVE SUMMARY

Background

U.S. Department of the Army (Army) Regulation 200-3 (Natural Resources–Land, Forest, and Wildlife Management) requires the preparation of Endangered Species Management Plans (ESMPs) for listed and proposed threatened species, endangered species, or critical habitat present on installations (*Army, 1995*). Compliance with Chapter 11 (Endangered/Threatened Species Guidance) of AR 200-3 requires coordination with other federal agencies responsible for the protection of these species. Failure to implement this ESMP can lead to violation of the Endangered Species Act of 1973 (ESA) and result in the costly disruption of military operations.

Two species of rare plants, Yadon's piperia (*Piperia yadonii*) and Hooker's manzanita (*Arctostaphylos hookeri* ssp. *hookeri*), were identified by the Army for inclusion in this ESMP. Yadon's piperia is listed as endangered by the U.S. Fish and Wildlife Service (FWS) (*FWS, 1998*). Hooker's manzanita currently has no federal status. It was chosen for inclusion in this plan in the event it is listed or proposed for listing as threatened or endangered in the future. If federal status is proposed for Hooker's manzanita and funds become available, the recommendations provided in this ESMP should be implemented. At this time, however, the Army is not obligated to implement recommendations for Hooker's manzanita

The POM Annex lands contain no Yadon's piperia or Hooker's manzanita and will not be discussed in this plan. Yadon's piperia and Hooker's manzanita are found on former Fort Ord lands slated for disposal. The Installation-Wide Multispecies Habitat Management Plan (HMP) for Former Fort Ord, California, serves as an ESMP for 18 endangered, threatened, or rare plant and animal species (including Yadon's piperia and Hooker's manzanita) on former Fort Ord and POM Annex lands (*USACE, 1997*). Four HMP species are found on POM Annex: Monterey spineflower (*Chorizanthe pungens* var. *pungens*), sandmat manzanita (*Arctostaphylos pumila*), Monterey ceanothus (*Ceanothus cuneatus* var. *rigidus*), and California black legless lizard (*Anniella pulchra nigra*).

Yadon's Piperia

Current Species Status. Yadon's piperia is endemic to California. It is found within closed-cone coniferous forest and maritime chaparral communities in northern coastal Monterey County. Two small populations of Yadon's piperia have been identified at POM: one near the cemetery and dormitories and one in the Huckleberry Hill Preserve (*Jones & Stokes, 1995*). Threats to the populations on the installation include trampling by people, deer browsing, and competition from non-native plant species.

Habitat Requirements and Limiting Factors. The primary limiting factor for Yadon's piperia is the availability of suitable habitat.

Management Objectives. Management objectives for Yadon's piperia are to protect and enhance existing populations on the installation.

Conservation Goals. The goals to conserve Yadon's piperia are to do the following:

1. Maintain the two existing POM Yadon's piperia populations. These populations occupy less than 1 acre; however, 120 acres of potentially suitable habitat is found on POM (*Jones & Stokes, 1995*). No population density goal has been established.

2. Avoid impacts to the population near the obstacle/orienteering course during training. No known installation or tenant unit mission requirements occur within the occupied habitat. However, the obstacle/orienteering course immediately adjacent to one Yadon's piperia population (near the cemetery and

dormitories) is located in potentially suitable habitat.

Actions Needed. The major steps needed to satisfy management objectives and achieve conservation goals are to perform the following:

1. Institute an annual monitoring program to record changes in population over time and to facilitate development of corrective measures, if required.

2. Protect existing populations from foot traffic by installing warning signs, instituting an awareness training program, and possibly installing fencing.

3. Hand-remove non-native species from documented habitat and from potential habitat areas.

4. Monitor deer browsing. Cage individual plants to protect them from browsing if necessary.

5. Establish a propagation and planting program to enhance marginal or buffer habitat (optional).

Hooker's Manzanita

Current Species Status. Hooker's manzanita is endemic to the Monterey Bay area and is found within maritime chaparral and closed-cone coniferous forests. Hooker's manzanita is randomly distributed on the west side of POM, west of Rifle Range Road and east of State Route 68. The number of individual plants occurring on base has not been established, but the estimated area of distribution is 57 acres. Threats to populations on the installation include habitat fragmentation, development, invasive species, trampling by people, and browsing by deer.

Habitat Requirements and Limiting Factors. The primary limiting factor for Hooker's manzanita is the availability of suitable habitat.

Management Objectives. Management options for Hooker's manzanita should be to protect and enhance existing populations on the installation.

Conservation Goals. The goals to conserve Hooker's manzanita are to do the following:

1. Maintain existing Hooker's manzanita populations on POM. Nine areas (approximately 57 acres) of Monterey pine forest habitat on the POM support populations of Hooker's manzanita. Approximately 120 acres of potentially suitable Hooker's manzanita habitat exists on the installation. A population density goal has not been established.

2. Avoid impacts to the populations near the obstacle/orienteering course during training. No known installation or tenant unit mission requirements with the exception of the obstacle/orienteering training occur within the occupied habitat.

3. If Hooker's manzanita is impacted during development, landscaping should include planting of Hooker's manzanita.

Actions Needed. The major steps needed to satisfy management objectives and achieve conservation goals are:

1. Hand-remove non-native species from habitat areas.

2. In the event the species becomes listed, institute an awareness training program and install "endangered species" warning sites.

3. Establish a propagation and planting program to augment existing populations (optional).

Total Estimated Cost of Conservation Actions. Projected costs for the first 5 years of this plan are as follows:

Year (1) $7,560; Year (2) $4,280; Year (3) $4,280; Year (4) $4,280; Year (5) $5,840. Table 2 provides a breakdown of cost per year by activity.

1.0 INTRODUCTION

The purpose of this Endangered Species Management Plan (ESMP) is to present information on two plant species at the Presidio of Monterey (POM): federally listed as endangered, Yadon's piperia (*Piperia yadonii*) and Hooker's manzanita (*Arctostaphylos hookeri* ssp. *hookeri),* a California Native Plant Society (CNPS) List 1B species. These two species of rare plants that are endemic to California's central coast and that occur or potentially occur on the POM or POM Annex lands were identified by the U.S. Department of the Army (Army) for inclusion in this ESMP. The regional location of these installations is provided on Figure 1. The site maps are provided as Figures 2 and 3. This ESMP will describe the occurrence of these plants at POM, discuss potential threats to these plants, provide conservation goals, and outline a management plan for these species and their habitat. Cost of the conservation efforts and impacts to installation training will also be discussed. This ESMP is based on and is consistent with the following laws, regulations, and guidelines: Endangered Species Act of 1973; Army Regulation (AR) 200-3; and the California Department of Fish and Game (DFG) Yadon's Piperia Recovery Strategies (*Jones & Stokes, 1996*).

Much of the information used in this ESMP was obtained from various sources (see Section 8.0, References). Information concerning population locations for Yadon's piperia and Hooker's manzanita potentially occurring at POM Annex was taken from the Installation-Wide Multi-Species Habitat Management Plan (HMP) for former Fort Ord and the Flora and Fauna Baseline Study of Fort Ord, California (*USACE, 1992, 1997*). The HMP and the baseline study do not show either Yadon's piperia or Hooker's manzanita as occurring on POM Annex lands. HLA field–checked these study results and concurred with the findings. Although central maritime chaparral (potential habitat for both of these species) occurs within POM Annex boundaries, habitat and soil types do not appear suitable to support either of these two species. Therefore, this ESMP will not provide guidelines for these species at the POM Annex.

Yadon's piperia and Hooker's manzanita are found on former Fort Ord lands slated for disposal. The HMP serves as an ESMP for 18 endangered, threatened, or rare plant and animal species (including Yadon's piperia and Hooker's manzanita) on former Fort Ord lands and POM Annex (*USACE, 1997*). Four HMP species are found on POM Annex: Monterey spineflower (*Chorizanthe pungens* var. *pungens*), sandmat manzanita (*Arctostaphylos pumila*), Monterey ceanothus (*Ceanothus cuneatus* var. *rigidus*), and California black legless lizard (*Anniella pulchra nigra*).

2.0 SPECIES INFORMATION

This section provides descriptions of the species, their distribution, habitat, life histories, reasons for listing, and existing conservation measures.

2.1 Yadon's Piperia

Description. Yadon's piperia is a slender perennial herb in the orchid family (Orchidaceae) that emerges during the winter from an underground bulb-like stem. Photographs of Yadon's piperia are provided on Figures 4 and 5. The plant is 10 to 50 centimeters high, with elongated basal leaves that are 10 to 15 centimeters long and 2 to 3 centimeters wide. Yadon's piperia flowers in summer (May through August). Many small flowers appear on a stalk that is 5 to 50 centimeters high. Each flower consists of six petal-like parts that are white with green margins or midveins. The lower petal forms a narrowly triangular lip that is 3 to 5 millimeters long and curved back toward a short, white spur. The spur is pointed downward and is 2.5 to 4 millimeters long (*Hickman, 1993*).

Yadon's piperia is similar to elegant piperia (*Piperia elegans*), elongate piperia (*P. elongata*), Michael's piperia (*P. michaelii*), and transverse piperia (*P. transversa*) but is distinguished from them by the shorter spur length, the particular pattern of green and white floral markings, and the earlier flowering time (*FWS, 1995*). Further information concerning technical descriptions of Yadon's piperia can be found in *The Jepson Manual: Higher Plants of California* (*Hickman, 1993*) and in *Two New Piperias* (*Orchidaceae*) *from Western North America* (*Morgan and Ackerman, 1990*). The U.S. Fish and Wildlife Service (FWS) proposed endangered status, pursuant to the ESA, for Yadon's piperia on August 2, 1995 (*FWS, 1995*) and subsequently determined endangered status on August 12, 1998 (*FWS, 1998*).

Distribution. Yadon's piperia is found in northern Monterey County from the Monterey Peninsula north to the Prunedale-Elkhorn Slough area. The density of Yadon's piperia has declined dramatically within its range, and populations are fragmented due to development. It is currently distributed throughout its historic range, except for the Pacific Grove area, which has since become urbanized. It is likely that the plant was previously more abundant in the Prunedale-Elkhorn Slough area (*FWS, 1995*). The total population of Yadon's piperia is estimated to be approximately 56,000 individuals. Approximately 96 percent of these plants occur on the Monterey Peninsula (*Jones & Stokes, 1996*). Total known occupied habitat of Yadon's piperia is estimated to be 355 acres. The area of potentially suitable habitat has not been determined (*Allen, 1996*).

Jones & Stokes Associates conducted surveys for Yadon's piperia on POM during December 1994 and April and June 1995 (*Jones & Stokes, 1995, 1996*). Botanists conducted surveys by walking zigzag transects thorough potential habitat. Approximately 50 individual plants were identified in open grassy understory of Monterey pine forest near the cemetery and dormitories. Two additional individual plants were located in the Huckleberry Hill Preserve in Monterey pine forest with chaparral understory (*Jones & Stokes, 1995*). Additional surveys done in 1998 by the Directorate of Environmental and Natural Resources Management (DENR) found the population by the cemetery and dormitories extended into a hard-packed embankment that connected the pine forest with adjacent dormitories. The embankment showed obvious signs of previous ground disturbance. The number of individual plants in 1998 along the embankment and in the original forest location was estimated to be 150 plants; most of these plants were found along the embankment. Known population locations occurring on the POM in 1995 are shown on Figure 6.

Based on the 1994 and 1995 surveys, POM has approximately 0.16 acres of occupied habitat and 120 acres of potentially suitable habitat for Yadon's piperia (*Jones & Stokes, 1995*). The population at POM is less than 1 percent of the total population estimated in the *Flora and Fauna Baseline Study of the Presidio of Monterey* (*Jones & Stokes, 1995*).

Habitat/Ecosystem. Yadon's piperia is found in maritime chaparral and closed-cone coniferous forests. It is found primarily on sandstone and sandy soil that is often poorly drained and dries in summer when the plants are flowering (*FWS, 1995*). Yadon's piperia prefers soils that retain moisture during the rainy season but are not subject to inundation (*Allen, 1996*). Most occurrences of Yadon's piperia appear to be on Narlon and Huckleberry soils (*Jones & Stokes, 1996*). Plant associations in maritime chaparral include shaggy-barked manzanita (*Arctostaphylos tomentosa*), chamise (*Adenostoma fasciculata*), toyon (*Heteromeles arbutifolia*), sticky monkey flower (*Mimulus aurantiacus*), California broom (*Lotus scoparius*), and rush lotus (*L. junceus*). Plant associations in closed-cone coniferous forests include Monterey pine (*Pinus radiata*), Bishop pine (*Pinus muricata*), Hooker's manzanita, western poison-oak (*Toxicodendron diversilobum*), blue wildrye (*Elymus glaucus*), bedstraw (*Galium* sp.), and California huckleberry (*Vaccinium ovatum*). Yadon's piperia occurs at elevations ranging from 30 to 150 meters on topography that ranges from relatively level to slopes that are moderate (*Morgan, 1997*).

Critical elements of the ecosystem inhabited by Yadon's piperia appear to be symbiotic relationships, disturbance, light availability, cover, non-native species competition, and deer browsing. Yadon's piperia is symbiotic with mycorrhizal fungi. Although the specific fungus is poorly understood, its presence is required for germination and establishment of Yadon's piperia. Observations made by David Allen indicate that it takes 10 to 15 years from a disturbance before the plant can become established (*Allen, 1996*). Yadon's piperia is usually found with other orchid species in the surrounding area such as ladies tresses (*Spiranthes* spp.) or other species in the genus *Piperia* (*Morgan, 1997*). It appears that light availability and not moisture is the more critical factor in the competitive challenge for Yadon's piperia (*Allen, 1996*). Dense cover from non-native species appears to impede germination and establishment of Yadon's piperia. However, cover provided by native grasses and Hooker's manzanita appears to enhance reproductive success by reducing browsing by deer and other herbivores (*Morgan, 1997*). In addition, the shrubs may provide protection from herbivores and possibly contribute to a more favorable moisture regime (*Allen, 1996*).

Life History/Ecology. Plants typically are found in groups numbering between 5 and 50; however, groups of 100 or more are found infrequently (*Allen, 1996*). During the first few years of growth, the plant produces one or two basal leaves that die back each summer. After several years of vegetative growth, the plant sends up a single stem to 50 centimeters tall with flowers arranged in a dense narrow-cylindrical raceme (*FWS, 1995*). Plants typically flower from May through August (*Skinner and Pavlik, 1994*). Moths in the noctuid (Noctuidae) and geometer (Geometridae) families have been observed pollinating other species of piperia. Mosquitoes have also been observed pollinating piperia species (*Morgan, 1997*). Possibly other nocturnal insects may pollinate the plant as well. The fruit is a capsule that matures in the fall. Tiny seeds are dropped and wind-dispersed from the capsule annually to create a seed bank in the surrounding soil. Strong winds are likely to carry the millions of dust-like seeds produced by a large population over a large area. Typical of orchids, the roots of Yadon's piperia form a close symbiotic association with mycorrhizal fungi. For the seed to germinate and become established, the fungus must be present. In turn, the fungus may not be able to persist without the orchid (*Jones & Stokes, 1996*).

The plant sprouts from roots after fire. While short-lived perennial taxa like Yadon's piperia may be able to persist through a few climatically

unfavorable years, maintaining critical seed production levels and appropriate habitat is essential (*FWS, 1995*). Not much information is available concerning the species or local populations tolerance to loss of individuals, but it is suspected that the effects of loss will be delayed because stocked seedbanks could potentially support new populations for some time (*Steeck, 1997*).

Reasons for Listing. Yadon's piperia was once more abundant on the Monterey peninsula. Habitat for the species has been altered, destroyed, and fragmented by the subdivision of residential lots and conversion to golf courses and other recreational facilities. Continued alteration and destruction of habitat due to urban, road, and golf course developments is currently the greatest threat to Yadon's piperia. Other threats include competition with non-native species, roadside and golf course mowing, and unlawful collection of plants and flowers. The small numbers of individuals and populations and the limited range also make Yadon's piperia vulnerable to stochastic extinction (i.e., extinction brought about by random environmental changes).

Conservation Measures. A recovery plan for Yadon's piperia has been prepared for DFG. Several entities are participating in ongoing conservation efforts for the species. These include the Nature Conservancy and the Pebble Beach Company. Pebble Beach Company has been conducting transplanting trials, although the success of its efforts has not yet been documented.

2.2 Hooker's Manzanita

Description. Hooker's manzanita is a perennial shrub in the heath family (Ericaceae). The plant grows as a mat or a mound-like evergreen shrub to heights of generally less than 1 meter. Photographs of Hooker's manzanita are provided on Figures 7 and 8. It does not produce an underground burl. Its stems may grow decumbent (less than 1 meter) or erect (1 to 3 meters). Leaves are erect, 2 to 3 centimeters long by 1 to 1.5 centimeters wide, and elliptic in shape. The upper and lower surfaces of the leaves are alike. The flowers appear in late winter to early spring (February to May). The flowers are white or pink, somewhat spherical, and in a dense raceme. Small fruits that resemble miniature apples (4 to 6 millimeters wide) appear after flowering (*Hickman 1993*). Further information concerning technical descriptions can be found in *A California Flora* (*Munz, 1959*). Hooker's manzanita is similar to the other subspecies in the species *hookeri* but can be distinguished from them by its location. Hooker's manzanita is also similar to *A. pumila*, *A. t. tomentosa*, and *A. montereyensis* but can be distinguished from them by stomates on both surfaces, the absence of a burl, and the scale-like bracts.

Distribution. Hooker's manzanita occurs from Carmel in Monterey County to the Santa Cruz Mountains in Santa Cruz County. Density of the Hooker's manzanita within this range has declined dramatically, and populations are more fragmented. It is currently found distributed throughout its historic range, except for populations in the Pacific Grove area, which were extirpated when the area became urbanized. Jones & Stokes Associates conducted surveys on POM for Hooker's manzanita during December 1994 and April and June 1995 (*Jones & Stokes, 1995*). Known population locations occurring on the POM in 1995 are shown on Figure 9.

Habitat/Ecosystem. Hooker's manzanita is found in maritime chaparral, coastal scrub, closed-cone coniferous forest, and cismontane woodland habitats. It is found primarily on sandy soils, sandy shales, and sandstone outcrops. Plant associations in maritime chaparral include shaggy-barked manzanita, chamise, toyon, sticky monkey flower, deer brush, and rush lotus. Plant associations in coastal scrub may include California sage (*Artemisia californica*), coyote brush, mock heather (*Ericameria ericoides*), coast buckwheat (*Eriogonum latifolium*), and Chamisso's bush lupine (*Lupinus chamissonis*). Plant associations in closed-cone coniferous forests include Monterey pine, Bishop pine, coast live oak (*Quercus agrifolia*), bracken fern (*Pteridium aquilinum* var. *pubescens*), California

huckleberry, shaggy-barked manzanita, toyon, and western poison-oak. Hooker's manzanita is found at elevations ranging between 85 and 300 meters.

Life History/Ecology. Hooker's manzanita flowers in late winter to early spring. Flowers are pollinated by hummingbirds and insects such as bees, flies, and moths. Small fruits appear after flowering. The fruits are eaten and dispersed by mammals and birds whose typical travel distance is generally greater than the range in which the species is found. Seed is produced annually but needs fire to crack the hard seed coat. New seedlings colonize the surrounding area after fire.

Reasons for Listing. Hooker's manzanita has not been federally listed as endangered or threatened and is not proposed for listing. However, CNPS considers Hooker's manzanita to have a limited distribution and to be endangered in a portion of its range. The CNPS proposed List 1B status for Hooker's manzanita in 1994. List 1B species may be subject to protection pursuant to the California Environmental Quality Act (CEQA). Threats to Hooker's manzanita populations include development (*CDFG, 1997*) and the lack of fire to sustain existing communities.

Conservation Measures. The HMP requires that the Army and Bureau of Land Management implement a prescribed burn plan in maritime chaparral habitat areas at former Fort Ord, which support approximately 4,800 acres of Hooker's manzanita (*USACE, 1997*).

3.0 CONSERVATION GOALS

This section states objectives for the project, or measurable criteria to meet the installation's conservation goals for each of the two species.

Surveys of the POM and the POM Annex were conducted on base in 1994 and 1995 to document habitats and determine locations of sensitive species (*Jones & Stokes, 1995, 1996*). Occupied habitats and known populations of these species were mapped as part of flora and fauna baseline studies (*Jones & Stokes, 1996*). HLA conducted additional surveys at POM and POM Annex on July 30, 1997.

Both Yadon's piperia and most Hooker's manzanita habitat occur on open space or lands that are used for recreational purposes. Conservation goals for these species involve maintaining existing population levels and areas of occupied habitat. Optional activities to enhance populations and habitat for these species could involve providing protection in the form of caging or fencing, reducing competition from exotic plant species by weeding, and reconstruction of disturbed or marginal habitat (if feasible).

3.1 Yadon's Piperia

Although neither of the populations on the POM is included in the CDFG recovery strategies goals and objectives (*Jones & Stokes, 1996*), this resource was used as a guideline.

The small number of Yadon's piperia plants on the POM represents a very small percentage of the existing population on the Monterey Peninsula. The occurrences of this species on the POM are separated and consist of few individuals. The small size of these populations makes them difficult to manage and prone to local extinction. The occurrences on POM are not suited for long-term management or recovery of the species, but loss of the plants should be avoided. Populations should be preserved by maintaining existing habitat as open space, excluding development, and given the opportunity, removing invasive weed species, and protecting individuals from trampling and herbivory.

3.2 Hooker's Manzanita

Currently, there is no critical habitat designated or recovery strategies developed for this species. The baseline flora and fauna studies (*Jones & Stokes, 1996*) identified habitat areas occupied by Hooker's manzanita on the POM (Figure 9). The total area has been determined to be approximately 57 acres. Based on the 1994 and 1995 surveys, the POM has approximately 120 acres of potentially suitable habitat, including natural areas vegetated by Monterey pine forest.

The area of land that supports populations of Hooker's manzanita on the POM is small in proportion to the total occupied lands in the range of this species. The occurrence of the species in the Huckleberry Hill area is of special significance, because this area is already a nature preserve. This species should be managed from a habitat approach and draw upon management prescriptions that preserve Monterey pine forest habitat. Priority for preservation of individual plants should be given to areas of intact Monterey pine forest. The 57 acres of habitat on the POM should be maintained as open space. If possible, weed removal should be conducted in habitat areas.

4.0 MANAGEMENT PRESCRIPTIONS AND ACTIONS

The management prescriptions and actions incorporated into this ESMP were developed in accordance with guidelines provided by the DENR, guidelines provided by FWS, and information obtained from recovery strategies in Recovery Strategies for Six Coastal Plant Species on the Monterey Peninsula (*Jones & Stokes, 1996*).

4.1 Habitat Management Units

Habitat management units (HMUs) are defined as areas where Yadon's piperia and Hooker's manzanita have been currently documented. Figure 6 indicates the HMU for Yadon's piperia. Figure 9 indicates the HMU for Hooker's manzanita.

4.2 Habitat Management Practices

Habitat management practices to conserve the populations of Yadon's piperia and Hooker's manzanita are geared to maintaining existing numbers and habitat, monitoring known populations, and removing invasive exotic plants. Much of this work could be performed by volunteers. The POM populations do not represent significant proportions of the regional populations for these two species.

4.2.1 Yadon's Piperia

Loss of plants due to trampling can be avoided by instituting an awareness education program and posting signs. If necessary, fencing can be installed to provide additional protection from trampling. Non-native species removal, particularly of French broom (*Genista monspessulana*) and Hottentot fig (*Carpobrotus edulis*), should be conducted to preserve existing habitat and reduce competition. Non-native species may be removed by hand or herbicides such as Roundup® may be used. Hand removal is preferable as impacts to native species are less likely and volunteer labor can be utilized. The use of weed levers will expedite removal of French broom. Because seed of French broom is thought to persist for decades in the soil, removal of plants will need to be maintained annually. If herbivory by deer proves to be a concern, individual plants can be caged using wire mesh.

Populations should be monitored to record changes in population number and extent over time. Results from monitoring could be useful in developing new management prescriptions or to enhance existing populations. The small number of Yadon's piperia at POM likely represents a small proportion of the genetic variability contained in other populations distributed over its range. Additionally, these plants are isolated from other populations due to surrounding development. The lack of exchange of genetic material among piperia plants at POM with other piperia populations at large could lead to reduced levels of variability and could leave the populations on the POM vulnerable to stochastic extinction. If funds become available, plans to enhance marginal or buffer habitat could be developed.

Yadon's piperia forms a corm that is capable of remaining dormant for a number of years. It is possible that additional plants exist on the Huckleberry Hill Nature Preserve or in other natural areas that are undetectable under dense pine forest understory. Additionally, other special-status species such as Pacific Grove clover (*Trifolium polyodon*), Monterey clover, (*Trifolium trichocalyx*), and Hickman's potentilla (*Potentilla hickmanii*) may have dormant seed in the soil seed bank. Surveys for Yadon's piperia and other special-status plant species will be conducted following any events that cause large-to moderate-scale ground disturbance such as landslides or fires.

4.2.2 Hooker's Manzanita

Measures to maintain existing populations of Hooker's manzanita include preserving open space and removing weeds. Loss of plants could

be avoided by instituting an awareness education program and posting signs adjacent to habitat areas. Non-native species removal, particularly French broom and Hottentot fig, should be conducted to preserve existing habitat and prevent competition. Populations should be monitored to record changes in estimated population number and extent over time. Results from monitoring could be useful in developing new management prescriptions or to further maintain or enhance existing populations.

Huckleberry Hill Nature Preserve is managed by the City of Monterey. Although fire is a natural part of the Monterey pine forest system, it is not feasible to conduct controlled burns due to the proximity of developed areas. The lack of fire in this community may constitute a threat to plant populations. If monitoring results indicate decreasing numbers, brush pile burning, small scale clearing, or other actions to mimic the effects of fire may become options. Any burning must be coordinated with local governments, DFG, California Department of Forestry, and regulatory agencies. In addition, the Installation would need to ensure compliance with the National Environmental Policy Act (NEPA).

4.3 Awareness Training Program

An awareness training program should be implemented for installation personnel who conduct activities in unimproved areas on base and could potentially have contact with Yadon's piperia and Hooker's manzanita. This program will help meet habitat management practices identified in Section 4.2 and will help avoid potential future ESA violations.

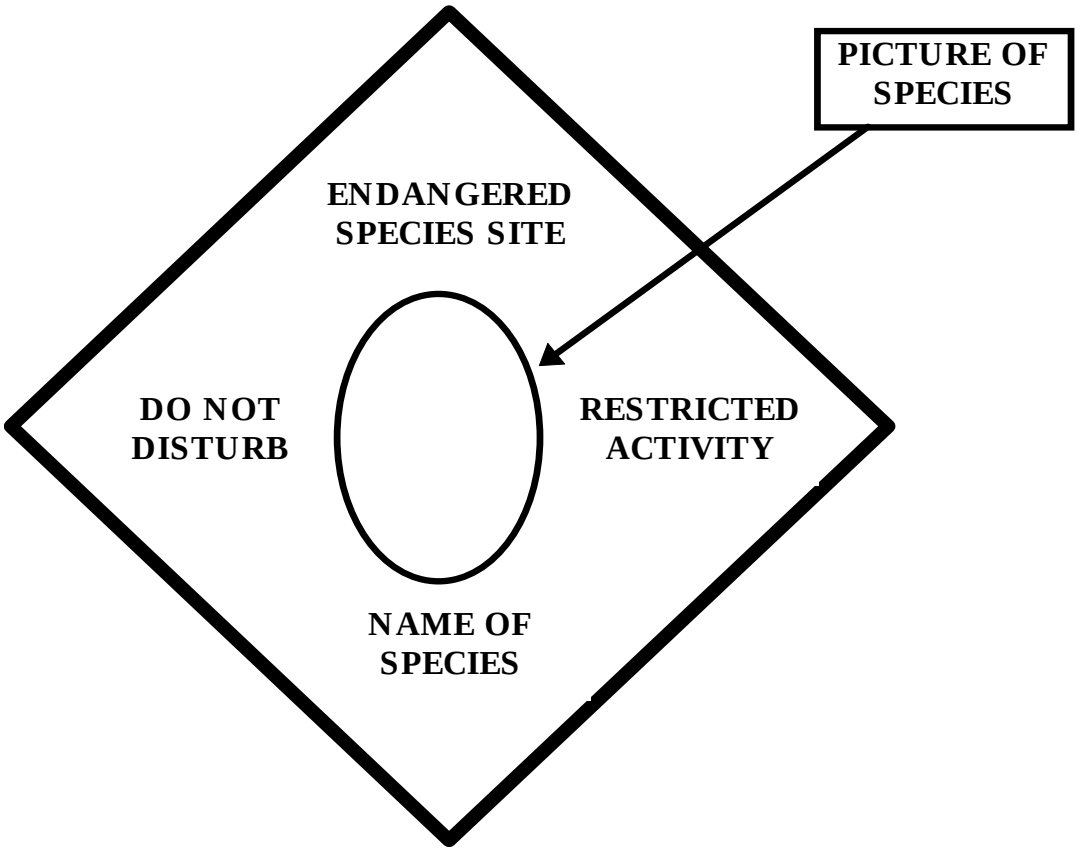
Training could involve periodic audiovisual presentations and/or distribution of an informational pamphlet. Information presented should include:

- Identification of Yadon's piperia and Hooker's manzanita
- An introduction to the natural history of these species and ecological significance of populations on the installation
- Known locations of populations of these species on the installation and locations of potential habitat
- Individual and installation responsibility and liability under federal law
- Methods to balance the installation mission requirements with conservation of habitat.

4.4 Signage Plan

Warning signs for listed, proposed, and candidate species and their habitat will conform to the specifications found in AR 200-3. Signs will be constructed of durable material, 10 inches square (oriented as a diamond), yellow or white in color, and of the design shown in Figure 10, below. The graphic depicting the species, the lettering "Endangered Species Site," and the species name will be printed in black. The warnings "Do Not Disturb" and "Restricted Activity" will be printed in red lettering. All lettering will be 3/8 inch high.

Figure 10. Endangered Species Warning Sign



5.0 MONITORING PLAN

This section describes a monitoring plan to periodically estimate population size and status, habitat size and status, and potential threats to species and factors affecting reproductive success. This information is crucial to the installation's ability to determine if conservation goals are being achieved. The Army is under no obligation to perform monitoring of Hooker's manzanita populations at this time.

Monitoring of populations on Huckleberry Hill Nature Preserve should be coordinated between the DENR and the City of Monterey. Monitoring will most likely be performed by DENR or volunteers directed by DENR. If monitoring data documents significant changes or threats to Yadon's piperia and Hooker's manzanita populations, corrective actions should be taken. If corrective actions are warranted (as determined by DENR), monitoring data could be used to provide guidance for success of corrective actions. Possible corrective actions are described in Sections 4.2.1 and 4.2.2. Corrective actions will be coordinated with the appropriate regulatory agencies and input from local interested parties or organizations sought.

Monitoring of Yadon's piperia and Hooker's manzanita may involve both surveying and sampling. When sampling is involved, sampling adequacy will be examined using established methods (e.g. cumulative mean curves, variance analysis, or species-area curves). Data may be gathered as number, density, or cover classes rather than absolute counts. If class information is gathered, classes will be defined to enable detecting significant population changes.

Known populations of species should be visited annually for 3 years to establish baseline data. Additional surveys for Yadon's piperia will be conducted following large to moderate ground disturbing events such as landslides or fires to document newly colonized areas. Once a baseline is established, sampling may be reduced to every other year for Yadon's piperia and every 3 years for Hooker's manzanita if populations appear to be stable. Regardless of sampling interval, species should be visited at least yearly to access habitat conditions and possible threats to species. The information outlined in the following sections will be gathered and recorded during annual monitoring.

5.1 Yadon's Piperia

Information collected on Yadon's piperia will include the following:

- The number (or size class) of individual blooming plants (conducted May through August). As an option depending on funding, an additional survey during the winter will be conducted to monitor the species in a vegetative state.
- The density (or density class) of plants within occupied habitat (expressed as numbers of plants per square meters)
- Percent of blooming plants that set seed and as an option, the percent of vegetative plants that produce flowers
- General habitat condition and possible threats to species (e.g. exotic plants, trampling, and evidence of herbivory).

5.2 Hooker's Manzanita

Information collected on Hooker's manzanita will include the following:

- Percent species cover should be determined using fixed line transects. Transects should be placed to incorporate areas of varying slope, aspect, and species composition. Transects should be marked with a permanent marker and locations documented on aerial photographs or maps.
- Percent of species falling into the following age classes: non-reproductive seedlings, reproductive adults, senescent (dying) older plants.

6.0 TIME, COSTS, AND PERSONNEL

Table 1 provides estimates of the time, costs, and personnel needed to carry out measures necessary to achieve the conservation goals described in Section 3.0. Personnel costs are provided as consultant fees if the Army chooses to contract the work. However, the Army is not obligated to use a consultant and may wish to conduct the work itself or utilize volunteer labor to reduce costs. The initial planning and funding period for the implementation of this ESMP is 5 years. Projected annual implementation costs are shown in Table 2.

7.0 CHECKLIST

Schedule	Activity	Implemented	
		Date	**Signature**
Winter 1999	Install warning signs.* Monitor Yadon's piperia in vegetative condition.		
Spring 1999	Implement awareness training program.*		
Summer 1999	Monitor Yadon's piperia populations while plants are in bloom.*		
Fall 1999	Monitor Yadon's piperia populations for seed-set.*		
Winter 1999/2000	Perform weed removal for French broom and Hottentot fig in habitat areas. Monitor Yadon's piperia in vegetative condition.		
Summer 2000	Monitor Yadon's piperia populations while plants are in bloom.*		
Fall 2000	Monitor Yadon's piperia populations for seed-set.		
Winter 2000/2001	Perform weed removal for French broom and Hottentot fig in habitat areas. Monitor Yadon's piperia in vegetative condition.		
Summer 2001	Monitor Yadon's piperia populations while plants are in bloom.*		
Fall 2001	Monitor Yadon's piperia populations for seed-set.		
Winter 2001/2002	Perform weed removal for French broom and Hottentot fig in habitat areas. Monitor Yadon's piperia in vegetative condition.		
Summer 2002	Monitor Yadon's piperia populations while plants are in bloom.*		
Fall 2002	Monitor Yadon's piperia populations for seed-set.		
Winter 2002/2003	Perform weed removal for French broom and Hottentot fig in habitat areas. Monitor Yadon's piperia in vegetative condition.		
Summer 2003	Monitor Yadon's piperia populations while plants are in bloom.*		
Fall 2003	Monitor Yadon's piperia populations for seed-set.		
Winter 2003	Perform weed removal for French broom and Hottentot fig in habitat areas. Monitor Yadon's piperia in vegetative condition.		

* Activities marked with an asterisk are required. The remaining activities are optional.

8.0 REFERENCES

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Table 1. Projected Annual Implementation Costs
Endangered Species Management Plan
for Yadon's Piperia and Hooker's Manzanita
Presidio of Monterey and Presidio of Monterey Annex
Monterey County, California

Fiscal Year	Estimated Annual Cost ($ thousands)
1999	7,560
2000	4,280
2001	4,280
2002	4,280
2003	4,280
2004*	1,560
5-Year Total	26,240

* Winter 2003 falls into fiscal year 2004.

Table 2. Estimate of Required and Optional Resources by Activity by Year
Endangered Species Management Plan for Yadon's Piperia and Hooker's Manzanita
Presidio of Monterey and Presidio of Monterey Annex
Monterey County, California

Fiscal Year (FY)		Activities	Personnel Hours	Cost ($$$)			
				Personnel ($64/Consultant)	Materials	Equipment	Total
FY 1999	Winter 1998/1999	Install warning signs.* Monitor Yadon's piperia in vegetative condition.	20	Consultant	500	200	1,980
	Spring 1999	Implement awareness training program.*	40	Consultant	200	100	2,860
	Summer 1999	Monitor Yadon's piperia populations while plants are in bloom.*	20	Consultant		80	1,360
	Fall 1999	Monitor Yadon's piperia populations for seed-set.*	20	Consultant		80	1,360
FY 2000	Winter 1999/2000	Perform weed removal for French broom and Hottentot fig in habitat areas. Monitor Yadon's piperia in vegetative condition.	20	Consultant	200	80	1,560
	Summer 2000	Monitor Yadon's piperia populations while plants are in bloom.*	20	Consultant		80	1,360
	Fall 2000	Monitor Yadon's piperia populations for seed-set.	20	Consultant		80	1,360
FY 2001	Winter 2000/2001	Perform weed removal for French broom and Hottentot fig in habitat areas. Monitor Yadon's piperia in vegetative condition.	20	Consultant	200	80	1,560
	Summer 2001	Monitor Yadon's piperia populations while plants are in bloom.*	20	Consultant		80	1,360

Table 2. Estimate of Required and Optional Resources by Activity by Year
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Monterey County, California

Fiscal Year (FY)		Activities	Personnel Hours	Cost ($$$)			
				Personnel ($64/Consultant)	Materials	Equipment	Total
	Fall 2001	Monitor Yadon's piperia populations for seed-set.	20	Consultant		80	1,360
FY 2002	Winter 2001/2002	Perform weed removal for French broom and Hottentot fig in habitat areas. Monitor Yadon's piperia in vegetative condition.	20	Consultant	200	80	1,560
	Summer 2002	Monitor Yadon's piperia populations while plants are in bloom.*	20	Consultant		80	1,360
	Fall 2002	Monitor Yadon's piperia populations for seed-set.	20	Consultant		80	1,360
FY 2003	Winter 2002/2003	Perform weed removal for French broom and Hottentot fig in habitat areas. Monitor Yadon's piperia in vegetative condition.	20	Consultant	200	80	1,560
	Summer 2003	Monitor Yadon's piperia populations while plants are in bloom.*	20	Consultant		80	1,360
	Fall 2003	Monitor Yadon's piperia populations for seed-set.	20	Consultant		80	1,360
FY 2004	Winter 2003	Perform weed removal for French broom and Hottentot fig in habitat areas. Monitor Yadon's piperia in vegetative condition.	20	Consultant	200	80	1,560

* Activities marked with an asterisk are required. The remaining activities are optional.

EXHIBIT A

INDIVIDUALS AND ORGANIZATIONS CONTRIBUTING TO THE PLAN

EXHIBIT A

INDIVIDUALS AND ORGANIZATIONS CONTRIBUTING TO THE PLAN

1.0 Harding Lawson Associates Natural Resources Staff

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EXHIBIT B

GLOSSARY

EXHIBIT B

GLOSSARY

bilateral	Divisible into mirror-image halves in only one way, having two symmetrical sides.
basal	Found at or near the base of a plant or plant part. Especially said of leaves clustered near the ground.
calyx (calyces)	Collective term for sepals' outermost or lowermost whorl of flower parts, generally green and enclosing remainder of flower in bud. Sometimes indistinguishable from corolla.
capsule	Dry, generally many-seeded fruit from compound pistil, nearly always dehiscent (irregularly or by pores, slits, or lines of separation).
corm	Short, thick, unbranched, underground stem often surrounded by dry (not fleshy) leaves or leaf bases.
corolla	Collective term for petals; whorl of flower parts immediately inside or above calyx, often large and brightly colored. Sometimes indistinguishable from calyx.
decumbent	Mostly lying flat on the ground but with tips curving up.
elliptic	In the shape of an ellipse (flattened circle).
foliage	Leaves of a plant.
herb	Plant with little or no wood above ground; aboveground parts are of less than 1 year or growing season duration.
inflorescence	An entire cluster of flowers and associated structures-e.g., axes, bracts, bractlets, pedicels. Often difficult to define as to type and boundaries but generally excluding full-sized foliage leaves.
isolateral	Poorly defined top and bottom.
lanceolate	Narrowly elongate, widest in the basal half, often tapered to an acute tip.
lip	Upper or lower of two parts in an unequally dived calyx or corolla. In *Orchidaceae*, generally the largest, lowest, most highly modified perianth part.
List 1B	CNPS lists these plants as rare, threatened, or endangered in California and elsewhere. These plants meet the definitions of Section 1901, Chapter 10 (Native Plant Protection Act) or Sections 2062 and 2067 (California Endangered Species Act) of the California Department of Fish and Game Code and are eligible for state listing.
mesic	Characterized by moist conditions; neither too moist nor too dry.
midvein	The main vein of a plant leaf that bisects the leaf longitudinally.
oblanceolate	Narrowly elongate, broadest above the middle.

pedicel	Stalk of an individual flower or fruit.
perennial	Living more than 2 years or growing seasons.
perianth	Calyx and corolla collectively, whether or not they are distinguishable.
raceme	Unbranched inflorescence of pediceled flowers that open from bottom to top.
recurved	Gradually curved downward or backward.
sepal	Individual member of the calyx, whether fused or not, generally green (see petal).
spur	Hollow, often conic projection or expansion, generally of a perianth part and containing nectar.
stochastic	Involving or containing a random variable.
stomate	A minute pore on a leaf or stem through which gasses such as carbon dioxide, oxygen, and water vapor pass by diffusion. Features of stomates help identify some plants.
symbiotic	Of or pertaining to a mode of life in which two organisms of different species live in intimate association with each other. Depending on the nature of the association, the relationship is designated mutualism, commensalism, parasitism, or phoresis.
tepal	A divisional of the perianth of a flower having petals and sepals that are virtually indistinguishable.
understory	The layer of shrubs and herbs below a canopy of trees.