

RECLAMATION

Managing Water in the West

DRAFT Environmental Assessment for Integrated Pest Management in the Pecos River Basin (Sumner, Brantley, and Avalon Dams; New Mexico), 2006-2011



U.S. Department of the Interior
Bureau of Reclamation
Albuquerque Area Office
Environment Division
Albuquerque, New Mexico

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U.S. Department of the Interior

BUREAU OF RECLAMATION
Albuquerque, New Mexico

Albuquerque Area Office

Draft Finding of No Significant Impact

Environmental Assessment for
Integrated Pest Management in the Pecos River Basin
(Sumner, Brantley and Avalon Dams;
New Mexico), 2006-2011

Manager, Environment Division

Date

Area Manager, Albuquerque Area Office

Date

AAO-06-006
FONSI Number

Background

A proposal to authorize the Bureau of Reclamation, including cooperators (Carlsbad Irrigation District and Brantely Lake State Park, Sumner Lake State Park, New Mexico Department of Energy, Minerals, and Natural Resources) and contractors, to use pesticides to control undesirable native and exotic plants on facilities and lands managed by Reclamation on the Pecos River, New Mexico, was analyzed in an Environmental Assessment (EA). In addition, the proposed treatment of weed and insect pests at Brantely Lake and Sumner Lake State Parks also was evaluated. The EA describes two alternatives: (1) Alternative A - No Action and (2) Alternative B - the Proposed Action to use herbicides as part of an Integrated Vegetation/Pest Management Strategy. Under the No Action Alternative, pesticides would not be used on Reclamation lands, but cooperators would continue to use manual and mechanical control methods that were authorized under other environmental analyses. Under the Proposed Action, pesticides would be used on an annual basis to control vegetation that threatens the structural integrity of dam structures, or adversely affects the adequate flow-carrying capacity of water conveyance. In addition, this analysis will also address the management of weeds invading recreation sites at Brantely Lake and Sumner Lake State Parks and control of insect pests that damage trees near facilities and recreation sites or insects that are considered to be a nuisance to visitors.

Summary of the Proposed Action

The propose action is to authorize Reclamation, cooperators, and contractors to use herbicides to control noxious weeds, invasive plants, and hazardous vegetation on Reclamation lands along the Pecos River, New Mexico. Approved herbicides include: Clopyralid, dicamba, glyphosate, imazapy, methsulfuron methyl, oryzalin, pendimethalin, picloram, sulfometuron methyl, and triclopyr, 2,4-D. Insecticides considered for use at Sumner Lake State Park will include malathion, acephate, carbaryl to control or prevent insects attacking shade trees, and hydramethylnon (a bait to control harvester ants).

Principles of adaptive management and managerial flexibility will be used during these projects. Pesticide treatments would allow decision makers to take advantage of new information that becomes available after a decision has been made. It is possible that a new product, approved and labeled by the U.S. Environmental Protection Agency (EPA), could become available during implementation. If implementation monitoring shows that the herbicides/insecticides analyzed in the EA are not effective in meeting the purpose and need and a new or improved product is available, the new product could be considered for use without further analysis. This would be the case only if the new or improved product fits within the same effects analysis disclosure for the herbicides covered in this EA. An analysis would be done the Reclamation's Environment Division, ALB-150, to determine the similarities of effects and if the decision should be amended to include new herbicide product.

Unless revised, this EA will remain in effect through 2011.

The EA describes the potential effects of the No Action alternative, not authorizing the use of herbicides/insecticides, and the Proposed Action to authorize the use herbicides/insecticides. Mitigation measures and Best Management Practices (also included in IPM/IVM plans) would be followed during implementation to mitigate the risk of adverse impacts to (1) humans; (2) non-target vegetation, including threatened, endangered, and sensitive plants; (3) non-target terrestrial and aquatic animals, including threatened, endangered, and sensitive animals; and (4) water quality. Since the propose action is not expected to have any adverse effect on threatened or endangered species, a Biological Assessment and Evaluation was not needed.

Alternative B, the proposed use of herbicides/insecticides, would be selected because it best meets the purpose and need as described in the EA (Chapter 1). It would allow Reclamation employees, cooperators, and contractors to effectively and efficiently control undesirable plant and insect species on Agency lands and facilities along the Pecos River.

The potential environmental effects and risks associated with the proposed use of herbicides/insecticides for humans and the environment were considered.

The alternatives considered in detail included Alternative A (No Action, i.e., no use of herbicides/insecticides), and Alternative B (the Proposed Action to use herbicides/insecticides).

Alternative A was not selected. Effective and economical control of undesirable vegetation and insect pests on Brantley Lake and Sumner Lake State Parks could not be achieved solely by the use of manual, mechanical, and preventive measures that are available. Manual and mechanical methods have proven to be ineffective for several species of sprouting plants, especially perennial species with deep root systems. In addition, the expense of controlling the remaining species of undesirable plants and insect pests was considered to be excessive under this alternative.

Alternative B was selected because it provides Reclamation managers with the full range of proven methods, including the use of herbicides/insecticides, to achieve effective and efficient Integrated Pest and Vegetation Management.

Environmental Impacts Related to the Resources of Concern

Based on the EA, it was determined that the proposed use of pesticides is not a major federal action that will significantly affect the quality of the human environment; therefore, an Environmental Impact Statement will not be prepared. The determination is based on the following:

- **Human Health**

The *risk to humans* associated with toxic effects of herbicides and insecticides would be negligible.

The disclosure of effects using herbicides/insecticides on the quality of the human environment nearly always generates some level of controversy. The concerns by the public over pesticide use will be considered, but the level of response is not expected to be substantial and the effects may not be *highly controversial*.

The possible effects described in the EA are not *highly uncertain* nor do they involve *unique or unknown risks*. The environmental effects are typical for this type of program using herbicides/insecticides to control unwanted pests. The analysis of possible effects is based on the best available information, science, and the judgment of pest management and land management specialists with Reclamation. The predicted environmental consequences are based on published information and each herbicide/insecticide, expected patterns of use, risk assessments developed for the USDA Forest Service for herbicides, and a summary of potential risks to humans and non-target species (Chapter 4), which were incorporated by reference.

- **Non-target Vegetation**

None of the pesticides proposed for use will have any significant affect (direct, indirect, or cumulative) on non-target vegetation. This action is limited to herbicide/insecticide use to control vegetation and insect pest on Reclamation lands and facilities on the Pecos River. Reclamation has proposed, and could propose in the future, the use of herbicides or insecticides to control certain pest species on the Pecos River. These proposals will be evaluated through the NEPA process and the effect of the actions in combination with treatments will be evaluated for *cumulatively significant impacts*.

- **Non-target Terrestrial and Aquatic Animals**

The proposed action with proposed mitigation measures identified in the IPM/IVM plans is *not likely to adversely affect or will have no effect on any endangered, threatened, or proposed species; or designated or proposed critical habitat areas; or nonessential experimental populations*. Effects to species listed under the Endangered Species Act and habitat designated as critical under the Act were disclosed in the EA, Chapter 4.

- **Water Quality**

There would be no direct, indirect, or cumulative impacts to water quality from the proposed use of herbicides or insecticides.

- **Indian Trust Assets**

There are no native American Indian Trust lands or assets in the vicinity of the proposed project area.

- **Environmental Justice**

Implementing the preferred plan would result in no adverse effects to minority or low-income populations.

Environmental Commitments

The application of pesticides is tightly controlled by state and federal agencies. Reclamation is required to follow all state and federal laws and regulations applicable to the application of pesticides. The mitigation measures listed in Chapter 5 would be followed when applying pesticides.

Coordination

Reclamation has coordinated with Sumner Lake State Park, Brantley Lake State Park, and the Carlsbad Irrigation District, in the preparation and approval of integrated pest management plans.

Conclusion

In accordance with the National Environmental Policy Act of 1969 (NEPA), as amended, and based on the analysis in the EA, the Bureau of Reclamation has determined that implementing the preferred plan presented in the EA for integrated pest management would not result in a significant impact on the human environment and does not require preparation of an environmental impact statement.

ACRONYMS AND ABBREVIATIONS

ADI -	Allowable Daily Intake
BLM -	Bureau of Land Management
BMPs -	Best Management Practices
CFR -	Code of Federal Regulation
CID -	Carlsbad Irrigation District
DOI -	U.S. Department of the Interior
EA -	Environmental Assessment
EPA -	U.S. Environmental Protection Agency
ESA -	Endangered Species Act
FIFRA -	Federal Insecticide, Fungicide, and Rodenticide Act
IPM -	Integrated Pest Management
ITAs -	Indian Trust Assets
IVM -	Integrated Vegetation Management
LC50 -	Lethal Concentration that will kill 50 percent of test animals, which is used to provide a relative measure of toxicity of a chemical
LD50	Lethal Dose that will kill 50 percent of test animals, which is used to provide a relative measure of toxicity of a chemical
NEPA -	National Environmental Policy Act
O&M -	Operations and Maintenance
PPE -	Personal Protective Equipment
RfD -	Reference Dose
T&E -	Threatened and Endangered
USDA -	United States Department of Agriculture
USFWS -	United States Fish and Wildlife Service

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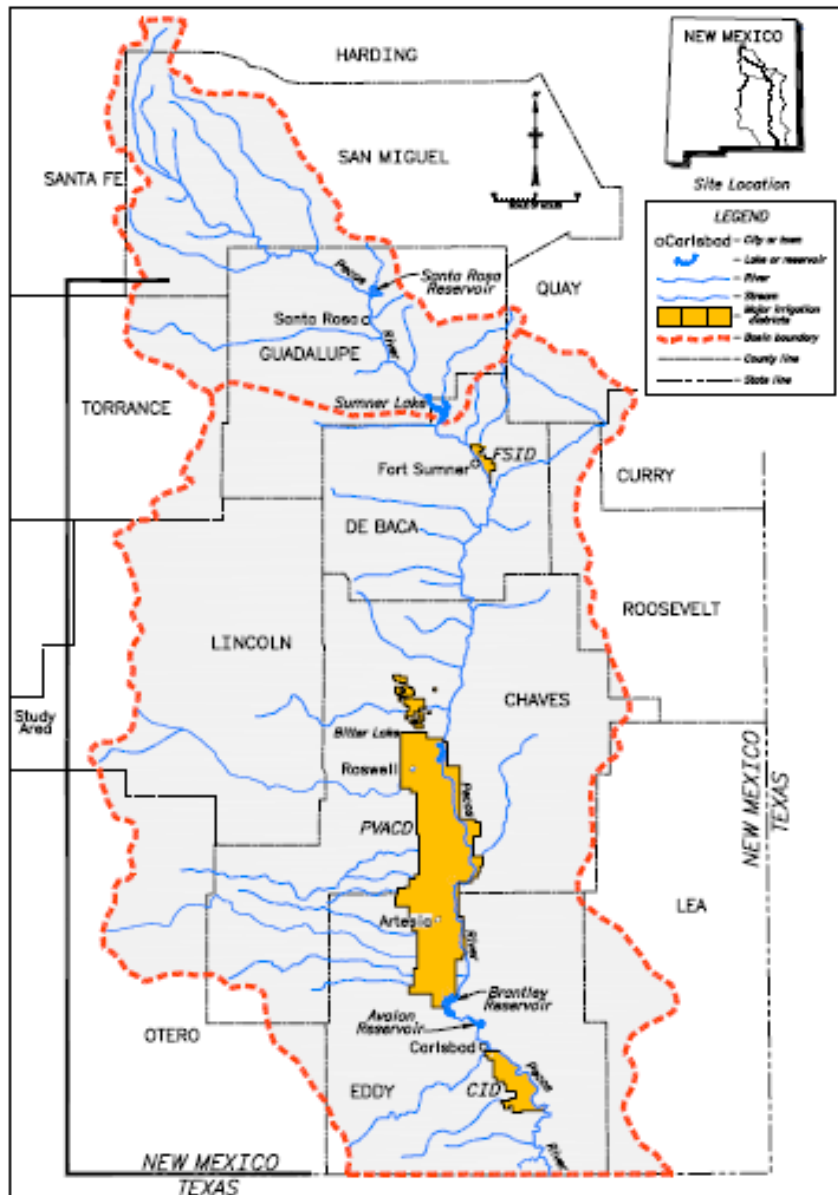
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Chapter 1 PURPOSE AND NEED

1.1 Introduction

The United States Department of the Interior, Bureau of Reclamation, Albuquerque Area Office, proposes to control and conduct long-term management of native and exotic plants on Sumner, Brantley, and Avalon Dams that are considered to be invasive, inhibit the proper inspection faces and structures, inhibit adequate access for normal emergency Operations and Maintenance (O&M) activities, threaten the structural integrity of dam structures, or adversely affect the adequate flow-carrying capacity of water conveyance structures. In addition, this analysis also addresses the management of weeds invading recreation sites at Brantley Lake and Sumner Lake State Parks and control of insect pests. Integrated Vegetation/Pest Management Plans were prepared and approved for all of the above mentioned facilities managed by Reclamation on the Pecos River (Guadalupe, DeBaca, Chavez, and Eddy Counties, New Mexico). Refer to Figure 1 for the locations of each facility. The Department of the Interior pesticide policy requires the preparation of plans for all pest control program on Interior owned lands. All viable manual, mechanical, and chemical (herbicide or insecticide) methods were addressed in the various Integrated Vegetation management (IVM) and Integrated Pest Management (IPM) plans. Each plan identified the objectives, IPM/IVM methods and strategies, mitigations; best management practices (BMPs), monitoring and follow-up actions, and safety.



Map 1.1 Pecos River basin location map

This Environmental Analysis (EA) has been prepared under the provisions of the National Environmental Policy Act (42 U.S.C. 4321 et seq.) and the Council on Environmental Quality regulations (40 CFR 1500).

Management objectives for the various units follow:

Sumner, Brantley, and Avalon Dam Faces and Structures: The objective is to remove all trees and shrubs that would interfere with the inspection of the dam faces and structures or compromised the structural integrity of the dam. Management of vegetation on the faces of the dams is necessary for the following reasons:

- To allow for proper surveillance and inspection of the structures and adjacent areas for seepage, cracking, sinkholes, settlement, deflection, and other signs of distress.
- To allow adequate access for normal and emergency Operation and Maintenance (O&M) activities.
- To prevent damage to the structures due to root growth, such as shortened seepage paths through embankments; voids in embankments from decaying roots from dead or damaged trees; expansion of crack or joints of concrete walls, canal linings, or pipes; and plugging of perforated or open-jointed pipes.
- To discourage animal/rodent activity by eliminating the food source and habitat.
- To allow adequate flow-carrying capacity of water conveyance structures (e.g., spillway inlet and outlet channels; open canals, laterals, and drains).

Riparian Areas on the River and Lakebeds: The objective for the lakebeds, especially the McMillan lakebed, is to study and develop methods to remove dense stands of saltcedar (*Tamarisk* spp.) and kochia (*Kochia scoparia*) and eventually begin implementation to remove the invasive plants and re-establish native vegetation, especially grasses and shrubs. Another objective would be to initiate control of infestations of other invasive plant species immediately following detection. The long-term view for management of vegetation in the lakebeds is to reduce the extensive infestations of invasive plant species and re-establish native vegetation like grasses and shrubs. These actions need to be done to prevent the build-up of the vegetation biomass that inhibits water conveyance and clogs structures.

Brantley Lake and Sumner State Park Recreation Sites: The goal of the New Mexico State Park and Recreation Division (New Mexico Department of Energy, Minerals, and Natural Resources) is to control unwanted vegetation (weeds) and insect pests to protect and enhance the investments made in developed areas and control pests to provide a

favorable environment for visitors. To meet this goal, managers have defined the following resource objectives:

- **Undesirable Plants:** Remove all undesirable grasses, broadleaf weeds, or trees that present a nuisance and hazard to visitors or are considered to be invasive.
- **Planted Trees:** Protect and improve the health of trees and prevent their loss from insect pests.
- **Harvester ants:** Reduce the nuisance to visitors caused by harvester ants to a negligible level.

The following IPM/IVM standards were established based on the assumptions that they are obtainable and measurable.

- **Control Effectiveness**
 - **Annual Control of Vegetation:** Treatments must show a strong potential for success, i.e., eighty (80) percent or higher control of selected plant species.
 - **Annual Control of Insects:** Over ninety (90) percent of insect populations must be controlled to protect trees or remove the nuisance factor caused by harvester ants.
- **Long-term Standards**
 - **Vegetation on Dam Faces and Structures:** After two (2) years of annual treatments, only one (1) to four (4) percent of the original number of undesirable plants would remain or invade the dam faces, which would require minimal follow-up maintenance control on a periodic basis.
 - **Vegetation in Riparian Areas Along the River and on the Lakebeds**
 - **Saltcedar:** Over three years, at least ninety seven (97) percent of the saltcedar population must be removed by aerial spraying to provide effective long-term control.
 - **Kochia:** Annual control would be required due to re-invasion from the extensive infestations adjacent to the lakebeds. Successful treatment is defined as the area needing control which would not exceed twenty (20) percent of the area treated in the previous year.

- Other invasive plant species: Following detection and control, the standard is one hundred (100) percent removal.
 - Re-vegetation: At least eighty (80) percent of treated sites must be able to be re-vegetated with native plant species. The Department of the Interior (DOI) Strategic Plan for 2003 to 2008 includes the goal to “sustain biological communities on DOI managed lands and waters in a manner consistent with obligations regarding the allocations and use of water.”
- **Efficiency**: The standard would be to select control methods that provide the maximum level of control at the least cost.
- **Cooperation**: The standard for cooperative agreements is to obtain approval of all involved parties prior to implementing vegetation control treatments.
- **Mitigations and Best Management Practices (BMPs)**: The standard is to ensure that vegetation control, especially the use of herbicides, and control of insects would be done according to technical guidelines and in compliance with policy and law. Pesticide applicators would be trained to ensure that they understand established mitigations and BMPs.
- **Monitoring and Records**: The standard is to maintain adequate records to assess the effectiveness of treatments. Project records would include the following elements:
 - Date of application
 - Undesirable plant or insect species
 - Control technique(s) used
 - Common name of pesticide(s) used
 - Description of formulation or tank mix
 - Application method (aerial, backpack, etc.)
 - Quantity (ounces/pounds) of pesticide used
 - Weather conditions (highest temperature, average wind speed, precipitation, etc.)
 - Estimate of acreage treated
 - Estimate of annual treatment success

- **Oversight:** The standard is to ensure that annual oversight and documentation of IVM/IPM programs are completed and meet the management objectives; treatments comply with standards, mitigations, and BMPs; and actions are in compliance with policies and law.

1.2 Proposed Action

Management actions can be optimized by adopting a systematic approach such as Integrated Vegetation Management (IVM) and Integrated Pest Management (IPM). Successful managers choose a variety of pest management options, such as prevention (Appendix E), containment, and control of invasive plants that have proven to be effective, economical, and environmentally acceptable. Control of insects will only be required when they are in sufficient numbers to damage trees or cause a nuisance to people. However, it must be realized when attempting to manage undesirable plants and insects that sustained control efforts, including follow-up treatments with pesticides, will be necessary to prevent reinvasion. Follow-up maintenance treatments would require less effort each year they are implemented. By implementing a well planned strategic IVM/IPM approach, following two (2) or possibly three (3) years of treatment, maintenance treatments in the future would only need to be done infrequently. With the exception of dam faces and structures, which need to be free of vegetation, a necessary component of IVM must be the maintenance or re-establishment of desirable vegetation on sites where control actions have been implemented. Re-vegetation would be especially important were control is done in riparian areas and lakebeds.

1.3 Need for the Action

- **Dam Faces and Structures:** Exotic and native species of woody shrubs and trees have invaded dam faces structures and the density of these plants is increasing. The roots of these trees and shrubs, such as saltcedar that can extend downward for more than fifty (50) feet, can compromise the structural integrity of the dams. Deep-rooted plants can also damage dam structures. Dense stands of grasses, annual broadleaf weeds, and perennial plants cover portions of dam faces preventing the ability of inspectors to check for seepage, cracking, sinkholes, settlements, deflections, or other signs of distress. Dense stands of plants, especially trees and shrubs, may eventually prevent adequate access for Operation and Maintenance (O&M) activities. Failure of a dam would present a serious threat to public safety and property in the floodplain along the Pecos River.
- **Riparian Areas on the River and Lakebeds:** Saltcedar and kochia are presenting major problems along riparian areas and the McMillan lakebed. Extensive and dense stands of saltcedar have restricted the width of the river, canals, and other water conveyance structures requiring periodic treatment. A major portion of the McMillan lakebed is covered with dense stands of

kochia. The growing condition is exceedingly favorable for the kochia and plants grow to over six feet in height. The kochia is highly competitive and has prevented desirable vegetation from being able to occupy the lakebed. Also, the massive amount of kochia biomass accumulates in canals and dam structures restricting water conveyance.

- **Brantley Lake and Sumner State Park Recreation Sites:** Undesirable weeds continue to infest recreation sites adversely affecting visitors. If left unchecked, plants like saltcedar, Malta starthistle, longspine sandbur, buffalo bur, and puncturevine will cover a larger area, become dense, and will become an increasing problem for visitors. Periodically, infestations of insects attack shade trees planted in campground, day use sites, and facilities. Heavy populations of aphid, caterpillars, and boring beetles will reduce their scenic quality and inhibit their health of the trees, and insecticides need to be used to protect the health of the shade trees. Harvester ant colonies invade recreation sites and their ability to sting people is a problem in campgrounds.

1.4 Purpose for the Action

- **Dam Faces and Structures:** Actions are needed to protect the structural integrity of dams and structures by allowing for (1) proper surveillance and inspection activities, (2) allow adequate access for normal O&M operations, (3) prevent damage to structures from the root growth of woody plants, (4) discourage animal/rodent activity by eliminating their food source and habitat, and (5) allow adequate flow-carrying capacity of water conveyance. Failure of a dam or structure could result in unacceptable loss of life and property along the Pecos River.
- **Riparian Areas on the River and Lakebeds:** Research and technique development are needed to develop control methods, including the use of herbicides, to control saltcedar and kochia. Once effective methods are developed, control operations would be needed to remove these undesirable species and allow for the re-establishment of native and other desirable plant species.
- **Brantley Lake and Sumner State Park Recreation Sites:** Herbicides would need to be used to remove undesirable plant species that present a problem to visitors in developed recreation sites. Also, insecticides would need to be periodically used to control insects that can damage shade trees in developed sites, and remove harvester ant colonies that are a nuisance to visitors.

1.5 Relevant Statutes, Regulations, and other Plans

Pertinent Laws and Regulations include:

- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
- New Mexico Department of Agriculture Pesticide Control Act
- National Environmental Policy Act (NEPA)
- Endangered Species Act (ESA)
- Migratory Bird Treaty Act
- Clean Water Act
- Any other pertinent state, local, or county regulations

1.6 Issues, Public Scoping

The Interdisciplinary Team developed the following issues that are a concern to Reclamation.

- **Issue 1.** Potential effects of the alternative upon human health (public and workers)
- **Issue 2.** Potential effects of the alternative on non-target vegetation, including threatened, endangered, and sensitive plants
- **Issue 3.** Potential effects of the alternative on non-target terrestrial and aquatic animals, including threatened, endangered, and sensitive animals
- **Issue 4.** Potential effects of the alternative on water quality

A scoping letter and this Draft EA will be sent to public to enlist their input concerning the issues that need to be addressed in the final EA.

1.7 Issues beyond the Scope of this Document

Vegetation management using biological methods will be analyzed under separate environmental analyses, and they will not be addressed in this EA. This information may be found in Reclamation's Programmatic Environmental Assessment/Biological

Assessment of the Carlsbad Project Vegetation Management Program, September, 15, 2004.

1.8 Incorporation by Reference

Regulations to implement the National Environmental Policy Act (NEPA) provide for the reduction of bulk and redundancy (40 CFR 1502.21) through incorporation by reference when the effect will reduce the size of the document without impeding agency and public review of the action. With the exception of the 1992 risk assessment (item 1), the other risk assessments can be found at the following website:

<http://www.fs.fed.us/foresthealth/pesticide/safetydata/risk/html>. A copy of the 1992 risk assessment will be available for review at the Bureau of Reclamation Albuquerque Area Office.

The following documents are incorporated by reference to ensure that the most recent information is reflected in this EA.

1. Risk Assessment for Herbicide Use in Forest Service Regions 1, 2, 3, 4, and 10 and on Bonneville Power Administration Sites (September 1992).
2. 2,4-D — WordPerfect Worksheets for Human Health and Ecological Risk Assessments. USDA Forest Service. November 24, 2001.
3. Clopyralid — WordPerfect Worksheets for Human Health and Ecological Risk Assessments. USDA Forest Service. November 28, 2001.
4. Selected Commercial Formulations of Glyphosate — Accord, Rodeo, Roundup, and Roundup Pro, Risk Assessment, Final Report. USDA Forest Service. April 25, 1999.
5. Effects of Surfactants on the Toxicity of Glyphosate, with specific Reference to Rodeo. USDA Forest Service. February 6, 1997.
6. Imazapyr — WordPerfect Worksheets for Human Health and Ecological Risk Assessments. USDA Forest Service. November 30, 2001.
7. Metsulfuron methyl — WordPerfect Worksheets for Human Health and Ecological Risk Assessments. USDA Forest Service. December 4, 2001.
8. Picloram — WordPerfect Worksheets for Human Health and Ecological Risk Assessments. USDA Forest Service. December 1, 2001.
9. Sulfometuron methyl (Oust) — WordPerfect Worksheets for Human Health and Ecological Risk Assessments. USDA Forest Service. November 23, 2001.
10. Triclopyr Acid (Garlon 3A) — WordPerfect Worksheets for Human Health and Ecological Risk Assessments. USDA Forest Service. November 23, 2001.
11. Triclopyr-Bee (Garlon 4) — WordPerfect Worksheets for Human Health and Ecological Risk Assessments. USDA Forest Service. November 23, 2001.
12. Neurotoxicity, Immunotoxicity, and Endocrine Disruption with Specific Commentary on Glyphosate, Triclopyr, and Hexazinone: Final Report. USDA Forest Service. February 14, 2002.
13. Vanquish (Dicamba) — WordPerfect Worksheets for Human Health and Ecological Risk Assessments. USDA Forest Service. November 27, 2001.

14. Sumner Dam Integrated Vegetation Management Plan – 2005-2010, Bureau of Reclamation.
15. Brantley Lake State Park Integrated Pest Management Plan – 2004-2009, March 2005, Bureau of Reclamation.
16. Sumner Lake State Park Integrated Pest Management Plan – 2006-2011, March 2005, Bureau of Reclamation.
17. Brantley and Avalon Dams Integrated Vegetation Management Plan – 2005-2010, November 2005, Bureau of Reclamation.
18. Programmatic Environmental Assessment/Biological Assessment of the Carlsbad Project Vegetation Management Program, Bureau of Reclamation, September 15, 2004.
19. Final Environmental Statement: Pecos River Basin Water Salvage Project, Bureau of Reclamation, February 26, 1979.

Chapter 2 ALTERNATIVES

2.1 Introduction

The alternatives are the heart of this environmental assessment, and this chapter describes the activities of both the No Action and the Proposed Alternatives. These alternatives will be evaluated against the issues in Chapter 1, and those that will be later developed during public scoping, with respect to the affected environment described in Chapter 3, providing a clear basis for choice among the options available for the decision maker and the public. This chapter displays the two alternatives developed in response to issues identified by an Interdisciplinary Team. Also, all practical alternatives were evaluated in the development of the IPM/IVM plans for each of the management units. Additional alternatives were identified during the analysis process, but they were eliminated because they were outside the scope of the proposed action, irrelevant to the decision to be made, or conjectural and not supported by scientific or factual evidence. IPM/IVM plans contain mitigation measures, Best Management Practices (BMPs), and a Safety and Spill Plan which pertain to each of the alternatives to address significant issues (Reference Chapter 5, Appendix C, and Appendix D).

2.2 Description of the Alternatives

2.2.1 Alternative A: No Action

The intent of this alternative would be to eliminate the use of IPM/IVM methods, especially those involving the use of pesticides, to control undesirable plant species on Reclamation lands and/or where management is done by cooperating agencies on Sumner, Brantley, and Avalon Dams and along the Pecos River and in lakebeds. Likewise, at Brantley Lake and Sumner Lake State Parks, herbicides would not be used to control undesirable plants and insecticides would not be used to control insects on planted trees and harvester ants in recreation developed sites.

Under this alternative, mechanical removal under the Pecos River Basin Water Salvage Project, which is covered by another environmental analysis, would continue. Since the 1960s, Reclamation has continued an annual program to mechanically treat approximately 33, 000 acres on the Pecos River in New Mexico to keep the sites free of saltcedar. This originally was a federally approved project between New Mexico and Texas. The Secretary of the Interior was to implement a continuing program to reduce the non-beneficial consumptive use of water in the Pecos River Basin, including the removal of saltcedar and other undesirable invasive species. The Texas portion was stopped in 1973 as a result of a lawsuit. Subsequently, the scattered treatment sites on both sides of the river have been maintained from Santa Rosa, New Mexico, to the State line of Texas. Treatment sites are distributed as follows: 40% south of Carlsbad, 40% north of Artesia just north of Roswell at the New Mexico State Game Refuge, and about 20% between Santa Rosa and the Ft. Sumner Irrigation District. Under contract RO910 with the Carlsbad Irrigation District (CID), the sites are mechanically cleared of any new saltcedar growth each year, utilizing Reclamation equipment and labor furnished by CID.

Mechanical removal of saltcedar by the CID along the floodway in McMillan lakebed would continue to be done. Annually, a strip about six (6) miles long by 200-300 feet in width is mowed once for twice a year to assure passage of flood flows in case such an event might occur.

Also under this alternative, individual hand or mechanical removal of trees and shrubs on dam faces or by structures would be done. Likewise, hand-pulling or grubbing of undesirable plants in developed sites at Brantley and Sumner Lake State Parks could be done.

This alternative would not involve the use of insecticides to control aphids or caterpillars infesting trees. Removal of aphids could be partially accomplished by the use of high pressure spraying with water. However, the damage or loss of planted trees at Sumner Lake State Park would have to be accepted as well as the cost of planting replacement trees.

Herbicides would not be used to control the extensive stands of saltcedar or kochia in the McMillan lakebed. These exotic plant species would continue to infest the site and it would not be possible to implement any effective restoration/rehabilitation actions with native plant species.

2.2.2 Alternative B: Proposed Action

Reclamation proposes to authorize its employees, the Carlsbad Irrigation District (CID), the New Mexico State Park and Recreation Division (New Mexico Department of Energy, Minerals, and Natural Resources), other cooperators, and contractors to use pesticides on agency managed lands and facilities. The use of pesticides would be an integral part of an IPM/IVM strategy as outlined in approved plans.

Different strategies would be needed to address undesirable plant problems on the dam faces and structures and the lakebeds.

- **Dam Faces and Structures:** The treatment goal would be to remove all trees, shrubs, and other undesirable plants on dam faces, roadsides, and near the spillways or near structures that have the potential to cause damage or interfere with access or inspection operations. After two (2) to three (3) years of treatment, maintenance treatments would only need to be done infrequently to remove a few plants that invade the dam faces. One-seeded juniper and other trees that do not sprout will be removed by cutting them as close to the ground as possible. Hand-grubbing of narrowleaf yucca and prickly pear cacti would provide effective and economical control of scattered plants. It would be especially important to obtain root-kill of trees like saltcedar with either Garlon 3A (cut stump method) or Garlon 4 (oil basal method). Honey mesquite, and the various woody shrubs using Tordon 22K (water basal application method) or an oil basal application of Garlon 4. These trees and shrubs readily sprout; thus, they will need to be treated with an herbicide (picloram or triclopyr) to obtain root-kill. Foliar applications of an herbicide (glyphosate) would be the preferred technique to remove plants like buffalo bur, longspine sandbur, and silverleaf nightshade. The initial treatment would require the most work and cost, but subsequent treatments would involve significantly less effort and will only need to be done infrequently. Re-vegetation of treatment sites on the dam faces is not needed since the objective is to maintain the dam faces free of trees, shrubs, or other plants.

- **Riparian Areas on the River and Lakebeds**
 - **Saltcedar**
 - **Aerial Application of Herbicide:** Dense stands of saltcedar over large acreages can be effectively controlled through the aerial application of imazapyr or a mixture of imazapyr and glyphosate. For optimal control, applications should be done from late August through September prior to foliar color change when plants are actively growing. These herbicides are slow acting and treated trees should not be removed for a period of three (3) years to achieve the desired root kill. It has been found that over 97 percent of trees must be killed in a treatment area to provide long-term control results, and revegetation is usually required to obtain sustainable, long-term results. If there are any nearby or upstream stands of saltcedar, it must be realized that they will often lead to rapid reinvasion of treatment sites, especially if natural regeneration does not occur or artificial plantings do not result in adequate ground cover to offer some competition to the development of saltcedar seedlings. Aerial application would only be attempted if the entire stand of saltcedar can be treated to achieve the

long-term objective of 97 percent control followed by mechanical removal of the dead stems and revegetation of treatment sites.

○ **Kochia**

- **Mechanical Treatment:** To be effective, mechanical treatments would have to remove all kochia plants in a project area before they set seed. Since the majority of kochia seeds are not viable for more than one year, preventing seed production by mowing can substantially reduce infestations the following season. The best time to mow plants is before they exceed two (2) feet in height to reduce the amount of vegetative matter left on the ground. The combined biomass in treatment areas can present problems by clogging dam and irrigation structures. Cutting the kochia for feed would be another viable option. Kochia has been used as livestock feed during droughts. As a forage crop, kochia is noteworthy because it has good drought tolerance, salinity tolerance, good leafiness, high yields, and it has high protein and carbohydrate content. Kochia can, however, be harmful or toxic to cattle if it comprises more than half (50 percent) of their diet. Kochia contains toxic substances including saponins, alkaloids, oxalates, and nitrates. Animals that consume large amounts of this plant may exhibit a range of health problems and have lower weight gains. Since each plant can produce up to 25,000 seeds a year, all plants on selected sites will need to be removed. The initial treatment of the extensive infestations, such as on the McMillan lakebed, would be time-consuming and costly. In addition, kochia infestations on adjacent sites may need to be controlled to prevent wind dispersal of seeds into the project area. The major difficulty associated with removal of the almost pure stands of kochia would be that there are no other plants present that have the capacity to occupy the treatment site. The high clay content of the area more than likely plays a significant role for vegetation reestablishment. Bare ground would not be acceptable, especially since it is highly probable that the site would be occupied by another exotic plant species that could be as much or more of a problem than kochia. Also, bare ground would be subject to creating dust storms during windy weather. Therefore, seeding would be necessary to occupy the site and prevent invasion by undesirable plants. Without a viable re-vegetation option, mechanical removal would not be a viable IVM option. Research in developing viable herbicide options of control need to be completed. Control with herbicides would occur following successful development of viable herbicide and re-vegetation options.
- **Application of Herbicides:** Several herbicides would effectively control kochia. Glyphosate, imazapyr, dicamba, pendimethalin, metsulfuron methyl, sulfometuron methyl, and 2,4-D products would

work. If desirable grasses are present, selective herbicides like Escort (metsulfuron methyl), 2,4-D, or dicamba (Clarity or Banvel) would remove kochia and have little or no effect on the grasses. Arsenal (imazapyr) or Accord (glyphosate) are broad spectrum herbicides that could be used where bareground control would be acceptable. Glyphosate and 2,4 -D would likely be the most cost effective products to use. However, if glyphosate might be used, ammonia sulfate (17 pounds/100 gallons of spray) must be added to prevent any potential antagonism (i.e., undesirable chemical reaction) with divalent cations in alkaline water common in New Mexico. The herbicides can be applied by on-the-ground power sprayers or by aerial application. Ground sprays work well on relatively flat ground where access is good and the equipment can be operated. Aerial application would be more cost effective for treating large tracts, especially where access may be difficult or impossible. The key to success in applying herbicides would be to spray early when the kochia plants are small. This plant is the first to emerge in the spring and it is usually well advanced by the time other broadleaf weeds emerge. Good coverage would also important, and the more persistent products, such as Escort, would provide extended results. However, if there are no desirable plant species present to occupy the site and prevent invasion by undesirable species, the herbicidal option ends up having the same problems as the mechanical techniques. Again, more research is needed to examine re-vegetation options before the use of herbicides can be implemented.

- **Control of Weeds and Insect Pests at Brantley and Sumner Lake State Parks**
 - **Hand Removal of Weeds:** When practical, hand removal or grubbing of individual plants would be the preferred approach.
 - **Foliar Application of Weeds:** Spot applications of Curtail (mixture of 2,4-D and clopyralid) and glyphosate (Accord XRT® or a similar product) would be considered for use to control Malta starthistle, longspine sandbur, buffalo bur, Russian thistle, cocklebur, and puncturevine when there are too many plants to be removed by hand methods. Since glyphosate would kill many broadleaf plants and grasses, it would only be used for spot applications mostly limited to graveled areas around campsites and shelters, roadsides and walkways, near buildings, and other sites frequented by Park visitors.
 - **Surface-Applied Preemergent Herbicide to Prevent Weeds:** Oryzalin (Surflan® WDG Speciality Herbicide) would be considered for use to prevent weed species from emerging if applied over the ground in gravelly

areas around campsites and shelters and other similar sites to keep them free of weeds.

- **Control of Aphids, Caterpillars, and Other Insects on Trees at Brantley and Sumner Lake State Parks**
 - **Physical Removal of Aphids:** For low to moderate densities of aphids, a high pressure stream of water could be used to wash-off the insects. This method will kill most of the aphids and protect the health and visual quality of the trees.
 - **Insecticidal Control of Aphids, Caterpillars, and Other Insects on the Foliage of Trees:** With dense populations of aphids and caterpillar (Lepidoptera) infestations, a foliar application of malathion or acephate (Orthene®) would be considered for use to protect the health and visual quality of trees. Infestations would need to be detected early, prior to significant defoliation, to allow for maximum benefit from the application.
 - **Borers on Cottonwood Trees:** For weakened or unhealthy trees, a two (2) percent solution of the insecticide (Sevin® SL) could be applied to the trunk and large limbs of such susceptible trees to protect them from being attacked by beetles (Coleoptera) and other boring insects.
 - **Harvester Ants:** Individual nests of harvester ants could be controlled by distributing two (2) tablespoons of Amdol® Pro (hydramethylnon) bait around the mound. Care must be taken during the application to not disturb the mound. Also, kitchen utensils must not be used to apply this bait.

Table 1 - Comparison of alternatives

Measurement Parameters	Alternative A - No Action (No Herbicide Use)	Alternative B – Preferred Alternative (Includes Herbicide Use)
Addresses the purpose and need?	No. Vegetation on dam faces, especially deep-rooted trees and shrubs, could not be effectively controlled by manual or mechanical methods. Public safety and protection of property would be at risk due to the potential failure of dams and structures. Also, management of saltcedar and other exotic plant species invading	Yes. Allows for the selection of a full range of Integrated Pest and Vegetation Management options, including the use of herbicides and insecticides. Offers the best protection of dams by removing deep-rooted plants that could compromise the structural integrity and provides for the safety of the public and



	lakebeds, in and around facilities, and other sites on Reclamation lands could not be effectively achieved. On Brantley Lake and Sumner Lake State Parks, it would not be possible to maintain or improve the health of planted trees by manual methods. Finally, harvester ant colonies could not be effectively managed, and they would diminish the recreational experience of visitors.	property. Control of undesirable plant infestations in lakebed would provide an opportunity to re-introduce native plant communities. The ability to effectively manage vegetation and insect pests at Brantley and Sumner Lake State Parks would provide the best opportunity to maintain or improve recreational conditions for visitors.
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Measurement Parameters	Alternative A - No Action (No Herbicide Use)	Alternative B – Preferred Alternative (Includes Herbicide Use)
Consistent with statutes, regulations, and other plans?	No. Not responsive to Reclamation policy to protect dams, structures, and facilities to provide for the protection of public safety and property. Also, the mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public would not be met. Finally, it would not be possible to restore native plant communities in lakebed and other Reclamation lands.	Yes. This alternative would allow Reclamation and cooperators and contractors to effectively manage vegetation and insect pests to achieve the stated mission and policies.

2.3 Alternatives Considered but Eliminated from Further Study

- Burning:** On sites where there are dense stands of kochia, fire could be used to remove the build up of dead vegetative material to avoid the potential problem of clogging irrigation and dam structures. However, since the plants would not burn until they begin to dry out, seed production would already have occurred, and burning would provide acceptable control the following



season. Also, burning large tracks of kochia would open the sites to unacceptable erosion from wind. Burning could be considered to remove the large amount of biomass, but would require obtaining all necessary environmental compliance and associated permits. Burning of dead kochia is not considered a viable vegetation management approach.

- **Biological Control of Saltcedar:** Research is underway to evaluate the effectiveness of a leaf beetle, *Diorhabada elongata*, to control saltcedar on the Pecos River. However, it is not known if this method will address the management objectives for Reclamation. Other biological control agents are not available for use in managing the identified pests.
- **Use of Organic Herbicides and Chemicals:** To be considered for use in managing or controlling a weed or other pest, chemicals must have a registration in compliance with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended. So, it would be illegal to use any chemical like salt or diesel oil to kill plants. There are some products, such as vinegar, that will control some plants, but such products are not cost-effective and they are more toxic than the proposed herbicides. Thus, they were eliminated from detailed consideration.
- **Grazing with Goats or other Livestock:** Goats are being evaluated for their potential to manage weeds, such as saltcedar, but further study will be needed before this method will be considered as a viable method to achieve the management objectives identified for this analysis.

2.4 Discussion of the Preferred Alternative

The preferred alternative would involve the use of eleven (11) herbicides and four (4) insecticides. All of the pesticides being considered are registered products by the U.S. Environmental Protection Agency and the Bureau of Pesticide Management, New Mexico Department of Agriculture.

2.4.1 Herbicides to Control Undesirable Vegetation

Herbicides proposed for use include clopyralid, dicamba, glyphosate, imazapyr, metsulfuron methyl, pendimethalin, picloram sulfometuron methyl, triclopyr, and 2,4-D. With the exception of picloram, all of these herbicides are classified as general use products that can be purchased by the public. Picloram is a “restricted use” herbicide, and applicators must be Certified Applicators to purchase and use this herbicide. These herbicides are marketed by a variety of trade names (Table 2).

Table 2 - Herbicide trade name list

Common Name	Trade Name
Clopyralid	Curtail (also contains 2,4-D)
Dicamba	Vanquish/Clarity/Banvel
Glyphosate	Accord XRL or similar products
Imazapyr	Arsenal
Metsulfuron Methyl	Escort
Oryzalin	Surflan WDG
Pendimethalin	Pendulum
Picloram	Tordon 22K*
Sulfmeturon Methyl	Oust
Triclopyr	Garlon 3A, Garlon 4, or similar products
2,4-D	Hardball or similar products and Curtail

*Restricted Use Product requiring certification

Herbicides are categorized as selective and non-selective. Selective herbicides can kill certain groups of plants and have little or no effect on other plants. For example, 2,4-D is a selective that can kill certain broadleaf plants, but grass species are tolerant of this compound, unless it is applied at a heavy level, which would exceed the recommendation on the pesticide label. So, certain herbicides can be selective depending on the amount and application technique used. For example, catclaw acacia can be controlled more effectively with less picloram than is needed to achieve the same level of control of honey mesquite. In this instance, the lower amount of picloram will have a lower level of potential effects on non-target plants growing immediately adjacent to the treated shrubs. Picloram, dicamba, clopyralid, and 2,4-D are all auxin-type compounds that affect the growth of plants and are selective for broadleaf plants, making them effective tools in some environments for manage difficult to control woody species while maintaining grasses. On the other hand, glyphosate and imazapyr are non-selective herbicides that can kill a broad spectrum of plants, including monocotyledons (grasses) and dicotyledons (broadleaf plants). Care must be taken when broad-spectrum herbicides are considered for use around desirable and other non-target plant species, especially those that are considered to be sensitive or rare.

There is considerable variation in the persistence of herbicides in the soil (Table 3). Some compounds can remain for over a year while other chemicals break-down in a few days. Long-term persistence in soil can be a beneficial trait for control of some plants, such as woody species like honey mesquite. Also, the residual herbicide in the soil can prevent development of the next generation of plants arising from seed. Glyphosate, 2,4-D, and dicamba are short-lived herbicides that remain in the soil for less than a month.

Table 3 - Persistence (average half-life) in soil for the herbicides proposed for use (Vencill 2002)

Herbicide	Persistence in Soil
Clopyralid	40 days
Dicamba	Less than 14 Days*
Glyphosate	47 Days
Imazapyr	25-142 Days*
Metsulfuron Methyl	30 Days
Oryzalin	20 Days
Pendimethalin	44 Days
Picloram	90 Days*
Sulfmeturon Methyl	2-28 Days
Triclopyr	30 Days
2,4-D	10 Days

*May persist significantly longer under conditions of low moisture, rainfall, and certain soil types.

All of the herbicide proposed for use, except for 2,4-D, are classified by the U.S. Environmental Protection Agency as being slightly toxic (Category III) to almost non-toxic to humans (Category IV). However, 2,4-D is rated moderately toxic (Category II), but the use of protective equipment and following safety procedures will reduce the risk to applicators. It should be understood that humans and plants have different metabolic pathways, and a compounds that is toxic to plants can be relatively non-toxic to humans (Table 4 and 5). The same concept applies to fish, birds, and species of wildlife.

Table 4 - Categories of acute pesticide toxicity and the associated signal word (Miller 1997)

Category	Signal Word Required on Label	Approximate Oral Dose That Can Kill an Average Person
I (Highly Toxic)	DANGER POISON!	A few drops to 1 teaspoon [or a few drops on the skin]
II (Moderately Toxic)	WARNING!	Over 1 teaspoon to 1 ounce
III (Slightly Toxic)	CAUTION!	Over 1 ounce to 1 pint or 1 pound
IV (Relatively Nontoxic)	CAUTION!	Over 1 pint or 1 pound

Table 5 - Relative acute toxicity and toxicity category of herbicides and common household compounds (Vencill 2002)

Common Name or Designation	Oral LD50 for Rats (mg/kg)	Toxicity category
Clopyralid	>5,000	IV
Dicamba	>5,000	IV
Glyphosate	>5,000	IV
Imazapyr	>5,000	IV
Metsulfuron Methyl	>5,000	IV
Oryzalin	>5,000	IV
Pendimethalin	>5,000	IV
Picloram	>5,000	IV
Sulfmeturon Methyl	>5,000	IV
Triclopyr	>1,500	III
2,4-D	375	II
Aspirin*	750	III
Caffeine*	200	II
Ethyl Alcohol*	13,700	III
Sugar*	30,000	IV
Table Salt*	3,320	IV

* Provided only for comparison of toxicity to herbicides.

A more detailed description of each herbicide proposed for use follows (See Table 1 for a listing of trade Names).

- Clopyralid:** This is a selective, post-emergence herbicide that is mainly used to control broadleaf species in three plant families: composites (Asteraceae), legumes (Frabraceae), and buckwheats (Polyganaceae). Its selectiveness makes this herbicide a useful material for control of invasive plants like Malta strathistle while preventing adverse effects to many native species. Grass species are especially tolerant to clopyralid. This herbicide is readily absorbed by roots and foliage and is readily transported in plant tissues. There is some information indicating that clopyralid may be more persistent in compost and soil, but there are no plans to use any compost on State Parks where this herbicide is proposed for use. This material has moderate persistence, high mobility, and high leaching potential. Thus, it would not be used near water in compliance with label requirements. The product is **Curtail**, which is a mixture of clopyralid and 2,4-D.
- Dicamba:** Dicamba is a broad spectrum herbicide used for control of broad-leaf plants. It is a growth-regulating herbicide readily absorbed and translocated from either root or foliage. This compound produces effects similar to 2,4-D. It has moderate persistence (half-life in soil under 14 days), high mobility, and high leaching potential. This herbicide would not be used within a ten (10) foot buffer zone of water or areas identified as shallow and

sensitive aquifers. Since it can move in surface runoff, it would not be used where impervious surfaces (compacted earth) exist proximal to water. However, the use of vegetated buffer zones would mitigate the risk of runoff-related contamination to surface water sources. *Vanquish, Clarity, and Banvel* are products labeled for non-crop situations. Dicamba can be mixed with 2,4-D to increase its effect on certain plants.

- **Glyphosate:** This is a non-selective herbicide that controls virtually all annual and perennial weeds, but it is generally most phototoxic to annual grasses. It works by inhibiting amino acid pathways in plants. These amino acid pathways are not found in animals; thus, this herbicide has relatively low toxicity to humans. The compound is absorbed by foliage, but rainfall within six (6) hours may reduce effectiveness. It has no soil activity. Persistence and mobility are low, and the compound tends to adhere to sediments when release into water. *Roundup* and *Accord* are commercial names of formulations registered for terrestrial applications, and *Rodeo* is an aquatically labeled formulation. Since this herbicide kills a broad spectrum of plants, care is needed when it is to be applied to avoid adverse effects on adjacent non-target and desirable plant species.
- **Imazapyr:** This herbicide is non-selective and it provides pre-emergence and post-emergence control, including residual control, of a variety of grasses, broadleaf weeds, and woody plants. Half-life in soil ranges from 25-142 days, depending on soil type and environmental conditions (Vencill 2002). Foliar absorption usually is rapid (within 24 hours). The product name is *Arsenal*. *Habitat* is an aquatic formulation.
- **Metsulfuron Methyl:** This is a sulfonylurea herbicide that is primarily absorbed through the foliage. It interrupts a biological process necessary for plant growth. It is a dry flowable that is mixed with water and applied at very low rates (1-3 ounces per acre) for control of a variety of weed species, including such difficult to control species as hoary cress (whiteweed, *Cardaria draba*) and perennial pepperweed (*Lepidium latifolium*). It is moderately residual in soil with a typical half-life of 30 days (Vencill 2002). The product labeled for non-crop areas is called *Escort*.
- **Oryzalin:** This herbicide should be applied to the soil prior to when undesirable plants develop from seeds. It is thought to be absorbed by roots. Most susceptible annual grasses and small-seeded broadleaf weeds fail to emerge. It is beneficial to have rain to increase the herbicidal properties of this compound, but wetting the soil by sprinkling would be worthwhile if there is no possibility of rain. This herbicide has a short to moderate residual in soil with a typical field half-life of 20 days. This compound has limited leaching under natural rainfall conditions. The trade name is *Surflan WDG*.

- **Pendimethalin:** This herbicide provides pre-emergent control of most annual grasses and certain broadleaf weeds as they germinate in any non-cropland site. The formulation is mixed with water and applied to the soil. The active ingredient is absorbed by roots, and it works by inhibiting polymerization of microtubules at the growth end of the tubule; thus preventing the alignment and separation of chromosomes during mitosis. It has little leaching potential and the soil half-life is about 44 days. The trade name is *Pendulum*.
- **Picloram:** Picloram is an active ingredient in *Tordon 22K*, which is the trade name. It is an organic chemical that is a plant growth regulator used for controlling unwanted broadleaf vegetation. Grasses are generally not susceptible to this herbicide. Picloram is considered to be rate-selective, meaning that the plants that can be controlled are dependent upon the rate of application. At one pint per acre, picloram kills knapweeds while leaving many native species unharmed. At one quart per acre for leafy spurge control, this herbicide kills many more plant species. It is commonly used to control woody shrubs and trees by spot applications of a water solution applied to the base of target plants. This is the only “restricted use” herbicide proposed for use, and the purchase and application of this compound can only be done under the direction of a certified pesticide applicator with a valid license. The average field half-life is 90 days (Vencill 2002), although it can persist for a longer period of time. Its persistence makes it particularly useful for control of weeds, but it must be used in such a way that it does not contaminate water.
- **Sulfometuron Methyl:** This compound is another sulfonylurea herbicide that has broad spectrum properties. It is a dry flowable material that is mixed with water and is toxic to target plants at very low rates (1 to 3 ounces per acre). The active ingredient is readily absorbed by roots and foliage; thus, it is used as a pre-emergent and post-emergent herbicide. The product name is *Oust*. Great care is needed to prevent dispersal of this product by wind or water to off-target areas.
- **Triclopyr:** This herbicide is selective and especially useful for controlling trees and woody shrubs. It acts by mimicking the activity of auxin, a natural growth hormone. The active ingredient is readily absorbed by foliage. Average half-life in soil is 30 days (Vencill 2002). Commercial formulations, *Garlon 3A* and *Garlon 4 (or similar products)* are used for vegetation management programs, and *Renovate 3* is a new aquatic formulation.
- **2,4-D:** This is one of the most commonly used home and garden herbicides in the United States, and it is one of the most extensively studied. It is a selective, foliar absorbed, translocated, phenoxy herbicide used mainly in post-emergence applications. The action that kills plants mimics natural plant hormones. 2,4-D is effective against many annual and perennial broadleaf weeds. Plants are most susceptible when they are young and growing rapidly. The average field half-life is 10 days. An important utility of 2,4-D is in

riparian areas for products with an aquatic label. There are many different brands for sale on the market, such as *Hardball* and *Weed-Be-Gone*, which can be purchased by the public in grocery stores, nurseries, etc. *Curtail* is a mixture of chlopyralid and 2, 4-D.

Active ingredients in herbicide formulations are defined as the chemicals that actually control the weed. So, imazapyr, picloram, and the other herbicides discussed earlier in this chapter are active ingredients. Because the water solubility of the some of these active ingredients is too low to feasibly dissolve large amounts in water, other ingredients are mixed with them to create a formulation. Other active ingredients like ester formulations of triclopyr are mixed with vegetable oils and products like limonene, which is a compound needed to move the active ingredient through bark for oil-basal bark applications for plants like saltcedar. These additional chemicals are called “inert ingredients” because they are not toxic to weeds at the designated rates of application (Felsot 2001).

Inert ingredients are identified on the herbicide label as a percentage of the entire formulation weight or volume. For example, the formulation containing imazapyr is called Arsenal. Arsenal is composed of 28.7 percent imazapyr and 71.3 percent inert ingredients. Thus, the majority of this formulation is actually inert ingredients.

Under pesticide law, the specific chemicals and amounts in the inert ingredients is considered proprietary information and they do not have to be identified. However, some manufacturers have released the list of inert ingredients and they have been posted on the Internet.

The Environmental Protection Agency (EPA) has identified about 1,200 inert ingredients that are used in registered pesticides. The EPA reviews existing human health data for inert ingredients including common carriers. The existing data include laboratory studies, epidemiological studies, and activity and structure relationships. EPA categorized inert ingredients into one of four categories:

Level 1 includes inert ingredients of toxicological concern.

Level 2 inert ingredients are potentially toxic and considered of high priority for further testing.

Level 3 inert ingredients are considered of “unknown toxicity.” For these chemicals, the data is insufficient to classify them at a higher level or at a lower level of concern. It must be understood, however, that the chemicals on this list do have some toxicity information, but EPA has not made a decision as to their classification. A number of chemicals on this list are also used in commonly sold consumer products without incident (Felsot 2001). Level 3 inert ingredients that may be used in herbicide formulations include borax, carbon dioxide, castor oil, jojoba bean oil, orange oil, and coconut oil soap. Bear in mind that inclusion of a

chemical on the Level 3 list does not mean the chemical is hazardous when it would be used in a prudent manner.

Level 4 inert ingredients are regarded by the EPA as being generally innocuous. Thus, the EPA indicates there should be no concern relative to adverse effects on public health or the environment when Level 4 compounds are used in herbicide formulations.

Inert ingredients likely to be in herbicide formulations to be used in New Mexico include water, ethanol, isopropanol, triethylamine, EDTA (ethylenediaminetetracetic acid), polyglycol non-ionic surfactant, triisopropanolamine, and versene acid. None of these inert ingredients are listed as Level 1 or 2 compounds. The water and alcohols (ethanol and isopropanol) are Level 4 compounds, and all others are listed as Level 3.

The same method used to assess the risk of exposure and effects applied to herbicide active ingredients can be applied to the inert ingredients. The 1992 Risk Assessment for the Southwestern Region provided herbicide carrier profiles for diesel oil, limonene, kerosene, and mineral oil (III-C-90 to III-C-94), although diesel oil and other petroleum hydrocarbons will not be used as herbicide carriers added to tank mixes. However, some herbicide formulations may contain minor amounts of some petroleum hydrocarbons.

Herbicides are widely used for vegetation management because low hazard products are available, they can be safely applied in a variety of terrain, and they can effectively decrease the economic costs of management. Compared to other methods of control, herbicides can provide the highest level of control at the least cost. For example, a study of the cost and efficacy of spotted knapweed management with integrated methods in Montana provided the following results (Brown, et al. 1999): (1) Tordon 22K at one pint per acre, 95 percent control of plants at \$30.75 per acre; (2) mowing, no plant control at \$200 per acre; (3) hand-pulling, 25 percent control plants at \$13,900 per acre.

2.4.2 Insecticides to Control Insects Attacking Trees and Harvester Ants

The preferred alternative would involve the use of four (4) insecticides, including:

- **Malathion:** This insecticide is available to the general public and is commonly used to control insect pests that attach trees, shrubs, and other ornamental plants. Malathion is a compound that kills insects that are directly sprayed or come in contact with it. It can be used to achieve effective control of aphids or caterpillars feeding on foliage. The Signal Word on the label is CAUTION, it is a TOXICITY CLASS III chemical, and the oral LD50 for rats is above 5,000 mg/kg. Malathion is a short-lived insecticide that degrades within a few hours of application when exposed to full sunlight.
- **Acephate:** Acephate is a contact and systemic insecticide that also will provide effective control of aphids and insects that feed on leaves of trees. This insecticide is another commonly used material that is available to the public to

control pests that attack trees and shrubs. The Signal Word on the label is CAUTION, it is a TOXICITY CLASS III chemical, and the oral LD50 for rats ranges from 700 to 980 mg/kg. Since the chemical is systemic and is absorbed by the plant, it can provide excellent control of insects like aphids.

- Carbaryl: This insecticide is possibly the most commonly used home and garden compound used in the United States. It is known by its trade name **Sevin**. This compound will maintain its insecticidal properties for about seven (7) days when applied to the foliage of trees, vegetables, or other plants. It has some contact action, but this chemical is mainly a stomach poison to insects that feed on foliage. Therefore, carbaryl is an effective material that can be used to kill caterpillars that feed on leaves, but it is not particularly effective in controlling aphids. In addition, carbaryl is often used to control pests that bore into the limbs and trunks of trees. It binds with the bark and can maintain effectiveness for up to a year. Therefore, Sevin SL can be applied to the bark trees as a preventive spray, and attacking beetles will be killed before they can bore into the inner bark and damage the tree. The Signal word is WARNING, it is a TOXICITY CLASS III chemical, and the oral LD50 for rats ranges from 246 to 283 mg/kg.
- Amdol® Pro (hydramethylnon): This bait is a yellow-tan granular material that has an odor characteristic to vegetable oil. It is a slow acting material that will effectively control harvester ants. The Signal Word on the label is CAUTION, it is a TOXICITY CLASS III chemical, and the oral LD50 for rats is >5,000 mg/kg.

Backpack, hand-held sprayers, or power sprayers can be used to apply malathion or acephate to the foliage of trees with infestations of aphids or caterpillars, and the same equipment can be used to apply a two (2) percent solution of carbaryl to the bark of limbs or the trunks of shade trees that are subject to attack by borers. Trees should only be treated with malathion or acephate when insects are present in sufficient numbers to damage foliage and reduce the visual quality of the shade trees. Therefore, spraying may not be necessary on an annual basis.

A Amdol® Pro bait will only be applied at two (2) tablespoons of material around the mound of ant nest that pose a nuisance risk to Sumner State Park visitors.

Chapter 3 AFFECTED ENVIRONMENTS

3.1 Introduction

This chapter summarizes human activities and existing environmental conditions within the facilities managed by Reclamation on the Pecos River (Guadalupe, DeBaca, Chavez, and Eddy Counties, New Mexico) as they pertain to the key issues identified in Chapter 1.6. Four (4) initial issues were developed and evaluated by the Interdisciplinary Team. Additional issues may be developed for this Draft EA by requesting input from the public through scoping. Each issue will be addressed later in this chapter. The affected

environment for each of the issues described in association with the actions is outlined in this EA.

The natural environment of the Pecos River from Sumner Lake south to the border with Texas is included in the Carlsbad Project. This Project is in southeastern New Mexico near Ft. Sumner and Carlsbad. The Carlsbad Project stores water in Santa Rosa (a Corps of Engineers Dam), Sumner, Brantley, and Avalon Dams to provide water for about 25,000 acres within the Carlsbad Irrigation District. Project features include Sumner Dam and Lake Sumner (formerly Alamogordo Dam and Reservoir), McMillan Dam (breached in 1991 and replaced with Brantley Dam), Avalon Dam, and a drainage and distribution system to irrigate 25,055 acres of land in the Carlsbad area (Refer to Figure 1).

Located in the Chihuahuan Desert, the Carlsbad Project area exhibits mostly sun-drenched days during the 212-day growing season. The water supply for the Project comes from the Pecos and Black Rivers. The Carlsbad Project was one of the earliest Reclamation projects and is significant as a surviving example of mixed 19th and 20th century technology. Many features of this project are listed on the National Register of Historic Places.

The Project provides for regulation and storage of irrigation and flood water in Lake Sumner, and Avalon Reservoir, with diversion of water from Avalon Reservoir into a canal system to irrigate project lands on both sides of the Pecos River near Carlsbad.

A description of the environments for each management unit follows:

Sumner Dam

Sumner Dam and Lake Sumner are on the Pecos River about 250 river miles north of Carlsbad and about 16 miles northwest of Fort Sumner, New Mexico. The dam is a zoned earthfill structure 164 feet high with a volume of 2,250,000 cubic yards.

The dam was constructed in 1937 with a major modification in 1956 which raised the dam and increased the spillway capacity. The dam is a zoned earthfill structure 164 feet high with a volume of 2,250,000 cubic yards. It is approximately 3,900 feet long, averages 30 feet wide at the crest, and is 164 feet high at the maximum section. The outlet works consist of a combination pressure tunnel and a 10-foot diameter penstock upstream of the gates and two penstocks, 5.5 feet in diameter, downstream. Releases are controlled by two 48-inch diameter jet flow valves, with a capacity up to 1,740 cubic feet per second at the top of the flood control pool. Irrigation releases, up to 100 cubic feet per second, may be made through a 20-inch jet flow valve. Larger releases are made through a service spillway near the west end of the dam. This service spillway is a tainter-gated chute-type structure with three 45-foot openings and an invert elevation at 4,259 feet mean sea level. An emergency spillway in the left abutment consists of a fuse plug type embankment. A 500-foot concrete sill, with a crest elevation of 4,275 feet mean sea level, is covered with earth and rock fill, and forms four individual sections at

elevations 4,282, 4,283, 4,284, and 4,285 feet mean sea level. These sections are 130 feet, 130 feet, 118 feet, and 118 feet respectively.

In 1999, the reservoir had an estimated active conservation capacity of 43,768 acre-feet. In addition to storage for irrigation, the dam and reservoir provide flood control and recreation benefits. While there is no storage allocated to recreation, there is a minimum pool of 2,500 acre feet. In 1980, a transfer of irrigation storage rights to Santa Rosa Dam (a Corps of Engineers' dam), and Reservoir in Northern New Mexico provided for more flood control storage in Lake Sumner (under direction of the Corps of Engineers).

Sumner Dam is 3,900 feet long with an upstream slope estimated at 50 feet and a downstream slope of about 900 feet. Therefore, this plan covers management of vegetation on a total area of about 85 acres. In 2004, it was estimated that about ten (10) acres were occupied by vegetation requiring management.

Sumner Lake State Park

The Sumner Dam and reservoir are part of the Carlsbad Irrigation Project, which is located in Southeastern New Mexico near the city of Fort Sumner, New Mexico. Reclamation and the Carlsbad Irrigation District (CID) oversee operation of the Dam and control all water stored in the reservoir.

Sumner Lake State Park was established because of the proximity to the reservoir which offered a variety of recreation activities. The reservoir was created in 1937 when the Bureau of Reclamation dammed the Pecos River near Alamogordo Creek, approximately 16 miles northwest of Fort Sumner. Originally named the Alamogordo Reservoir, the area was designated Alamogordo State Park by a lease agreement between the New Mexico State Parks Commission and Reclamation in 1966. The 50-year lease, which will expire in 2016, enabled the state to develop, operate, and maintain approximately 4,000 acres next to the lake for public recreation purposes. In 1974, the name was changed to Sumner Lake. In 1984, an additional 2,700 acres on the east side of the lake was added to the agreement on an experimental basis. It later became a permanent addition. In 1991, the land known as the "lease lot area" was returned to Reclamation to be sold to individual leaseholders. Presently, Sumner Lake State Park encompasses 6,100 acres at an elevation of 4,300 feet. During the past several years, more than 80,000 people have visited the park.

This plan addresses the developed landscape within Sumner Lake State Park, which totals about 3.52 acres. A breakdown of this acreage is as follows: Visitor Information Center 0.049 acres, boat building and equipment yard 0.074 acres, staff residences 0.232 acres, two comfort station areas 0.016 acres, Mesquite Loop 0.483 acres, Pecos Campground 0.295 acres, River campgrounds 0.207 acres, vault toilet areas 0.096 acres, boat parking lot areas 0.254 acres, Rocky Shelters 0.086 acres, Three Shelter Point 0.005 acres, and Group Shelters 0.269 acres. The East side area, which is the East Side Campground is 0.095 acres, North Shore is 1.357 acres.

Sumner Lake lies at the northern edge of the Chihuahuan Desert, east of the Texas Plains, and on the eastern edge of the Rocky Mountain foothills. This region averages about 10 inches of precipitation annually, with only about 45 days of freezing weather. Summer temperatures often reach around 100 degrees. The terrain is dotted with large rock outcroppings. The vegetation is a mix of upper desert plant communities, one-seeded juniper trees on dry foothills, and riparian sites with cottonwood and Siberian elm trees.

The developed sites in the Park include transplanted cottonwood, juniper, ponderosa pine, globe willow, and Arizona ash trees. With the exception of the juniper species, all of these trees are not adapted to the harsh site and require irrigation and maintenance.

Saltcedar trees are invading the site, and the following plants are considered to be a nuisance to visitors: Longspine sandbur, buffalo bur, cocklebur, Russian thistle, and puncturevine.

The trees in developed sites are exceedingly important to visitors in providing shade and reducing temperatures and for their aesthetic values. However, most of the trees are growing in less than favorable conditions and they are repeatedly subject to attack by aphids and defoliating insects.

Harvester ants, which sting people when disturbed, are a nuisance to visitors in the Park.

Brantley Dam and Reservoir

Brantley Dam is on the Pecos River about 13 miles upstream from the city of Carlsbad, New Mexico. It is about 10 miles upstream from the Avalon Dam. These dams are part of the Carlsbad Project.

The Brantley Project area extends about 16.5 miles above the dam site. The Pecos River watershed is in a semi-arid region. Average annual precipitation in the Pecos River Basin varies from about 10 inches near Pecos, Texas, to greater than 33 inches in the higher mountain elevations of northern New Mexico.

The main purpose of this dam is to replace McMillan Dam, which was declared unsafe. Dam safety evaluations in 1964 of McMillan and Avalon Dams showed that a large flood could exceed the existing spillway capacity of McMillan Dam and overtop the structure. Brantley was designed and construction relocations started in 1983. Additional benefits include irrigation, flood control, fish and wildlife enhancement, and recreation.

Brantley Dam is comprised of several dams:

The main dam is a concrete gravity section 730 feet long and 143.5 feet high above the streambed with a roadway elevation at 3,308.5 feet above mean sea level. The main dam contains the outlet works and the spillway.

The east wing dam is an earth and rockfill section 730 feet long with a maximum height of 150 feet where it crosses the Pecos River. The crest width is 24 feet, and the crest elevation is 3,308 feet above mean sea level.

The west wing dam is an earth and rockfill section 8,020 feet long with a maximum height of 120 feet where it ties to the main dam. The crest width is 24 feet, and the crest elevation is 3,308 feet above mean sea level.

The outlet works consist of two four-foot-square conduits controlled by tandem hydraulic slide gates. The invert elevation is 3,210.7 feet mean sea level with a design capacity of 1,450 cubic feet per second at reservoir elevation 3,259.5 feet mean sea level and a maximum capacity of 1,800 cubic feet per second at water surface elevation 3,283 (the top of the flood control pool).

The spillway is part of the central section of the main dam. It has six gated bays, each 50 feet wide. Six radial arm gates (tainter gates) control spillway discharge. Each radial arm gate is 50 feet wide by 25.24 feet high. Crest elevation is 3,259.5 feet mean sea level. At the maximum water surface elevation of 3,303.5, the spillway capacity is about 357,000 cubic feet per second.

A low flow outlet works is to the left of the spillway on the downstream side of the dam. This structure ensures a minimum flow of 20 cubic feet per second in the portion of the river between the dam and the junction with the spillway channel. The structure consists of a 36-inch diameter concrete pipe between the stilling basin and the old Pecos River channel.

Carlsbad Irrigation District operates and maintains Brantley Dam for irrigation releases.

Brantley Lake State Park

Brantley Lake State Park is part of the Carlsbad Irrigation Project, which is located in southeastern New Mexico near the city of Carlsbad, New Mexico. Brantley Lake State Park encompasses approximately 3,000 acres around Brantley Reservoir. The area managed by the New Mexico State Park and Recreation Division, is typified by Ector series soils, commonly found in limestone areas of the upper Chihuahuan Desert. The proposed management plan is restricted to the very specific management of the developed landscape within Brantley Lake State Park (refer to Figure 1). The following represents the developed areas within Brantley Lake State Park: Visitor Information Center, Maintenance Area, Staff Residences, Limestone Campground, East side Day Use Area and Seven Rivers Day Use Area.

Avalon Dam and Reservoir

In addition to forming a small storage and regulating reservoir, Avalon Dam serves as the diversion dam for the project by diverting water into the Main Canal. The dam is located on the Pecos River five miles north of Carlsbad, New Mexico. The dam is a zoned

earthfill structure that was constructed by private interests in 1888. The dam washed out in 1893 and, after reconstruction, was washed out again in 1904 by the Pecos River flood. The Reclamation Service rebuilt the dam in 1907. The height of the dam was increased in 1912, and again in 1936. The dam now has a structural height of 60 feet and a volume of 202,000 cubic yards. This is an earthfilled structure 1,360 feet long and 53 feet high. There are three spillways and an outlet works. The original reservoir storage capacity was 7,000 acre-feet; a 1996 resurvey showed a capacity of 4,466 acre-feet at the top of conservation pool.

3.2 Description of Relevant Affected Issues and Resources

3.2.1 Issue 1. Effects of the alternative upon human health (public and workers)

A considerable body of information from tests on laboratory animals is available for the herbicides considered for possible use in controlling noxious and invasive weeds and hazardous species. Most of these tests were conducted as a requirement of the U.S. Environmental Protection Agency (EPA) for the registration process. Only those herbicides approved by the EPA will be considered for use. In addition, all of the herbicides proposed for use have been subjected to long-term feeding studies that test for general systemic effects, such as kidney and liver damage. Also, tests of the effects on reproductive and developmental toxicity (birth defects), mutagenicity (permanent transmissible change in genetic material), neurotoxicity (destructive or poisonous effect upon nerve tissue), carcinogenicity (ability or tendency to produce cancer), and immunotoxicity (poisonous to components of the entire immune system) have been conducted. “No observed effect levels” (NOELs) are available for most types of these tests.

Extrapolating a NOEL from an animal study to humans is an uncertain process. No one can predict a safe exposure to any substance, natural or synthetic, unless the specific situation or context of exposure and dose are known. In other words, the risk or probability of harm from any substance or activity is never zero, but it can be so low as to be negligible. The EPA compensates for the uncertainty by dividing NOELs from test animals by a safety factor, typically 100, to derive a Reference Dose (RfD). Thus, the RfD is defined as the dose to humans at which there is a reasonable certainty of no harm. The factor of 100 is a risk management device that allows extrapolation of the data from animals to humans under the assumption that animals are less sensitive than humans. The factor also allows the data to be applicable to the most vulnerable members of the population, including children and senior citizens. Because the NOEL is mostly based on animal lifetime exposure tests, the RfD actually represents the tolerable daily exposure over a lifetime (assumed to be 70 years for humans).

The 1992 risk assessment (USDA Forest Service) is comprised of three parts: (1) the exposure analysis, (2) the hazard analysis, and (3) the risk analysis. In the

exposure analysis, a range of possible doses to the public and workers is estimated. A variety of scenarios and exposure pathways are examined that could result in dermal and oral doses. In general, the exposure analysis assumes that the more a person is exposed to a particular compound, the higher the dose will be. All herbicide application scenarios for Reclamation workers, cooperators, or contractors and the public would be at or below the routine typical application rates. These estimated rates assume a minimal exposure to workers and an even lower exposure of the general public. In the hazard analysis, tests and data related to the toxicity of the various compounds are reviewed. These results are comparable to the risk assessments incorporated by reference in Chapter 1. Data indicated the doses at which toxic effects are seen and, conversely, dose levels at which no toxic effects are observed. To deal in part with incomplete information, a margin of safety, which is 100 times less than the NOEL is used. The hazard analysis also reviews the data on the possible carcinogenicity of the herbicides. This analysis assumes that any dose of a carcinogen has some probability of causing cancer and that the higher dose, the greater the probability of cancer. The third part of the risk analysis involves the analysis and characterization of risk. In this section, dose levels calculated in the exposure analysis are compared to determine the non-carcinogenic, systemic, and reproductive effects of herbicides. The risk analysis also indicates the probability of developing cancer based on a projection of the doses received over a lifetime (assumed to be 70 years for humans). Certain baseline criteria are set to evaluate the possible risk to humans. Cancer risk is set at a benchmark value of one in one million, which is commonly accepted by the scientific community as representing a negligible addition to the current U.S. cancer rate. Evaluation of systemic and reproductive health risk is based on the NOEL. In evaluating the potential impact to humans, it must be kept in mind the small amount that is typically used.

Direct effects for workers are those that may occur from direct contact (dermal exposure) with an herbicide. Potential applications will be by backpack and ground based mechanical methods, and the area treated per day will be dependent on the specific site and type of application. It is determined that the proposed vegetation treatments fall within the typical scenario for herbicide use considering the proposed application rates (Table III-B-1, page III-B-3; USDA Forest Service 1992) and acres treated per day per worker (Table III-D-8, page III-D-23). It is determined that it is very unlikely that a project would include all of the conditions that exist in the routine extreme scenario (Table III-D-6, page III-D-20; Table III-B-2, page III-B-4; Table III-D-8, page III-D-23). The conditions of herbicide application will affect the exposure; thus, implementation of the mitigation measures and Best Management Practices, covered in Appendix C, will reduce possible exposures. Also, using personal protective equipment, as covered in the Safety and Spill Plan (Appendix D) will lower exposure of workers by as much as 68 percent, since most application exposure is through the skin and not through the lungs by breathing vapors. Proper training and certification of applicators on mixing, loading, and application is essential to reduce the risks to workers.

For the herbicides being considered for use, 2,4-D and triclopyr pose a moderate risk of systemic effects for backpack applicators and ground mechanical applicator/mixer loader (Table III-E-13, page III-E-17, 1992 risk assessment). In addition, 2,4-D and dicamba have a moderate risk for reproductive effects. These risks would be mitigated by measures covered in the preceding paragraph and by limiting maximum exposure to these herbicides. Worker doses for the remaining herbicides proposed for use are likely to be well below the RfD if reasonable safety precautions are followed. There is the possibility that workers could receive dermal exposures from the spill of an herbicide concentrate and/or the spill of an herbicide mixture, including carriers. Table III-E-14 (page III-E-18), 1992 risk assessment, for right-of-way sites, displays the risks associated with accidents (assuming a 2,000-gallon tank spill). The risk to workers associated with accidental spills is expected to be negligible if they are trained, use required protective clothing and equipment, and follow steps outlined in the Safety and Spill Plan (Appendix D).

Concern has been raised about the increased risk of cancer that could result from exposure to low levels of an herbicide. All of the herbicides being considered for use have undergone testing for cancer. Tests for dicamba have shown no evidence of cancer initiation or promotion. The evidence for 2,4-D and picloram have been debated. Nevertheless, the 1992 risk assessment assumes that the various herbicides are carcinogens. The analyses also assume that any dose of a carcinogen could cause cancer and the probability of cancer increases with increased doses. Estimates of the probability of developing cancer from exposure to these compounds are based on a conservative extrapolation from cancer rates in animals subjected to the chemical for a lifetime. The projected cancer rates are highest for workers since their dose could be higher. Even for the workers, the risks seem relatively low compared to other commonly encountered risks. For example, one round-trip transcontinental aircraft trip carries with it an increased risk of cancer from cosmic rays in the order of one in a million. Smoking two cigarettes increases the risk of cancer by one in a million as does eating six pounds of peanut butter due to aflatoxin. Cancer probabilities would increase by one in a million after spraying 2,4-D for 137 days or spraying picloram for about 11,000 days. Since the average American has about a one in four chance of developing cancer in his or her lifetime, the cumulative impact from spraying herbicides at the proposed rates is considered to be insignificant.

There is the possibility that a small percentage of the population in southeastern New Mexico will be hypersensitive or allergic to any one or more of the herbicides proposed for use. Well-known allergenic substances include common foods, pollen, bacterial and fungal toxins, insect bites and stings, etc. Less frequent are hypersensitivities to certain fragrances and solvents. Allergies and hypersensitivities are atypical reactions exhibited by very few individuals in any population (Felsot 2001). Typical allergic symptoms include runny nose, watery eyes, swelling, and hives. Symptoms exhibited by allergic individuals are caused by specific immunological reactions of the body that are triggered by exposure to very low doses of allergens. Allergic reactions result when the body's normal immune

system defenses overproduce antibodies to specific foreign substances. Allergenic and hypersensitive reactions occur by different mechanisms than toxicity. Toxic reactions result when chemical doses become high enough to interfere with normal physiological functions of cells and tissues. Individuals who have allergic reactions or hypersensitivity are generally aware of their sensitivities and such people would not be permitted to work on spray crews. The public would be excluded from treatment sites.

In summary, the risk or probability of harm to humans from the proposed use of herbicides is not zero, but it is reasonable to expect that the human health impacts from the proposed herbicide applications would be insignificantly small. The process for evaluating the risk associated with the application of insecticides would be the same as for herbicides. Nevertheless, the issue of human safety will be evaluated by the potential for exposure of applicators and the public.

3.2.2 Issue 2. Effects of the alternative on non-target vegetation, including threatened, endangered, and sensitive plants

There are no federally or state threatened, endangered, or sensitive plant species in the areas proposed for the application of herbicides.

Control of woody shrubs and trees on dam faces would be accomplished by spot applications to individual plants, including picloram and triclopyr which are selective herbicides. Applications with dicamba, imazapyr, glyphosate, metsulfuron methyl, pendimethalin, and sulfometuron methyl would be done to remove small patches of vegetation that could inhibit the inspection of dam faces or structures. Since the objective on dam faces would be keep them free vegetation, affects on non-target plants would not be a concern. Since saltcedar and kochia infestations are mainly pure stands of these exotic species in the McMillan Lakebed, their removal would have little if any affect on the few native plants that were present. However, extensive control of the dense saltcedar and kochia infested sites would not occur until there was a reasonable opportunity to re-establish native plants. Finally, control of vegetation at Brantley and Sumner Lake State Parks would be accomplished by the use of selective herbicides or by selective application to specific undesirable plants. Thus, there would be minimal if any effect to non-target plant communities.

The effect of using the proposed herbicides will be evaluated with respect to their potential to damage or kill non-target vegetation.

The insecticides proposed for use would not have any adverse effect on non-target vegetation.

3.2.3. Issue 3. Effects of the alternative on non-target terrestrial and aquatic animals, including threatened and endangered species

Although applications will not be made directly to water, the potential impact of herbicides that could affect fish and other aquatic organisms is a function of three factors: 1) toxic characteristics of the active ingredient; 2) amount of the active ingredient in the water where aquatic organisms live, and 3) length of time an organism is exposed to the active ingredient.

Whether an organism is affected by an herbicide/insecticide is generally measured in a laboratory using a “LC50” test. The LC50 is the herbicide concentration that is lethal to 50 percent of the organisms exposed to the active ingredient for a given time. Although the LC50 is frequently used as a toxicity standard, 50 percent mortality of fish or other aquatic organisms would not be acceptable under any circumstance on Reclamation lands. For this reason, biologists calculate a “No Observed Effect Level” (NOEL). This is the amount of active ingredient that would have no measurable effects on test organisms after several days of exposure.

The herbicides proposed for use are all characterized by relatively low aquatic toxicity under typical case water concentrations (Table III-H-6. page III-H-13. 1992 risk assessment). The only exceptions are for triclopyr and limonene, which may present a high risk for trout in streams and a moderate risk for trout in lakes. Picloram, dicamba, and 2,4-D may present a moderate risk under extreme water concentration, but this case seems highly unlikely under the conditions of proposed application. Dicamba and glyphosate are roughly 1/5 to 1/50 as toxic to various aquatic organisms.

In regard to the risk to threatened and endangered (T&E) or sensitive aquatic organisms, triclopyr products not labeled for aquatic use may present an unacceptable risk to T&E cold water fish under the typical case scenario. Likewise, 2,4-D not labeled for aquatic use may present an unacceptable risk to T&E aquatic invertebrates. It must be noted that the assessment was made using aerial application as the treatment approach. A ground-based application would reduce the risk. Also, it does not appear that any proposed applications would occur where these organisms are present; however, to mitigate the concern, triclopyr products not labeled for aquatic use will not be sprayed within the high water zone of any stream or water course where cold water T&E or sensitive fish are present. In addition, 2,4-D products not labeled for aquatic use would not be sprayed in any location where there are T&E or sensitive aquatic invertebrate species.

The majority of herbicide/insecticide applications near water would be by hand backpack or truck mounted hand wand applications, and this would result in an exceedingly low risk of contamination of surface water. Leaching of herbicides through soil is not a significant process. Herbicides do have the potential for overland flow during heavy rainstorms, but the likelihood of such movement on infiltration-dominated sites makes water contamination unlikely. Mitigation

measures (Chapter 5) and Best Management Practices (Appendix C) will serve to reduce the potential for possible adverse effects to aquatic organisms.

The analysis of effects will be based on the concentration of pesticides that could be delivered to water and the length of time of exposure.

3.2.3 Issue 4. Effects of the Alternative on Water Quality

Pesticide treatment impacts on water quality could occur by either direct or indirect means. Direct impacts would result from the introduction of compounds directly into water from spray drift, runoff, or leaching. Indirect impacts would result if vegetative cover was reduced to the degree that wind or water erosion would occur leading to sedimentation in the Pecos River and lakes.

This issue will be evaluated by how and where herbicides/insecticides will be applied and the mitigation measures and BMPs will be utilized to reduce the potential contamination of water.

3.3 Indian Trust Assets (ITAs)

Indian Trust Assets or resources are defined as legal interests in assets held in trust by the U.S. Government for Native American Indian tribes or individual tribal members. Examples of ITAs are lands, minerals, water rights, other natural resources, money, or claims. An ITA cannot be sold, leased, or otherwise alienated without approval of the Federal government.

3.4 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires that the effects on minority and low-income populations within a project area be given special consideration to determine if the proposed action would result in disproportionate adverse effects to their communities. According to the Bureau of Business and Economic Research, University of New Mexico, 2004, the annual per capita income for the State of New Mexico in 2002 was \$24,823. The 2002 per capita personal income by county is as follows: Guadalupe County: \$14,415; DeBaca County: \$ 20,299; and Eddy County: \$23,763.

Chapter 4 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This chapter described the potential consequences or effects of the two alternatives related to management concerns and public issues.

4.2 Predicted Effects on Each Relevant Issue and Resource

4.2.1 Effects of the alternative upon human health (public and workers)

- **Alternative A - No Action (No Herbicide/Insecticide Use)**

Since there would be no herbicide or insecticide use on land or facilities managed by Reclamation, neither the public nor workers would be at risk from pesticide exposure.

The risks to workers would be somewhat higher for this alternative than for the preferred alternative. In addition to the risks from traveling and transportation of equipment to work sites, workers involved in hand pulling or grubbing of plants would be at an increased risk of physical injury while digging, although this risk can be mitigated through the use of safety procedures and safety equipment. Also, there is a risk, albeit small, associated with the use of equipment to remove vegetation.

- **Alternative B - Proposed Action (Use of Herbicides/Insecticides)**

No toxic effects to public health are expected from the eleven (11) herbicides being considered for use. Routes and duration of exposure are important factors determining effect of toxins to human health. Exposure to the public would mainly come from skin contact with sprayed vegetation. The chance of this type of exposure is low since individuals would not frequent potential treatment sites, especially when spraying operations are being done.

However, if an individual did enter a spray area, the skin is a protective barrier that slows movement of a material into the body, and studies show that about ten (10) percent or less of a chemical applied to skin is absorbed (Felsot 2001). Importantly, herbicide labeling requires low application rates for such terrestrial applications. In addition, the target for spraying would involve individual plants or scattered patches of weeds, especially at the base of woody plants that would not be contacted by people. Importantly, spraying would take place no more than once in any one site in a season. Thus, potential exposure levels to the general public, those who might have dermal contact with a dilute concentration of a small quantity of herbicide, would be well below a threshold of concern.

Exposure levels of workers could be of concern in extreme scenarios without protective clothing and equipment. Therefore, it is important for workers to mitigate this concern through the proper use of protective clothing and personal protective equipment (PPE) and through careful handling of herbicide concentrates.

With respect to the herbicides identified for potential use, none pose a risk to public health for systemic or reproductive effects. None of the herbicides were found to pose greater than one (1) in one (1) million risk of causing cancer. The various risk assessments (Chapter 1, Page 19, Items 1-12, Incorporated by Reference) indicate all of the herbicides analyzed show little tendency for bioaccumulation and the small amounts that could be absorbed through the skin are readily and completely eliminated from the body (Felsot 2001).

The risk to workers is low for all herbicides being considered, other than 2,4-D and dicamba, but this risk would be mitigated by limiting exposure as identified in Chapter 2 (USDA Forest Service, 1992 Risk Assessment, Table III-E-4, page E-III-8). In any 24-hour period, workers using backpacks will not be allowed to apply more than 0.9 pounds of 2,4-D or 2.3 pounds of dicamba (Table III-E-21, page III-E-45).

As a general rule, the inert ingredients in the herbicide formulations proposed for use are less acutely toxic than the active ingredients (1992 Risk Assessment, Table III-F-1, pages III-F-2-3). Diesel oil, kerosene, and mineral oil are considered to be in the EPA Toxicity Category of “very slightly toxic,” and limonene is considered “slightly toxic.” In addition, exposure to any one inert ingredient is significantly lowered due to the large amount of dilution for spray mixes. For example, one pint of Tordon 22K containing 75.6 percent inert ingredients is mixed with 35 gallons of water for every acre sprayed during ground applications. Thus, the concentration of the inert ingredients would be diluted with water approximately 370 fold prior to spraying, and the Tordon 22K would constitute about 0.09 percent of the total volume of spray. After spraying, the inert ingredients will dry on plant surfaces or deposit in the soil, where they would be subject to plant and microbial metabolism just like the active ingredient.

People who have hypersensitive or allergic reactions to herbicides are generally aware of their sensitivities and people will be informed and excluded from treatment sites during operations.

Overall, it is unlikely that more than a few gallons of malathion or acephate will be used on an annual basis. Probably less than one (1) pound of the active ingredient of carbaryl would need to be applied annually to protect trees from insect attack.

The potential adverse effects to applicators of malathion, acephate, and carbaryl can be essentially reduced to a negligible level through the use of safety equipment including: Safety glasses or goggles, chemically resistant gloves, boots, long-sleeved shirt, long pants, and a hat.

Applications of malathion, acephate, and carbaryl solutions would be done when the public is not present, and will not use camping or recreation sites for at least 24 hours. Once the spray has dried on the foliage or bark of trees, the risk of exposure is very small. It is important to note that all of these insecticides are greatly diluted with water which greatly reduces to toxicity risk. Thus, there would be an extremely low probability that any members of the public will be exposed to these materials.

Amdol® Pro (hydramethylnon) bait would be directly applied around harvester ant mounds (2 tablespoons) to control the nest. Treatment will only be necessary where ant colonies pose a nuisance to Park visitors. If label precautions are followed, this material will pose no safety risk to humans.

4.2.2 Effects of the alternative on non-target vegetation, including threatened, endangered, and sensitive plants

- **Alternative A - No Action (No Herbicide/Insecticide Use)**

Manual methods are highly selective and would have little unintended effects on non-target vegetation. However, manual methods are extremely expensive and can cost from a few hundred dollars per acre for scattered infestations to several thousand dollars per acre to treat dense infestations.

Mechanical methods, such as mowing and grading, are much less selective and effects to non-target plants would occur, although adverse effects could be mitigated by restricting the use of mechanical methods at known locations of a T&E plant. Nevertheless, the expanded use of mechanical methods for this alternative would have a greater potential effect to non-target vegetation than through the use of selective herbicides under the preferred alternative. Grading and disking would involve repeated disturbance of the soil surface, providing a favorable substrate for seed of undesirable species, especially exotic species. The equipment can transport seeds and other plant parts capable of establishment on the disturbed soil surfaces. Undesirable vegetation is expected to continue to flourish and be available for spread to adjacent areas when soils are disturbed. Mowing can be an effective means of controlling vegetation where there is access. Mower height can be adjusted to minimize disruption of plant roots and the soil surface to encourage successful competition by preferred ground cover species. However, some weed species, like sprouting shrubs, are adaptive to mowing regimes and will overcome the adverse pressure of mowing. This adaptive nature effectively minimizes the positive results achieved by mowing. If exotic weeds are present in an area treated mechanically, equipment would need to be cleaned of plant materials before moving to uninfested areas. There would be no adverse effects to gypsum wild buckwheat, which is the only T&E plant species of concern, since it is not located where potential treatment would be done.

The direct and indirect effects would be the same as those described under the No Action alternative for Issue 1. Over the long term, undesirable vegetation would not be controlled through the exclusive use of manual and mechanical methods, and this would pose a greater threat to native plant populations, including T&E species.

- **Alternative B - Proposed Action (Use of Herbicides and Insecticides)**

The use of herbicides can greatly impact non-target plant populations if the herbicide being used would kill the species of concern in occupied habitat. Several of the herbicides being considered for use are selective, meaning they can kill the species of concern while causing little or no effect to non-target plants. The impacts of treatment with selective herbicides would vary depending on how closely the target and non-target plant species are related and the rate of application. However, a selective method of application could be used to keep broad spectrum herbicides away from species of concern if the species could be impacted. Broadcast applications of glyphosate, a broad spectrum herbicide, would not be used where a T&E plant species is known to occur.

Annual plants are generally more sensitive to herbicides, and they would be affected to a greater degree than perennial plants, especially if they are treated before seed production. Annual and perennial weed species growing at a site for more than a few years often have large seed reserves in the upper soil horizons. Infested sites could require repeated treatment until the majority of the seeds have germinated and the plants killed. Repeated applications of broad-leaf selective herbicides could lead to grass-dominated areas.

Whether herbicidal or mechanical means are being considered, the locations of T&E plant populations will be identified prior to considering any treatment of vegetation. To protect native plant communities, broadcast applications of herbicides will only be authorized by Reclamation if a selective herbicide is applied that will not harm the plants of concern. In the event that harm could occur from broadcast applications of the herbicides being considered, spraying will be limited to individual target plant applications, such as with backpack sprayers, or by truck-mounted hand wands. However, there are no known populations of T&E plants occurring in the sites being considered for possible application of herbicides.

In general, the proposed alternative would provide the best long-term management of target plants utilizing herbicidal and other methods, under an IPM/IVM approach.

None of the insecticides proposed for use will have any significant affect (direct, indirect, or cumulative) on non-target vegetation.

4.2.3 Effects of the alternative on non-target terrestrial and aquatic animals, including threatened, endangered, and sensitive animals

- **Alternative A - No Action (No Herbicide/Insecticide Use)**

Excluding dam faces, intensive vegetation management by maximizing the use of mechanical and manual methods would have some adverse impacts on wildlife, wildlife habitat, and adjacent aquatic sites. More frequent disturbance to soils and vegetation would prevent native plant communities from remaining or becoming established. Mowing or other mechanical removal of vegetation would reduce cover for nesting and hiding and food availability for many small birds and mammals. Mowing during the breeding season could damage habitat, destroy nestlings, and reduce productivity of ground-nesting birds. Conversely, mowing may stimulate the production of palatable grasses and forbs, thus providing food for various wildlife species and attracting large ungulates. The use of mechanical equipment could result in increased soil compaction and accelerated erosion which, in turn, could inhibit the growth of new vegetation, damage the habitat for burrowing animals, open sites to invasive plants, and damage adjacent aquatic environments due to increased sedimentation. Over time, selection of this alternative would increase sediment delivery to aquatic habitats, alter aquatic ecosystems, and negatively affect aquatic organisms. On the other hand, there would be little or no pesticide residues that could move into aquatic habitats by selection of this alternative. Any direct adverse effects to threatened, endangered, and sensitive animals would be eliminated by using the same coordination, mitigations (Chapter 5), and best management practices (Appendix C) that are planned for the preferred alternative.

The direct, indirect, and cumulative effects for this alternative would be greater than for the proposed action.

- **Alternative B - Proposed Action (Use of Herbicides)**

Impacts of herbicidal vegetation control to terrestrial and aquatic organisms include direct toxicological effects and indirect effects from habitat alternation.

Risk assessments reviewed for this analysis identify the toxicity levels for ten (10) of the eleven (11) herbicides being considered for use. No risk analysis has been done for oryzalin, but this compound is being considered for limited use (less than a pound of active ingredient per year) in camping and recreation sites on the Sumner Lake State Park. Comparisons of the expected environmental concentrations with the toxic levels of these herbicides indicate that adverse effects on birds, rodents, and grazing animals are not expected. Levels to which the organisms would be exposed would be hundreds to

thousands of times lower than the levels that would cause toxic effects. All of the herbicides being considered are quickly excreted by exposed animals and do not accumulate in body tissues or organs. Thus, secondary effects on predators, such as coyotes or raptors, are not reasonably expected.

The direct, indirect, and cumulative impacts to animals, including insects, from herbicide applications are expected to be negligible. Since these herbicides do not bioaccumulate and they are degraded in the environment, the cumulative effects of the proposed use of herbicides would be insignificant. In addition, the proposed herbicides kill weeds by a mode of action that is unique to plants, and the toxic effects to animals, especially for dilute solutions, is relatively low or negligible.

The proposed use of herbicides is not expected to affect the habitat of some threatened, endangered, or proposed animals. As previously discussed, the invasion of exotic weeds into native habitats has the potential to seriously degrade them and make them unsuitable for native wildlife, including threatened, endangered, and proposed animals.

The majority of herbicide applications near water will be by hand backpack or truck mounted hand wand applications, and this will result in minimal risk to contamination of surface water. Leaching of herbicides through soil is not a significant process, such as on dam faces. Herbicides do have the potential for overland flow during heavy rainstorms, but the likelihood of such movement on infiltration-dominated sites makes water contamination unlikely. Mitigation measures (Chapter 5) and Best Management Practices (Appendix C) will serve to reduce the potential for possible adverse effects to aquatic organisms.

The coordination, mitigation, and best management practices described in IPM/IVM plans would further ensure the conservation of threatened, endangered, and proposed animals. When known populations, suitable habitats, or designated or proposed critical habitats of threatened, endangered, or proposed animals occur in a proposed treatment area, surveys will be done, as needed, prior to herbicide applications. Buffer zones would be marked. Treatments to eliminate exotic weeds and invasive plants would include spraying with selective herbicides that would kill the target plants but not harm important native plants, spot treatment of the target plants with backpack sprayers or truck mounted hand wands, or hand grubbing with no herbicide use. Post-spray monitoring will be done to ensure that the protective measures were effective and to determine the effectiveness of the treatments in eliminating target plants. With these protective measures in place, the proposed action is not expected to adversely affect any threatened or endangered animals or areas of designated critical habitat.

To prevent certain herbicides from entering water, several mitigations (Chapter 5) and Best Management Practices (Appendix C) would be implemented under this alternative to limit potential adverse effects. These measures include establishing a buffer area next to bodies of water for broadcast applications of herbicide products that do not have aquatic labels. Glyphosate, 2,4-D, imazapyr, triclopyr formulations are labeled for aquatic use and would be the herbicides used next to bodies of water. Spot applications of terrestrial labeled materials like triclopyr, glyphosate, and imazapyr would occur to the edge of some bodies of waters in compliance with label requirements. Through the use of these resource protection measures and following herbicide label restrictions, the potential for adverse effects to aquatic organisms and habitats would be negligible. For all of the herbicides being considered, it does not appear that an observed level of effect would occur.

The application of malathion, acephate, carbaryl, and hydramethylnon bait would only be done in recreation sites at Sumner Lake State Park; thus, there would only be an extremely remote possibility that non-target terrestrial or aquatic species would be exposed. Therefore, the effects on non-target animals would be negligible.

Directly, indirectly, and cumulatively, this alternative provides the greatest protection for terrestrial and aquatic animals, while achieving Reclamation goals and objectives.

4.2.4 Effects of the alternative on water quality

- **Alternative A - No Action (No Herbicide/Insecticide Use)**

The potential impact to water quality for this alternative would be related to the increased use of mechanical and manual methods to treat vegetation. Impacts would include increased runoff, soil erosion, and sedimentation. Frequent use of heavy equipment for mechanical management of vegetation could result in significant soil disturbance or compaction. Mechanical vegetation management activities that remove extensive areas of vegetation would reduce the capacity for filtration and the removal of pollutants, and subject the area to wind erosion. Mowing, cutting, and trimming of vegetation may temporarily reduce the ability of vegetation to protect soil surfaces from erosion and to filter pollutants from water produced during storms. Adverse effects on water quality would result from the transport and deposition of eroded sediments that would include nutrient enrichment, increased turbidity, and decreased oxygen levels (if nutrient concentrations sufficiently stimulate algal blooms). On the other hand, careful mechanical treatments like mowing, in some areas, could improve the vegetative cover along waterways and these areas would help to intercept sediments and contaminants. However, in other areas, repeated mowing pressure on native

grasses reduces their vigor and leads to an increase in brush and annual weed species, which do not bind the soil and cause an increase in soil erosion from water and wind.

It is important to remember that cultural practices, such as seeding, would be used where practicable to reclaim areas that have an erosion problem. However, the potential adverse effects related to reliance on mechanical and manual methods would be expected to be greater than for the proposed action.

The greater the precipitation, the greater the likelihood would be for experiencing runoff in the Pecos River system. Runoff is defined as the movement of water across the soil surface until it reaches a defined natural stream channel. If the soil surface is disturbed during construction or maintenance, the infiltration capacity may be significantly reduced and runoff may occur. Grasses are particularly effective in intercepting sediments and filtering pollutants. However, where woody vegetation moves onto sites and out-competes grasses, a decrease in filtration could occur. Likewise, exotic weed infestations would reduce grasses and increase the potential for runoff. In general, the absence of any vegetation management could increase the risk of erosion of soils and decrease soil stability, thereby reducing the ability of the right-of-way vegetation to filter sediments from storm water before it reaches nearby streams.

In arid and desert sites, surface water is generally ephemeral and present only after rainstorms. Vegetation along waterways is usually sparse, except during particularly wet periods. The potential for surface runoff during heavy storms is usually high with or without mechanical and manual treatments. However, vegetation management practices, which lead to a decrease in grass and other plant species that have good soil binding root systems, could have significant adverse effects. Nevertheless, it is not likely that water quality would be substantially impacted on these sites through selection of this alternative.

- **Alternative B - Proposed Action (Use of Herbicides/Insecticides)**

Both direct and indirect water quality impacts can result from the use of herbicides to control vegetation. Direct adverse effects could result from improper applications for the following situations: (1) waters receiving herbicide from spray, drift, or spills; or (2) the possibility of large-scale applications to impervious and compacted soils, combined with runoff, transporting herbicides to water resources. However, the herbicides proposed for use are expected to have little to no negative impact on water quality if they are applied in accordance with registered label directions. Utilization of mitigation measures (Chapter 5) and Best Management Practices (Appendix C) will further reduce the potential adverse effects. To ensure proper application and to avoid problems related to runoff, all herbicide applications

would be conducted by or under the supervision of a trained pesticide applicator.

Several mechanisms prevent or retard the migration of herbicides through the soil profiles. These mechanisms include chemical precipitation, chemical degradation, volatilization, physical and biological degradation, biological uptake, and adsorption. Clays and organic matter in the soil adsorb certain organic compounds like herbicides (e.g. glyphosate). As a result, the ability of herbicides to leach through the soil column for entry to ground water would be reduced significantly. However, some herbicides have some soil activity, that is, they can dissolve in water and move down the soil column. An example would be picloram. An extensive study of the environmental fate of picloram determined that, at normal application rates, picloram was not detectable in surface or groundwater over a 445-day study (Watson et al. 1989). Nevertheless, where soil permeability could be conducive to water contamination, picloram and other water-mobile compounds will not be used where the water table is within six (6) feet of the surface. Also, a buffer of ten (10) feet would be imposed for herbicides that could move over the surface and contaminate water sources. Aquatically labeled formulations of imazapyr, 2,4-D, glyphosate, and triclopyr can be safely applied up to the edge of water sources. These herbicides have a short half-life, do not move readily through soil, have low toxicity to aquatic organisms, and have other properties that allow for their safe use near water. Imazapyr and triclopyr can be applied up to the edge of non-irrigation water sources, but they cannot be applied to water. The other materials considered in this analysis should not pose any significant threat to water quality as long as they are not applied within the buffer zone established for surface water sources.

Table 6 - Potential for surface runoff and leaching for proposed herbicides (Vencill 2002)

Common Name of Herbicide	Solubility in Water (ml/L)	Half Life in Soil	Potential for Surface Runoff	Potential for Leaching
Clopyralid	1,000 (acid) 300,000 (salt)	40 Days	Low	Moderate
Dicamba	4,500 (acid) – 4000,000 (salt)	Less than 14 Days*	Low	Low to Moderate
Glyphosate	15,700 (pH 7) – 900,000 (salt, pH 7)	47 Days	Low	Low
Imazapyr	11,272 (pH 7)	25-142 Days*	Low	Low
Metsulfuron methyl	548 (pH 5) – 2,790 (pH 7)	30 Days	Low	Moderate at pH 7, but less at pH 6
Oryzalin	5,420 at 7 pH	20 Days	Low	Low
Pendimethalin	0.275	44 Days	Low	Low
Picloram	430	90 Days*	Moderate	High
Sulfometuron methyl	10 (pH 5) – 300 (pH 7)	20-28 Days	Low	Moderate at pH 7, but less at pH 6
Triclopyr	23 (ester) – 2,100,000 (salt)	30 Days	Not Available	Not Available
2,4-D	796 (salt)	10 Days	Low	Moderate

*May persist significantly longer under conditions of low soil moisture and rainfall and soil types.

Since the herbicides considered for use are short-lived and degrade in the environment and mitigations and BMP's will reduce the chances of herbicides moving into water, it is concluded that the typical application rates will not contribute to any significant cumulative impacts to water quality.

Insecticide applications proposed at Sumner Lake State Park are far enough away from water to prevent any reasonable possibility of contamination.

Thus, there would be not direct, indirect, or cumulative impacts to water quality from the proposed use of herbicides/insecticides.

4.3 Irreversible and Irretrievable Commitment of Resources

Although the risk is very small, public safety could be compromised if a dam failure occurred as a result of adopting of Alternative A, No Action. In addition, there could be an unacceptable loss of property if a dam failure occurred. A dam failure could result in the loss of lives and cost millions if not tens of millions of dollars.

No irreversible or irretrievable commitment of resources is expected by adopting Alternative B, Integrated Pest Management, involving the use of herbicides and insecticides. Even under a worst-case scenario, the effects of the proposed use of herbicides and insecticides would be negligible.

4.4 Cumulative Impacts

The probability of Reclamation applicators (including cooperators and contractors) or the general public being exposed simultaneously to other herbicide/insecticide applications would be very remote. Once the spray mixture dries on plants or moves into plant tissues, the risk of exposure is very small. Likewise, the risk of exposure to herbicides applied in the previous year is even less likely. Most of the herbicides being considered for use do not persist for very long in the environment, since they are degraded by sunlight and soil microbes. Some compounds only remain in the soil for a few days while others may be present for a few months. Exposure from the various programs done in the past, and the possible exposure from proposed operations, would not likely approach the acceptable daily intake (ADI) or RfD for any of the proposed herbicides.

No cumulative impacts to native plant communities are expected as a result of the proposed use of herbicides/insecticides over the five (5) year timeframe for this EA.

The most significant cumulative effect to terrestrial wildlife and aquatic species over the long term would come from the adoption of Alternative A (No Action). This alternative would result in habitat loss and erosion related to the continued expansion of exotic and invasive plant infestations. Monocultures of these species would develop, such as has occurred in the McMillan lakebed. Palatable forage for game and non-game wildlife species would progressively decrease. Ground cover, grass production, seed producing food sources, and the prey base would continue to decline. The continued expansion of exotic weed infestation would lead to a reduction in populations of some animals. For example, in Arizona, extensive stands of Lehmann lovegrass (*Eragrostis lehmanniana*) had fewer quail, small mammals, and seed-harvester ants (Westbrooks 1998). However, no cumulative impacts would be expected under Alternative B (IPM and use of pesticides).

The No Action alternative would not be as effective in controlling vegetation, and erosion from adjacent lands of mixed ownership would increase if exotic plant infestations expand over the long run. The progressive increase in sediments would have a cumulative impact on water quality.

Under the Proposed Action (Alternative B), no cumulative impacts to water quality would be expected to occur, especially if pesticide labels, BMPs (Appendix C), mitigations (Chapter 5), and the requirements of the safety and spill plan (Appendix D) are followed.

Chapter 5 ENVIRONMENTAL COMMITMENTS

The application of pesticides is tightly controlled by state and federal agencies. Reclamation is required to follow all state and federal laws and regulations applicable to the application of herbicides. The following mitigation measures will be followed when applying herbicides:

- All herbicide/insecticide label requirements will be followed.
- All BMPs will be followed (Appendix C).
- Herbicides/insecticides will not be directly applied to water.
- Spot applications of triclopyr and glyphosate can be done to the edge of some bodies of water in compliance with label requirements, but spot applications will not be done within 5 feet of water being used for irrigation.
- Ester formulations of triclopyr (Garlon 4 and Tahoe 4) will not be applied in the summer when high temperatures (over 85° Fahrenheit) can cause volatilization.
- Applications of insecticides will not be done within 30 feet of the edge of Sumner Lake or other water sources.
- Applicators will be required to wear long-sleeved shirts and long pants, boots plus socks, and other personal protective equipment (PPE) as required on the label.
- All requirements in the attached Safety and Spill Plan will be followed (see Appendix D).
- Herbicides/insecticides will be secured (lock and key) at all times.
- Herbicides/insecticides will be transported according to safety requirements.

Chapter 6 CONSULTATION AND COORDINATION

Reclamation has coordinated with Sumner Lake State Park, Brantley Lake State Park, and the Carlsbad Irrigation District, in the preparation and approval of integrated pest management plans.

Chapter 7 LIST OF PREPARERS

NAME	RESPONSIBILITY	QUALIFICATIONS	PARTICIPATION
Doug Parker	Contract Specialist	M.S. Forest Entomology, 39 years professional experience with USDA Forest Service as Pest Management and Pesticide Specialist	NEPA, IPM
Nancy Umbreit	Environmental Protection Specialist, Integrated Pest Management Coordinator, and NEPA Project Manager	B.S. Biology; 27years professional experience.	NEPA, IPM

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Appendix A: Plant and Wildlife Lists

Federally listed threatened and endangered (T&E) species that are known or are suspected to occur in or near the Pecos River system from Sumner Lake south to the Texas border include: Bald Eagle (*Haliaeetus leucocephalus*), Interior Least Tern (*Sterna antillarum athalassos*), Pecos Bluntnose Shiner (*Notropis simus pecoensis*), Pecos Gambusia (*Gambusia nobilis*), and Gypsum Wild Buckwheat (*Eriogonum gypsophilum*). Proposed treatments would not be done within a quarter mile from potential habitat of any of these species. Therefore, no effects would be expected, especially through the use of mitigations and BMPs addressed in Appendix C. Refer to Tables 7, 8, and 9 for a listing of representative wildlife, fish and federally listed threatened and endangered species found along the Pecos River in Guadalupe, DeBaca, Chavez, and Eddy Counties, New Mexico.

Table 7. Selected Wildlife Species reported from Sumner to Avalon Reservoirs, Pecos River, New Mexico ^a.

COMMON NAME	SCIENTIFIC NAME
American Coot	<i>Fulica americana</i>
American Avocet	<i>Recurvirostra americana</i>
American White Pelican	<i>Pelecanus erythrorhynchos</i>
Bank S wallow	<i>Riparia riparia</i>
Barn S wallow	<i>Hirundo rustica</i>
Belted Kingfisher	<i>Ceryle alcyon</i>
Black-N ecked Stilt	<i>Himantopus mexicanus</i>
Brown Pelican	<i>Pelecanus occidentalis carolinensis</i> ^b
Burrowing Owl	<i>Athene cunicularia</i>
Canyon Wren	<i>Catherpes mexicanus</i>
Cliff Swallow	<i>Hirundo pyrrhonota</i>
Common Loon	<i>Gavia immer</i>
Common Nighthawk	<i>Chordeiles minor</i>
Double-C rested Cormorant	<i>Phalacrocorax auritus</i>
Eared Grebe	<i>Podiceps nigricollis</i>

Gambel's Quail	<i>Callipepla gambelii</i>
Greater Roadrunner	<i>Geococcyx californianus</i>
Great Blue Heron	<i>Ardea herodias</i>
Great-H orned Owl	<i>Bubo virginianus</i>
Green Heron	<i>Butorides virescens</i>

Herring Gull	<i>Larus argentatus</i>
House Sparrow	<i>Passer domesticus</i>
Interior Least Tern	<i>Sterna antillarum^b</i>
Kill D eer	<i>Charadrius vociferus</i>
Mallard	<i>Anas platyrhynchos</i>
Mourning Dove	<i>Zenaida macroura</i>
Northern Harrier	<i>Circus cyaneus</i>
Northern Shoveler	<i>Anas clypeata</i>
Red-Winged Blackbird	<i>Agelaius phoeniceus</i>
Ring-N ecked Pheasant	<i>Phasianus colchicus</i>
Snowy Egret	<i>Egretta thula</i>
Turkey Vulture	<i>Cathartes aura</i>
Western Kingbird	<i>Tyrannus verticalis</i>
Western Meadowlark	<i>Sturnella neglecta</i>
White-W inged Dove	<i>Zenaida asiatica</i>
Wilson's Phalarope	<i>Phalaropus tricolor</i>
Yellow-billed Cuckoo	<i>Coccyzus americanus^c</i>
Blacktail Jackrabbit	<i>Lepus californicus</i>
Coyote	<i>Canis latrans</i>
Raccoon	<i>Procyon lotor</i> (sign observed)



Mule Deer	<i>Odocoileus hemionus</i>
Little Striped Whiptail	<i>Cnemidophorus inornatus</i>
Turtle	Unidentified
Western Whiptail	<i>Cnemidophorus inornatus</i>

^a Brantley and Avalon Reservoirs Resource Management Plan Environmental Assessment, December 2003

^b Federally listed species

^c Also known to occur on the Pecos River (Reclamation 1996)

Table 8. Fish species reported from Brantley Reservoir (BR), Avalon Reservoir (AR), and the Pecos River (PR) within the Project Area.

COMMON NAME (SCIENTIFIC NAME)	BR	AR	PR
Inland Silverside (<i>Menidia beryllina</i>)	X	X	X
Blue Sucker (<i>Cycleptus elongates</i>)			X
Gray Redhorse (<i>Moxostoma congestum</i>)		X	
River Carpsucker (<i>Carpionodes carpio</i>)	X	X	X
Smallmouth Buffalo (<i>Ictiobus bubalus</i>)	X	X	X
Black Crappie (<i>Pomoxis nigromaculatus</i>)	X	X	X
Bluegill (<i>Lepomis macrochirus</i>)	X	X	X
Green Sunfish (<i>Lepomis cyanellus</i>)	X	X	X
Largemouth Bass (<i>Micropterus salmoides</i>)	X	X	X
Longear Sunfish (<i>Lepomis megalotis</i>)	X	X	X
Spotted Bass (<i>Micropterus punctulatus</i>)	X	X	X
Warmouth (<i>Lepomis gulosus</i>)	X	X	X
White crappie (<i>Pomoxis annularis</i>)	X	X	X

Gizzard Shad (<i>Dorosoma cepedianum</i>)	X	X	X
Threadfin Shad (<i>Dorosoma petenense</i>)	X	X	
Common Carp (<i>Cyprinus carpio</i>)	X	X	X
Fathead Minnow (<i>Pimephales promelas</i>)	X	X	X
Red Shiner (<i>Cyprinella lutrensis</i>)	X	X	X
Plains Killifish (<i>Fundulus zebrinus</i>)	X	X	X
Black Bullhead (<i>Ameiurus melas</i>)	X	X	X
Channel Catfish (<i>Ictalurus punctatus</i>)	X	X	X
Flathead Catfish (<i>Pylodictis olivaris</i>)	X	X	X
Longnose Aar (<i>Lepisosteus osseus</i>)	X	X	X
White Bass (<i>Morone chrysops</i>)	X	X	
Bigscale Logperch (<i>Percina macrolepida</i>)	X	X	X
Walleye (<i>Stizostedion vitreum</i>)	X	X	
Western Mosquitofish (<i>Gambusia affinis</i>)	X	X	X



Table 9. Other federally listed threatened and endangered species found from Sumner Reservoir to Avalon Reservoir, New Mexico.

Common Name (Scientific Name)	Federal Status	Typical Habitat
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Threatened	May be found along lakes, reservoirs, and river systems during the winter months.
Interior Least Tern (<i>Sterna antillarum athalassos</i>)	Endangered	Found on bare or sparsely vegetated sand beaches or sand bars along scoured river and lake shorelines, Brantley Reservoir.
Northern Aplomado Falcon (<i>Falco femoralis septentrionalis</i>)	Endangered	Yucca or mesquite desert grasslands with scattered prominent woody vegetation.
Black-footed Ferret (<i>Mustela frenata neomexicana</i>)	Endangered (Experimental Pop.)	Prairie dog towns in prairie grasslands up to 10,500 feet elevation.
Pecos Bluntnose Shiner (<i>Notropis simus pecoensis</i>)	Endangered	Wide, shallow sandy channels found within the Pecos River downstream from Sumner Dam to Brantley Reservoir.
Pecos Gambusia (<i>Gambusia nobilis</i>)	Endangered	Restricted to a few springs and gypsum sinkholes.
Kuenzler Hedgehog Cactus (<i>Echinocereus fendleri</i> var. <i>kuenzleri</i>)	Endangered	Occurs in woodland between 5800 and 7000 feet on gentle south-facing slopes having limestone influenced soil.
Lee's Pincushion Cactus (<i>Coryphantha sneedii</i> var. <i>leei</i>)	Threatened	Restricted to cracks and ledges of steep limestone outcrops above 4000 feet.

Bald Eagles frequent the Pecos River during the winter months, and foraging habitat is associated with the reservoirs, Pecos River, and small ponds.

In June 2004, a small breeding colony of the Interior Lest Tern was discovered at Brantley Reservoir. Interior Least Tern Suitable nesting habitat for the Interior Least Tern is bare or sparsely vegetated sand beaches or and bars, which is found along scoured river and lake shorelines.

The Pecos Bluntnose Shiner is federally listed as threatened (USFWS 1987) and listed as endangered (Group 2) by the State of New Mexico. Critical habitat has been designated for this species, but it does not extent into the sites proposed for pesticide applications.

The federally endangered Pecos Gambusia is endemic to the Pecos basin in southeastern New Mexico and western Texas. It is known to occur in ponds, springs, tributaries, or formally connected backwaters. Its habitat includes an association with aquatic vegetation throughout Bitterlake National Wildlife Refuge and the Salt Creek Wilderness Areas.

Only three populations of the gypsum wild buckwheat are known to exist and all three are in Eddy County, New Mexico. This plant is found on gypsum soils, most frequently on material that has eroded from nearby gypsum outcrops. Only one of the three

populations occurs on both Reclamation and Bureau of Land Management (BLM) lands on the Seven Hills escarpment where 50 individuals were observed. In 1998, Reclamation conducted a through search on potential habitat east of Highway 285, but not plants were found.



Appendix B: Mitigations and Best Management Practices

- **Pre-spray BMPs**
 - Comprehensive project files will be maintained.
 - Non-pesticidal techniques will be evaluated for use when they are known to provide acceptable control (over 80%) at a reasonable cost.
 - Herbicides/insecticides will only be used when they provide the most effective control relative to cost and do not present unacceptable environmental or safety risk.
 - Herbicides/insecticides will be selected based on their ability to provide the most effective control and least cost.
 - Applicators will be required to read and understand the label and Material Data Safety Sheet for all herbicides being used.
 - The lowest effective herbicide/insecticide rate will be used.
 - Treatment sites will be checked by qualified personnel to ensure they are not occupied by threatened, endangered, or sensitive species.

- **Herbicide/Insecticide Spraying BMPs**
 - Individuals spraying herbicides/insecticides will receive safety and application training prior to doing any treatment.
 - Spraying will not be done when the average wind speed exceeds 8 miles per hour or as indicated on the label.
 - Applications will not be done when there is a threat of rain or snow.
 - Treatment areas will be posted with information signs to inform the public that herbicides are being used and the date of application.
 - Mixing of herbicides/insecticides will not be done near water, recreation sites, residences, or areas frequented by the public.
 - Daily treatment records will be kept.
 - Applicators will use appropriate PPE.

- **Herbicide/Insecticide post-spray BMPs**
 - Treatment areas will be checked at least once annually to assess efficacy.
 - Application records will be maintained in the project file.
 - Managerial oversight will be done annually to ensure compliance with all requirements.

Appendix C: Pesticide Safety and Spill Plan

Information and equipment

- All individuals applying pesticides will receive training on safety and application procedures prior to spraying.
- A copy of pesticide labels and MSDS will be available at all times during project operations, and applicators will be completely familiar with these documents.
- Required PPE will be worn at all times when pesticides are being mixed and applied.
- An emergency spill kit, with directions for use, will be present when herbicides are being transported, mixed and applied.
- Employees will be trained in the use of the spill kit prior to initiation of operations.
- The spill kit will contain the following equipment:
 - At least three gallons of clean water
 - Hand soap
 - Shovel
 - Broom
 - Ten pounds of absorbent material, such as kitty litter
 - Box of plastic bags
 - Nitrile gloves

Procedures for pesticide spill containment

Information in this section is derived from the EPA document “Applying Pesticides Correctly: A Guide for Private and Commercial Applicators,” and the rules and regulations for the New Mexico Pesticide Control Act administered by the New Mexico Department of Agriculture, Pesticide Management Bureau.

The following information will be reviewed by workers who handle pesticides:

- Immediately notify the direct supervisor of an incident or spill. Identify the nature of the incident and extent of the spill, including the product and chemical names and the EPA registration number(s).
- Remove any injured or contaminated person to a safe area. Remove contaminated clothing and follow MSDS guidelines for emergency first aid procedures regarding exposure. Do not leave an injured person alone. Obtain medical help for any injured employee.
- Contain the spilled pesticide as much as possible on the site. Prevent the herbicide from entering ditches, gullies, wells, or water systems.
- **Small Spills** (Less than 1 gallon of pesticide formulation or less than 10 gallons of herbicide mixture)
 - Qualified employees will be present to confine a spill.
 - Follow MSDS guidelines for emergency first aid procedures in the event of an accidental exposure.
 - Restrict entry to the spill area.
 - Contain the spread of the spill with earthen dikes.
 - Cover the spill with absorbent material.
 - Place contaminated materials into leak-proof container(s) and label.
 - Dispose of contaminated material according to label instructions and State Requirements.
- **Large Spills** (More than 1 gallon of pesticide formulation or more than 10 gallons of herbicide mixture)
 - Keep people away from the spill.
 - Follow MSDS guidelines for emergency first aid procedures in the event of an accidental exposure.
 - Contain the spread of the spill with earthen dikes.
 - Cover the spill with absorbent material.

- Spread the absorbent material around the perimeter of the spill and sweep toward the center.
- Call the direct supervisor and the local fire department, and follow their instructions for further actions.

Procedures for pesticide mixing, loading and disposal

- Mixing of pesticides and adjuvants will be done at least 100 feet from well heads or surface waters.
- Dilution water will be added to the spray container prior to the addition of the pesticide concentrate.
- Hoses used to add dilution water to spray containers shall be equipped with a device to prevent back-siphoning, or a minimum 2-inch air gap.
- Workers mixing pesticides will wear the maximum PPE required by the label.
- Empty containers will be triple rinsed. Rinsate will be added to the spray mix or disposed of on the application site at a rate that does not exceed amounts addressed on the label.
- Unused pesticide will be stored in a locked facility in accordance with herbicide storage instructions provided by the manufacturer, and in accordance with the New Mexico Department of Agriculture regulations.
- Empty and rinsed herbicide containers will be punctured and disposed in accordance with label instructions.

Transportation and Security

- Transport only the quantity of pesticide needed for the day's operation.
- Do not leave vehicles being used to transport pesticides unattended unless the pesticides are secured in a locked area.
- Keep pesticides separated from drivers and passengers when they are being moved from storage sites to field locations
- Do not transport open container with pesticides.
- Make sure all lids or bungs are tight on pesticide containers prior to transport.
- Maintain security of pesticides at field sites.

Appendix D – Prevention by Heavy Equipment Hygiene

Introduction

Construction equipment hygiene and clean-down procedures is necessary to prevent the spread and development of noxious weeds and invasive plants.

- **The Issue.** Relocating construction equipment from project to project, or from one site to another, is a significant factor in the spread of weeds and development of weed infestations.
- **Contaminants Causing Spread.** The most common contaminants on equipment are weed seeds and plant debris or plant parts that can result in vegetative reproduction. Some seeds are small and they can be difficult to remove, especially when they penetrate deep into mechanical parts of the equipment.

Initial Preventive Measures

An effective and economical preventive approach is for equipment operators to avoid contamination of machinery. This approach can reduce or eliminate the need to clean equipment. Some useful practices include:

- Work from non-infested areas into infested areas.
- Strategically designate equipment wash-down sites at each project to minimize weed spread.

Machinery Most at Risk

The types of machinery and equipment that are of concern in the spread of weeds follow:

- Track Equipment (dozer, excavator, crane, mulcher, etc.),
- Pneumatic Wheel Equipment (loader, grader, scraper, backhoe, chipper, etc.).

Critical Contamination Areas

When decontaminating equipment and attachments, there are certain areas of the machine that require particular attention. These areas of critical contamination generally come into contact with the soil or plant material when the equipment is in use.

Clean-Down Options

The following are effective methods to remove weed seeds and plants:

- **Wash-down** can be achieved by applying water to the equipment at high pressure using a pressure cleaner or spray tank and pump. The critical areas on equipment must be rigorously targeted and thoroughly washed clean.
- **Air blast** assists decontamination of machinery, especially for those hard-to-reach areas such as cavities and joints. A compressor with hose and suitable nozzles is required.
- **Physical removal** with hand-held tools is an option that is most appropriate for contaminants that adhere to equipment. Physical removal is often undertaken prior to or as a follow up procedure to both water and/ or air blast clean-down. This may be labor intensive, but it will ensure that contaminants are removed and disposed of correctly. Brooms, brushes, shovels and scraping tools can help with clean down procedures.

Clean-Down Considerations

When implementing hygiene protocols a number of considerations need to be addressed to minimize further infestations and achieve maximum hygiene standards.

These include:

- Whether to clean the equipment on or off project site;
- Whether to utilize companies that provide portable equipment cleaning facilities;
- Or, whether to use existing equipment wash bay facilities located at local commercial enterprises.

Important Consideration

When engaging contractors, verify that they implement equipment hygiene protocols as a standard practice. Undertake physical inspections of their equipment to confirm weed free status, before and after the job is undertaken.

General Movement of Equipment

Everyone has a responsibility to ensure that they check their equipment for possible weed seed and plant part contaminants and implement appropriate clean down procedures.