RECLAMATION

Managing Water in the West

DRAFT

Environmental Assessment and Finding of No Significant Impact for Integrated Pest Management on the San Juan-Chama Project; Colorado and New Mexico

U. S. Department of the Interior
Bureau of Reclamation
Albuquerque Area Office
Environment Division
Albuquerque, New Mexico
October 2011

MISSION STATEMENTS

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

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.

U.S. Department of the Interior

BUREAU OF RECLAMATION
Albuquerque, New Mexico

Albuquerque Area Office

Finding of No Significant Impact

Environmental Assessment for
Integrated Pest Management of
Invasive Plants on the
San Juan-Chama Project;
Colorado and New Mexico

_____ _____
Manager, Environment Division Date

_____ _____
Area Manager, Albuquerque Area Office Date

AAO-11-009
FONSI Number

Background

A proposal to authorize the Bureau of Reclamation, including cooperators and contractors, to use manual, mechanical, and herbicidal methods to control undesirable native and exotic plants at facilities and on lands held in title by the United States (Reclamation) on the San Juan-Chama (SJC) Project, Colorado and New Mexico, was analyzed in an Environmental Assessment (EA).

The EA describes two alternatives: Alternative A, No Action; and Alternative B, Proposed action to manage invasive plants using manual, mechanical, and herbicidal methods as part of an Integrated Pest Management (IPM) Strategy. Under Alternative A, No Action Alternative, invasive plants on Reclamation facilities and lands would not be managed and the consequences would be accepted. Under Alternative B, Agency employees, cooperators, and contractors propose to use manual, mechanical, herbicidal, or a combination of these methods to control invasive plants.

Herbicides are proposed for use to control exotic and native invasive plant species that (1) threaten native plant communities on wetlands, (2) threaten the structural integrity of structures, or (3) have the potential to spread from SJC Project sites to adjacent lands. This analysis will address the management of vegetation with herbicides at Blanco Diversion Dam site, Oso Diversion Dam site, Willow Creek Conveyance Channel, Heron Dam and Reservoir, the SJC Project office complex located in Chama, NM, and other SJC Project lands.

Summary of the Proposed Action

The proposed actions are to authorize Reclamation employees, cooperators, and contractors to implement IPM methods to control undesirable plant pests. Manual methods would be considered for use in managing small infestations (less than 1/10 acre) when such methods are determined to the effective and not overly expensive to implement. Mechanical methods, such as grading and mowing, would occur on sites accessible to heavy equipment. Mowing of saltcedar, followed by an herbicide application, could be done around the shore of Heron Lake. Grading could be done on a limited basis along roadways or at SJC Project sites to control invasive plants like Russian thistle and kochia. For management of vegetation that cannot be effectively controlled by manual and mechanical means, herbicides considered for use would include: Aminopyralid, clopyralid, glyphosate, imazapy, methsulfuron methyl, oryzalin, triclopyr, and 2,4-D.

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 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.

Alternative A was not selected. Reclamation could not achieve its mandate to safely operate SJC Project facilities and structures, protect native plant communities on SJC Project lands, and prevent the spread of invasive plant species from Reclamation managed sites to adjacent lands.

Alternative B, the proposed use of manual, mechanical, and herbicidal methods, was selected when such methods would be effective in managing invasive plant species. This alternative would include the implementation of preventive methods to inhibit the dispersal of pests, especially the transport of seeds of invasive plants on equipment (see Appendix C). However, it must be realized that manual and mechanical methods have not proven to be effective for several species that have the capacity to sprout, especially perennial species with deep root systems. In addition, the expense of controlling some species of undesirable plants was considered to be excessive under this alternative. Also, this alternative was selected because it provides Reclamation managers with the full range of proven methods, including the use of herbicides, to achieve effective and efficient IPM. Mitigation measures and Best Management Practices (also included in the IPM plan) would be followed during implementation to mitigate the risk of adverse impacts to (1) humans; (2) non-target vegetation; (3) non-target terrestrial and aquatic animals, including threatened, endangered, and sensitive animals; and (4) water quality. Since the propose action would not effect any threatened or endangered species, a Biological Assessment is not needed.

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

Environmental Impacts Related to the Resources of Concern

Based on the EA, it was determined that the proposed use of manual and mechanical, and herbicidal methods 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 manual and mechanical methods and the toxic effects of herbicides would be negligible.

  The disclosure of effects of the IPM methods, including the use of herbicides 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 of the methods 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 to control undesirable weeds. 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, expected patterns of use, risk assessments developed for the U.S. Forest Service for herbicides, which were incorporated by reference, and a summary of potential risks to humans and non-target species (Chapter 4).

- **Non-target Vegetation**

  None of the methods and pesticides proposed for use will have any significant affect (direct, indirect, or cumulative) on non-target vegetation. This action is limited to control of invasive plants on SJC Project lands and at facilities.

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

  The proposed actions with proposed mitigation measures, which were identified in an approved IPM Plan, are not expected to have *any effect on any endangered, threatened, or proposed species; or designated or proposed critical habitat areas*; or nonessential experimental populations. Likewise, other animal species and aquatic animals are not expected to be affected by the proposed actions.

- **Water Quality**

  There would be no direct, indirect, or cumulative impacts to water quality form the proposed use of IPM methods, including the use of herbicides.

- **Indian Trust Assets**

  There are no known 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.

- **Irreversible and Irretrievable Commitment of Resources**

- No irreversible or irretrievable commitment of resources is expected by adopting

Alternative B, Proposed Actions (IPM), including the use of herbicides. Even under the worst-case scenario, the effects of the proposed use of herbicides would be negligible. Prior to doing any mechanical treatments, especially removal of large trees and/or shrubs, the Albuquerque Area Office Environment Division's Archaeologist would be called to determine if the State Historic Preservation Office would require consultation.

- **Cumulative Impacts**

  No cumulative impacts would occur to people, non-target vegetation, terrestrial wildlife, non-target animals, and water quality from the proposed actions, Alternative B.

Measurement Parameters	Alternative A - No Action (No Use of IPM Methods)
Addresses the purpose and need?	No. Management of invasive weeds and Reclamation's mission and policies could not be achieved by selecting this alternative. Failure to manage invasive plants, especially deep-rooted species, would not protect SJC Project structures and facilities. Unchecked, invasive weed infestations would displace native plant communities in wetlands and impact wildlife habitat. Also, exotic plant and invasive plant species in and around facilities and other sites on Reclamation lands would continue to expand and would subsequently spread onto nearby state, private, and federal lands.

Measurement Parameters	Alternative B – Preferred Alternative (Use of Manual, Mechanical and Herbicidal Methods)
Addresses the purpose and need?	Yes. The alternative allows for the selection manual, mechanical, and herbicidal methods to control invasive weed infestations. Small infestations of some species of invasive plants, one-tenth (1/10) acre or less, could be controlled by manual methods. In equipment storage yards and on facilities, hand grubbing of plants, like kochia, could be effectively and economically managed by hand-grubbing or pulling of individual plants. Mowers could be used to cut saltcedar trees followed by a cut surface application of an herbicide to achieve root kill. On roads and similar sites, undesirable annual plant species could be effectively managed by grading the upper few inches of soil. The application of selective herbicides in wetlands would remove invasive weeds and protect native plant communities and wildlife habitat.

Measurement Parameters	Alternative A - No Action (No Use of IPM Methods)
Consistent with statutes, regulations, and other plans?	No. This alternative would not be responsive to Reclamation policy to protect 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.

Measurement Parameters	Alternatives B (Use of Manual, Mechanical, and Herbicide Methods)
Consistent with statutes, regulations, and other plans?	Yes. This alternative would be responsive to Reclamation's mission and 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. This alternative also would meet Reclamation's policy to protect the health and safety of employees.

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, Best Management Practices in Appendix A, the Pesticide Safety and Spill Plan in Appendix B, and Prevention by Heavy Equipment Hygiene (Appendix C) would be followed, including supervision of program operations.

Coordination

Reclamation has issued a scoping letter to interested federal and state agencies as well as a consultation invitation to interested tribes. The Draft EA and IPM plan will be posted on Reclamation's website at: http://www.usbr.gov/uc/albuq/envdocs/index.html

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 IPM would not result in a significant impact on the human environment and does not require preparation of an environmental impact statement.

ACRONONYMS AND ABBREVATIONS

ADI -	**Allowable Daily Intake**
BMPs-	**Best Management Practices**
CFR -	**Code of Federal Regulation**
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**
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**
NOEL-	**No Observed Effect Levels**
O&M -	**Operations and Maintenance**
PPE -	**Personal Protective Equipment**
RfD -	**Reference Dose**
T&E -	**Threatened and Endangered**
USDA-	**United States Department of Agriculture**

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CHAPTER 1 PURPOSE AND NEED

Introduction

The United States Department of the Interior (DOI), Bureau of Reclamation, Albuquerque Area Office, proposes to control and conduct long-term management of invasive plants with manual mechanical, and herbicidal methods on lands and facilities held in title by the United States (Reclamation).

The San Juan-Chama (SJC) Project consists of a system of diversion structures and tunnels for movement of water from the San Juan River Basin to the Rio Grande Basin. Project was authorized by Congress in 1962 to supply water from the Navajo, Little Navajo, and Blanco Rivers, tributaries of the San Juan River, which are all part of the Colorado River system. The SJC Project includes three diversion dams (Blanco, Little Oso, and Oso) in Colorado and includes 27 miles of concrete-lined tunnels, one of which passes under the Continental Divide. In New Mexico, the Project includes Heron Dam, modification to El Vado outlet works, and the Pojoaque Unit, which includes Nambe Falls Dam. The primary purpose of the SJC Project is to furnish a water supply to the middle Rio Grande Valley for municipal, domestic, and industrial uses. The Project is also authorized to provide supplemental irrigation water and incidental recreation and fish and wildlife benefits.

The purpose of this plan is to outline the objectives, management alternatives, short- and long-term Integrated Pest Management (IPM) strategies, control techniques, mitigations and best management practices (BMPs), and monitoring and follow-up actions to control undesirable native plant species and invasive weeds on the following SJC Project facilities: (1) Blanco and Oso Diversion Dam sites, (2) Oso Diversion Dam Wetlands, (3) Willow Creek Conveyance Channel, (4) Heron Reservoir, (5) Heron Dam, and (6) SJC Project office and equipment storage facility located in Chama, NM.

Management of undesirable vegetation, which includes both native and exotic species, 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 emergency Operation and Maintenance (O&M) activities.

- To prevent damage to structures due to root growth, such as shortened seepage paths through embankments; voids in embankment from decaying

roots from dead or damaged trees; expansion of crack or joints of concrete walls; and plugging of perforated or open-jointed pipes.

- Keep plants from overgrowing and obscuring equipment, structures, and facilities

- Prevent the buildup and spread of exotic species from federal property to adjacent land of mixed ownership.

- Remove invasive plant species from wetland sites to protect native plant communities.

- Maintain or enhance the visual quality of structures and facilities that are adjacent to recreational sites

- Enhance desirable plant communities to provide favorable habitat for fish and wildlife

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

- **Annual Control Standard.** Annual treatment must show a strong potential for success, i.e., 80 percent or higher control of selected plant species.

- **Long-term Standard.** After two years of annual treatments, only one to four percent of the original number of targeted plants will remain or invade treatment areas, which will require minimal follow-up maintenance control.

- **Efficiency**: The standard will be to select control methods that provide the maximum level of control at the least cost.

- **Environmental Acceptability**: The standard will be to prevent or mitigate any adverse environmental effects associated with implementation of IPM methods. Prior to any on-the-ground management, an environmental analysis must be completed and approved.

- **Distribution and Mapping of Weed Infestations**: The standard is to determine the location of weed infestations and record the distribution on maps.

- **Cooperation**: The standard is to obtain approval of cooperative agreements by all involved parties prior to implementing control treatments.

- **Mitigations and Best Management Practices (BMPs)**: The standard is to ensure that control activities, especially those involving the use of pesticides, are done in a quality manner in compliance with policy and law (Federal Insecticide, Fungicide, and Rodenticide Act). Applicators will 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 will include the following elements:

    - Date of application
    - Target pest(s)
    - Control technique(s) used
    - Common name of herbicide(s) used
    - Description of formulation or tank mix
    - Application method (aerial, backpack, etc.)
    - Quantity (ounces/pounds) of herbicide 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 of the IPM program is completed to assess if the management objectives were met; treatments complied with standards, mitigations, and BMPs; and actions were in compliance with policy and law.

Environmental concerns for the SJC Project follow:

- **Wetlands:** The wetlands at the Oso Diversion site are being invaded by Canada thistle, and the infestation is expected to increase and replace desired native plant communities. In 2011, Russian knapweed and perennial pepperweed infestations were not observed in the wetlands, but these species have the potential to cause further damage to the wetlands.

- **Rio Grande Silvery Minnow:** Reclamation leases water from the SJC Project contractors and provides it to the Middle Rio Grande Conservancy District (MRGCD) for irrigation. MRGCD then operates its irrigation and drainage system to allow native Rio Grande water to remain in the river undiverted for habitat needs for the Rio Grande silvery minnow (*Hybognathus amarus*).

Proposed Action

Management actions can be optimized by adopting a systematic approach such as Integrated Pest Management (IPM). Successful managers choose a variety of vegetation management options including prevention, containment, and control of species that have proven to be effective, economical, and environmentally acceptable. However, it must be realized when attempting to manage invasive weed that sustained control efforts, including follow-up treatments with herbicides, 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 IPM approach, following two (2) or possibly three (3) years of treatment, additional maintenance treatments would be reduced and done less frequently. The standard for managing noxious weeds would be to reduce the extent and density, and eventually eliminate infestations after the seed bank in the soil is exhausted. Nevertheless, invasive weeds will continue to spread onto Reclamation lands, and annual control measures will likely be needs, although at a lower rate than initial efforts.

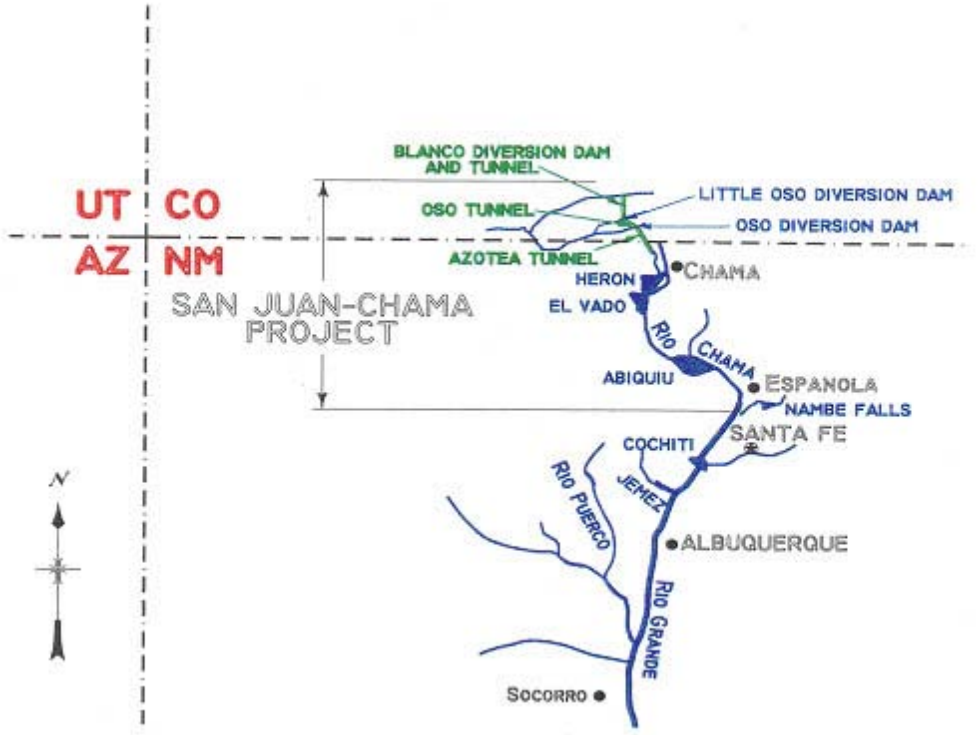

Figure 1. San Juan-Chama Project location map.

Need for the Action

- **Oso Diversion Dam Site (approximately 80 acres):** In August 2011, it is estimated that less than 30 acres were infested with invasive weeds at the Oso Diversion Dam site.

    - **Wetlands:** At least once per year, inspect sites for the presence of weed infestations will be necessary, and treat all detected weed infestations with herbicides would be needed to protect native plant communities. Canada thistle and bull thistle are the primary weed species that should be controlled.

    - **Terrestrial Sites:** At least once per year, inspect all terrestrial sites for the presence of weed infestations, and conduct control operations with herbicides should be done to reduce the population levels. Control operations will prevent spread to adjacent areas. Again, Canada thistle and bull thistle are the primary weed species that should be controlled. Once weed populations have been controlled, it would be beneficial to plant grasses on treatment sites to prevent re-invasion of problem weeds.

- **Willow Creek:** Thinleaf alder trees and shrubs and clumps of willow are growing in the riprap along the channelized portions of the creek, and the root system of these woody plants will reduce the structural integrity of the riprap along the channels.

- **Heron Lake:** Scattered stands of saltcedars have infested the shoreline of Heron Lake, and the infestations will continue to expand and spread onto adjacent areas. In 2011, saltcedar was observed in scattered patches and individual plants, primarily on the reservoir's shoreline (east side from Heron Dam north to the Brushy Point campground).

- **Blanco Diversion Dam Site:** Small infestations of Canada thistle, bull thistle, and oxeye daisy at the site would increase in density, and the infestations would spread onto adjacent lands. In 2011, it was estimated that there was less than an acre of weed infestations.

- **Chama Office Complex:** Kochia, Russian thistle, grass species, and other plants annually infest the office complex site creating a safety hazard for operation of equipment. The plants also impair the visual quality of the complex.

- **Heron Dam Outer Slope:** There are a few scattered shrubs occurring on the outer slope of the dam, but these shrubs do not pose a problem at present. However, gray rabbitbrush and big sagebrush have the capacity to infest this site and impair Operation and Maintenance (O&M) operations.

Purpose for the Action

- **Oso Diversion Dam Site (approximately 80 acres):** Containment and control of invasive weeds on this site is considered the most important priority for the SJC Project. In 2011, less than 30 acres of the 80 acre site had scattered weed infestations.

    - **Wetlands:** The purpose would be to control invasive weeds infesting the site to protect native plant communities and enhance habitat for wildlife.

    - **Terrestrial Sites:** The purpose would be to contain and control invasive weeds to allow grasses and other desirable plants to occupy the site to prevent re-invasion by targeted weed species. Another purpose would be to prevent the expansion of weed infestations on Reclamation lands to spread to adjacent lands of mixed ownership,

- **Willow Creek:** The purpose would be to control scattered trees and shrubs on the inner slopes along about nine (9) miles of the channelized portions of Willow Creek. Large thinleaf alders could be pulled using heavy equipment, but no more than 500 trees should be removed per year to prevent an unacceptable discharge of silt into the creek from disturbance of soil by root removal. Alders less than two (2) inches in diameter ground level and willows could be controlled by the application of herbicides. Scattered one-seed juniper tress could be controlled by cutting stems as close to the ground level as possible with a chainsaw.

- **Heron Lake:** The purpose would be to remove scattered saltcedar trees and shrubs around the edge of the lake. Trees over two (2) inches in diameter at ground level could be cut with a chainsaw or use of a mower, and the cut surfaces immediately treated with a herbicide. Smaller saltcedar plants that have smooth bark above the ground level could be controlled by an oil basal application of an herbicide. The location and acreage of the saltcedar infestation needs to be determined prior to conducting control operations. However, infestations appear to be relatively small, it is estimated that less than 50 acres were infested in August 2011.

- **Blanco Diversion Dam Site (approximately 50 acres):** The purpose would be to control patches of bull thistle, Canada thistle, and oxeye daisy at this site to prevent the infestations from expanding. The infestations are small, and there are only a few scattered individual plants or clumps of plants on the site. The total area infested by the three species is possibly about one (1) acres in size.

- **Office Complex:** The purpose would be to remove various plant species the pose a safety threat for operation of heavy equipment and improve the visual quality of the complex.
- **Heron Dam Outer Slope:** The purpose would be to remove the scattered shrubs occurring on the outer slope of the dam. Species like gray rabbitbrush and big sagebrush could impair Operation and Maintenance operations or have the capacity to threaten the integrity of any structure

Relevant Statutes, Regulations, and other Plans

Pertinent Laws and Regulations include:

- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
- National Environmental Policy Act (NEPA)
- Endangered Species Act (ESA)
- Clean Water Act
- Any other pertinent state, local, or county regulations

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

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- **Issue 4.** Potential effects of the alternative on water quality

This Draft EA will be posted on Reclamation's Upper Colorado Region's web site for public review; this will provide for additional input prior to finalizing the EA. The Draft EA and IPM plan will be posted on Reclamation's website at:
http://www.usbr.gov/uc/albuq/envdocs/index.html

Issues beyond the Scope of this Document

Biological methods to control undesirable plants will not be addressed in this EA.

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. Selected Commercial Formulations of Glyphosate — Accord, Rodeo, Roundup, and Roundup Pro, Risk Assessment, Final Report. USDA Forest Service. April 25, 1999.
4. Effects of Surfactants on the Toxicity of Glyphosate, with specific Reference to Rodeo. USDA Forest Service. February 6, 1997.
5. Imazapyr — WordPerfect Worksheets for Human Health and Ecological Risk Assessments. USDA Forest Service. November 30, 2001.
6. Metsulfuron methyl — WordPerfect Worksheets for Human Health and Ecological Risk Assessments. USDA Forest Service. December 4, 2001.
7. Triclopyr Acid (Garlon 3A) — WordPerfect Worksheets for Human Health and Ecological Risk Assessments. USDA Forest Service. November 23, 2001.
8. Triclopyr-Bee (Garlon 4) — WordPerfect Worksheets for Human Health and Ecological Risk Assessments. USDA Forest Service. November 23, 2001
9. Final Environmental Statement: Pecos River Basin Water Salvage Project, Bureau of Reclamation, February 26, 1979.
10. San Juan-Chama Project Integrated Pest Management Plan, [date approved].

Chapter 2 ALTERNATIVES

Introduction

The alternatives are the heart of this environmental assessment, and this chapter describes the activities of both the No Action and the Proposed Alternative (IPM). These alternatives will be evaluated against the issues identified in Chapter 1, and those that will be later developed during public scoping, with respect to the affected environment described in Chapter 3, to provide a clear basis to choice among the options available for the decision maker and the public. This chapter displays the two (2) alternatives developed in response to issues identified by an Interdisciplinary Team. Also, all practical alternatives were evaluated in the development of the IPM plans for the SJC Project. 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.

Description of the Alternatives

Alternative A: No Action

The intent of this alternative would be to eliminate any use of IPM methods to control undesirable and invasive plant species on Reclamation lands and facilities managed by the SJC Project. All of the adverse safety, health, and environmental effects of plant and animal pests would have to be accepted. Under this alternative, Reclamation would not be able to meet its mission and management objectives. The alternative will serve as a basis of comparison for the proposed IPM alternatives.

Alternative B: Integrated Pest Management using a Combination of Mechanical, Manual, and Herbicidal Methods

Different methods and strategies would be needed to address specific invasive plant problems. The following methods and strategies could be used under this alternative:

- **Manual Removal of Undesirable Plants:** Manual vegetation control can involve the use of weed eaters, chain saws, small power mowers, as well as tools like hoes, shovels, and pruning shears. Manual control can be effective for shallow-rooted plants, but this approach may not be effective for controlling deep-rooted species like Russian knapweed. An advantage of manual control is that it can be performed selectively to remove target weeds, while preserving desirable plants. Disadvantages are that manual methods are labor-intensive and extremely expensive (Brown et al. 1999). The strategy for this method would be to annually remove individual plants or small patches of

plants. If treatment is done before the plants set seed, some lasting control can be expected. However, it is unrealistic to expect that species like kochia would be eliminated from Reclamation properties by manual removal. Annual management can be achieved, but it would not be possible during the timeframe of this analysis to achieve any meaningful control invasive weeds using manual methods.

- **Mechanical Removal of Undesirable Terrestrial Plants:** Periodic removal of the aerial (above ground) portions of saltcedar, coyote willow, and other trees and shrubs by large mowers would suppress their growth and keep them from reaching their potential size. However, the root systems of the perennial species would not be removed and the plants to sprout. Some species, such as saltcedar, have the ability to grow up to six (6) feet or more in one growing season. Some plants could exceed twelve (12) in height if they were mowed every third year. Therefore, the roots of such species could damage structures from continual root growth. The use of rotary and flail mowers can provide another tool to assist mangers in maintaining vegetation height for visibility, fire protection, and appearance. A disadvantage of mowing is that it can scatter and transport of seeds and plant parts of invasive species to surrounding sites, holding areas, maintenance yards, and along roadways, thus, potentially increasing the spread of these undesirable plants (refer to Appendix C for methods that would be used to prevent the spread of seeds and plant parts of exotic and invasive plant species). The strategy would be to annually remove the aerial portions of annual plants, grasses, or other species by mowing or removal by grading the soil with heavy equipment. Temporary management of such plants could be achieved, but it is highly unlikely that any lasting control could be achieved. The best timing to conduct such mechanical treatments would be when the plants are relatively small before they set seed.

- **Control with Herbicides**

    - **Use of Herbicides to Manage Bull thistle.** Bull thistle establishment is favored in open areas and sites with disturbed soils. Therefore, management actions that favor the establishment of desirable vegetation, especially perennial grasses, will prevent bull thistle invasion. On sites with extensive stands of this weed, the application of an herbicide is usually the most economical method of control. Clopyralid, 2,4-D, or a combination of these two herbicides (Curtail®) will provide excellent control of the rosette or seedling stages in either the Spring or Fall. Prior to flowering, bull thistles can be controlled with aminopyralid, 2,4-D, or dicamba. Glyphosate will control this plant, but this herbicide is non-selective and will kill grasses. Therefore, glyphosate would only be recommended for use as a last resort.

- **Canada thistle.** Canada thistle infestations can spread by sexual reproduction (seeds) and asexual spread by creeping, horizontal roots. Therefore, manual methods like-pulling or grubbing will not control established stands because it is almost impossible to remove the entire root system. The same herbicides that will control bull thistle will provide acceptable control of Canada thistle, including aminopyralid, clopyralid, 2,4-D. Also, dicamba, and metsulfuron will control Canada thistle. Since Curtail® will also control bull thistle; it would be the most practical material to use.

Figure 2. Canada thistle and bull thistle infestation at Oso Diversion Dam Site.

- **Thinleaf alder and willows.** The following herbicides will provide effective control of woody shrubs and trees: 2,4-D, glyphosate, imazapry, methsulfuron, and triclopyr. Glyphosate and imazapyr are non-selective herbicides that will kill most plants. Triclopyr, metsulfuron, and 2,4-D are selective herbicides that will control woody plants, but they will have little or no effect on grasses. Since herbicides are registered by site, it will be necessary to select a product that has an aquatic label if there is a possibility of getting spray in

water, which includes Rodeo® (glyphosate), Habitat® (imazapyr), and Renovate 3® (triclopyr). Elsewhere, the other herbicides could be an option. Since triclopyr will control saltcedar, in addition to willow and thinleaf alder, there is an advantage to use the same methods to control them.

- **Saltcedar.** The treatment strategy is to remove all trees and shrubs around the edge of Heron Lake. Saltcedar is highly invasive and infestations could expand in size and density. Annual removal of woody species will protect the shoreline of Heron Lake and reduce seed production, which will help to reduce treatment costs in future years. Revegetation of treatment sites will not be needed since the objective is to remove the plants and create bare ground on the edge of the lake. It will be necessary to achieve root-kill of these trees because they have the ability to sprout if the aerial portions are cut or burned. Therefore, herbicides will need to be used, singly or in conjunction with mechanical methods, to achieve root-kill of these tree and shrub species. Mechanical mowing of these trees or shrubs along the lake's edge is a viable option to remove larger plants or clumps of shrubs if it is done in conjunction with immediate application of an amine formulation of triclopyr to the cut surfaces. Effective control of saltcedar also can be achieved by foliar, cut-surface, and oil basal applications of an herbicide. Foliar applications of a mixture of imazapyr and glyphosate are effective when applied between June and September, but the best results can be achieved by applying these herbicides in late August and September when the trees are moving carbohydrate reserves to their root systems. However, this technique would not be economical to treat existing infestations. Also, small saltcedar saplings and regrowth (stems less than 2 to 3 inches in diameter at ground level and less than 8 feet tall) can be controlled by a basal application of triclopyr (ester formulation) mixed with vegetable oil or another proven carrier. Triclopyr applications can be done at any time of the year, although early fall or late spring applications are preferred. The most practical approaches to control the limited saltcedars along the lake's edge would be as follows: (1) for small trees, use the oil basal approach using Garlon 4® in Improved JLB Oil Plus; and (2) for large trees, cut the stems with a mower or chainsaw and immediately treat the cut surfaces with Garlon 3A®. Renovate 3®, which is an aquatically labeled triclopyr product, can be used immediately adjacent (within 5 feet) to water.

- **Big sagebrush.** Individual plant foliar applications of an herbicide, especially an ester formulation of 2,4-D, would be the most effective and economical method of control.

- **Gray Rabbitbrush.** This shrub cannot be effectively controlled by removing the above ground portions of the plant. It will readily sprout from the deep taproot. Grubbing, digging, or mechanical removal of the root system is too costly and impractical, and the soil disturbance will favor invasion of these shrubs as well as invasive by species like kochia and Russian knapweed. The only proven method of control is using picloram (Tordon 22K®). This product is a Restricted Use herbicide that will provide excellent control (90 percent or higher) at a cost of $40 to $60 per acres depending on the density and size of shrubs being controlled. This herbicide is highly mobile in soil and should not be used were the water table is within six (6) feet of the soil surface or on the inner slopes of canals where surface flow could get into water. Applicators must be certified to apply this product. Also, daily use record must be kept for the application of this herbicide, and these records must be kept for a minimum of three years. The preferred option is to use triclopyr, especially since it is a selective herbicide that will have little or no effect on grasses. Application trials were conducted in the Alamosa Field Division in 2010 and 2011, and tentative results indicate that adequate control can be achieved if proper application techniques are employed.

- **Russian knapweed.** Hand removal of Russian knapweed is ineffective due to the extensive root system the will readily produce sprouts if disturbed. Mechanical options will not control Russian knapweed for the same reasons that hand removal does not work. Herbicide use is the only current option available to control Russian knapweed on Reclamation managed lands. Effective control for two years after treatment of greater than 95% can be obtained with application of aminopyralid, clopyralid, or a combination of clopyralid plus 2,4-D (Curtail®). Aminopyralid will provide the best results, but it should not be used near water or where ground water is within is (6) feet of the soil surface or on inside faces of canals where surface flow could contaminate water. Curtail® is the best product to use on the inside faces of canals to control Russian knapweed. However, care must be taken to not get any spray in water. In 2011, no infestations are known to occur on SJC Project lands.

- **Perennial pepperweed.** Since this plant is a deep rooted perennial, hand pulling or grubbing is not an effective method. Mechanical control is not possible for the same reasons that hand removal does not work. On roadsides, rangelands, and waste areas; metsulfuron methyl (Escort ®) can be applied to actively growing rosettes early in the spring will provide effective control. These herbicides also can be applied to the regrowth before the bud stage or fall regrowth before a killing frost. However, it is best to treat plants before seeds are

produced to the seed bank in the soil and reduce subsequent treatments. Escort ®) cannot be used where they could get into the water. If plants are growing within five (5) feet of water, the best option is to use an aquatically labeled formulation of 2,4-D (DMA® 4 IVM or comparable product).

- **Oxeye daisy.** This plant is a perennial that has extensive, creeping roots. The oxeye daisy infestation at the Blanco Division Dam site occupies less than 1/10 acre. Spot applications of a two (2) percent solution of Redee® R&P (triclopyr and cloprylid) or Curtai® (clopyralid and 2,4-D) would provide the best control with the least effort.

- **Kochia.** Several herbicides will effectively control kochia. Glyphosate, imazapyr, dicamba, metsulfuron methyl, and 2,4-D products will provide excellent control results if applied correctly. If desirable grasses are present, selective herbicides like Escort (metsulfuron), 2,4-D ((DMA® 4 IVM or comparable product)), or dicamba (Banvel®) will remove kochia and have little or no effect on the grasses. Arsenal® (imazapyr) or Accord XRT®(glyphosate) are broad spectrum herbicides the can be used where bareground control would be acceptable. Glyphoste and 2, 4-D will likely be the most cost effective products to use. However, when glyphosate is used, it may be necessary to add ammonia sulfate (17 pounds/100 gallons of spray or equivalent rate) to the spray solution to prevent any potential antagonism with divalent cations in alkaline water common in the Southwest. The herbicides can be applied by on-the-ground power sprayers or by backpack sprayers. Broadcast application works well on relatively flat ground where access is good. The key to success in applying herbicides is 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 is also important, and the more persistent products, such as Escort, will provide extended results. However, if there are not desirable plant species present to occupy the site to prevent invasion by undesirable species, repeated treatments will need to be done. At the Office complex, it would be worthwhile to add oryzalin (Surflan® A.S.) to spray solution of glyphosate to inhibit germination of seeds in the soil, which will increase lasting control of many weed species.

- **Russian Thistle**. The following herbicides will provide effective and economical control of Russian thistle: (1) glyphosate (Rodeo® on the inside of canals and Accord XRT® or a comparable product on terrestrial sites); and (2) Curtail® (clopyralid and 2,4-D). Again, when

glyphosate is used, it may be necessary to add ammopnia sulfate (17 pounds/100 gallons or equivalent rate) if the mixing water is alkaline.

Table 1. Comparison of alternatives to meet the purpose and need.

Measurement Parameters	Alternative A - No Action	Alternative B – Preferred Alternative
Addresses the purpose and need?	No. Invasive weeds would not be controlled. Invasive exotic plant infestations would continue to increase on terrestrial and wetland sites and expand to adjacent lands. The density of trees and shrubs along the channelized portions of Willow Creek would increase and damage to the riprap would expand. Weeds in administrative sites would obscure structures and equipment and present a safety hazard for Reclamation employees.	Yes. Allows for the selection of a full range of IPM options, including the use of manual, mechanical, and herbicidal methods. Offers the best protection of dams and other structures by removing deep-rooted plants that could compromise the structural integrity and provides for the safety of the public and property. Removal of undesirable vegetations would allow adequate access for normal and emergency Operation and Maintenance (O&M) activities and improve safety for Reclamation employees in Administrative sites. Control of undesirable plant infestations would provide an opportunity to protect native plant communities, and offer protection to adjacent lands of mixed ownership

Alternatives Considered but Eliminated from Further Study

- **Burning**: On sites where there are dense stands of exotic plants, fire could be used to remove the built 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. 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 exotic plants is not considered a viable vegetation management approach, especially for the scattered infestations on SJC Project sites.

- **Biological Control of Saltcedar:** Research is underway to evaluate the effectiveness of a leaf beetle, *Diorhabada elongata*, to control saltcedar at several sites in the West. 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, especially for the isolated infestations on SJC Project sites.

- **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.

Herbicides to Control Undesirable Terrestrial Vegetation

Herbicides considered for use include aminopyralid, clopyralid, dicamba, glyphosate, imazapy, methsulfuron methyl, oryzalin, triclopyr, and 2,4-D. These herbicides are classified as general use products that can be purchased by the public. These herbicides are marketed by a variety of trade names (Table 2).

Table 2 - Herbicide trade name list

Common Name	Trade Name
Aminopyralid	Milestone®
Clopyralid	Reclaim® or Curtail®
Dicamba	Vanquish®/Clarity®/Banvel®
Glyphosate	Accord® XRT or similar products
Imazapyr	Arsenal®
Metsulfuron Methyl	Escort®
Oryzalin	Surflan® WDG
Triclopyr	Garlon® 3A, Garlon® 4, or similar products
2,4-D	DMA® 4 IVM, or similar products

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. Dicamba 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 management of 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 gray rabbitbrush. 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
Aminopyralid	35 Days
Clopyralid	40 Days
Dicamba	Less than 14 Days*
Glyphosate	47 Days
Imazapyr	25-142 Days*
Metsulfuron Methyl	30 Days
Oryzalin	20 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 herbicides 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 I 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
Aminopyralid	>5,000	IV
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
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 2 for a listing of trade names).

- **Aminopyralid:** Aminopyralid is a new herbicide available for selective control of susceptible broadleaf plants, including invasive and noxious species. It is an organic chemical that is a plant growth regulator used for controlling unwanted broadleaf vegetation. It has limited activity on woody species, including trees, when applied to the soil under the canopy. It is active at rates of application lower than other herbicides. The average half-life in soil is 35 days. This herbicide would not be used within a ten (10) foot buffer zone of water. The herbicide is particularly effective in the control of knapweed species, especially Russian knapweed. The product name is **Milestone®**.

- **Clopyralid:** This is a selective, post-emergence herbicide that is mainly used to control broadleaf species in three plant families: composites (Asteraceae), legumes (Fabraceae), and buckwheats (Polyganaceae). Its selectiveness makes this herbicide a useful material for control of invasive plants like Russian knapweed, while preventing adverse effects to many native plant species. Grass species are especially tolerant to clopyralid. This herbicide is readily absorbed by roots and foliage and is readily transported to plant tissues. There is some information indicating that clopyralid may be more persistent in compost and soil, but there are no plans to use compost on the SJC Project where the herbicide could be used. This material has moderate persistent, high mobility, and high leaching potential. Thus, is would not be used near water in compliance with label requirements. This product is **Reclaim® and Curtail®** (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 **Rode®*o*** 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 (whitetop, *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**.

- **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 **DMA® 4 IVM or comparable product**. This herbicide can be purchased by the public in grocery stores, nurseries, etc.

Active ingredients in herbicide formulations are defined as the chemicals that actually control the weed. So, imazapyr, triclopyr, 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 Colorado and 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 (USDA Forest Service) 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.

Chapter 3 AFFECTED ENVIRONMENTS

Introduction

This chapter summarizes human activities and existing environmental conditions on lands managed by Reclamation on the SJC Project, Colorado and New Mexico, as they pertain to the key issues identified in Chapter 1. Four initial issues were developed and evaluated by the Interdisciplinary Team. Additional issues will 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 SJC Project consists of a system of diversion structures and tunnels for movement of water from the San Juan River Basin to the Rio Grande Basin (see description in Chapter 1). The sites that are affected by invasive weeds include the following sites: (1) Blanco Diversion Dam, (2) Oso Diversion Dam. (3) Willow Creek Conveyance Channel, (4) Heron Lake, (5) Heron Dam, and (6) SJC Project office and equipment storage facility. All of these sites have undergone construction activities and these cannot be considered as natural environments. The following are descriptions of the natural environments adjacent to these sites:

- **Blanco Diversion Dam**. The environment adjacent to this site in southern Colorado is a mixed conifer forest with Douglas-fir, true firs, spruce, ponderosa pine, and quaking aspen. Mixed conifer forests generally occur at an elevation of 8,000 to 10,000 feet, and the annual precipitation is usually 25 to 30 inches. There is typically a diverse understory of forbs, grasses, and shrubs. The entire Blanco Dam site has disturbed soils with structures, roads, and sediment and gravel piles. As a result, the site should be considered as being unnatural and the disturbed soils are subject to invasion by exotic weeds.

- **Oso Diversion Dam.** This Diversion Dam is also in southern Colorado, and the surrounding environment is a mixed conifer forest similar to the Blanco Diversion Dam site.

    - **Terrestrial Sites.** This site includes structures, roads, spoil disposal piles, and a landfill area called the island.

    - **Wetlands.** Creation of the wetlands, located at the Oso Diversion Dam spoil project, resulted from a small mining operation that ended in 2002. The total area covers 2847 square feet, which is less than 1/10 acre. Cattails and sedges are the dominate vegetation, but Canada thistle has invaded the wetlands. There are no threatened or endangered species at this site.

- **Willow Creek Conveyance Channel.** The environment adjacent to Willow Creek is classified as a pinyon/juniper woodland with pinyon pine, one-seed juniper, big sagebrush, gray rabbitbrush, grasses, and various forbs. Thin-leaf alder trees and clumps of a native willow species are common along the edge of the stream. A few on-seed juniper trees and scattered big sagebrush and gray rabbitbrush shrubs have invaded the inner slope of the stream.

- **Heron Lake.** The environment around the Heron Lake is classified as a pinyon/juniper woodland. Scattered stands of saltcedar occur along the bank of the Lake at or below the high water level, especially along the eastern edge of the Lake.

- **Heron Dam.** The environment adjacent to the dam is also a pinyon/juniper woodland. The dam is an earthfill structure that is 276 feet tall and 1,221 feet long. A few shrubs occur on the outer slope of the dam, but they are not believed to affect the structural integrity of the structure or impede O&M operations.

- **SJC Project Office and Equipment Storage Area.** This complex is located on the northern edge of Chama, New Mexico. The adjacent environment is a mixed conifer forest. Various species of grasses and forbs occur on the site, and they are control by manual methods. However, if a species like Russian knapweed invaded the office complex, the use of an herbicide could be required.

Description of Relevant Affected Issues and Resources

Issue 1: Effect of the Alternative upon Human Health (Public and Workers)

- **Manual Methods:** Hand-pulling, grubbing, or cutting of a relatively small number of plants or patches of weeds would be primarily done in storage and maintenance yards, and at administrative sites. In some cases, hand-held power tools could be used. There is always some risk of injury to employees operating chain saws, weed eaters, and power mowers, and care must to taken to properly train operators of such hand-held tools. Even though the use of safety equipment (chaps, eye protection goggles, hard hats, and steel toe boots) is mandatory for Reclamation employees when operating chain saws, there still would be some risk to individuals removing weeds with hand tools. Therefore, this method will be evaluated with respect to the risk of injury to Reclamation employees compared with other IPM methods.

- **Mechanical Methods:** There is always a safety risk for Reclamation employees and contractors who operate heavy equipment or who are working in the same area as the equipment. To reduce the risk, employees are required to wear safety vests, hard hats, and safety boots with steel toes. The use of heavy equipment is a routine and typical operation by SJC Project employees for many different operations, and employees are required to strictly follow safety requirements. The issue will be evaluated with respect to the relative risk to employees and contractors using of mechanical methods to treat vegetation.

- **Herbicidal Methods:** 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: the exposure analysis, the hazard analysis, and 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) and acres treated per day per worker (Table III-D-8, page III-D-23) in the 1992 risk assessment. 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, 1992 risk assessment). The conditions of herbicide application will affect the exposure; thus, implementation of the mitigation measures and Best Management Practices, covered in Chapter 2 (page 28), will reduce possible exposures. Also, using personal protective equipment, as covered in a Safety and Spill Plan (Appendix B) 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 B).

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 has 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.

Issue 2: Effect of the Alternative on Non-target Vegetation

- **Manual Methods:** Manual methods used to control individual plants or small patches of plants are highly selective; thus, the use of such methods would not have any significant effect on non-target plants.

- **Mechanical Methods:** Controlling undesirable plants with heavy equipment could have associative effects to non-target vegetation. However, this method will be only used on sites that have undergone substantial disturbance, such as along roadways, canal faces, and construction sites. Therefore, such sites are

mostly invaded by invasive species like Russian thistle, kochia, and other invasive species. Since there are no threatened, endangered, or sensitive plant species in the project area, there would be no restrictions for controlling stands of undesirable plants that are assessable to operation of heavy equipment. This issue will be evaluated on the possibility of adversely affecting desirable plant communities in Reclamation lands and adjoining sites.

- **Herbicidal Methods:** Foliar applications with aminopyralid, dicamba, imazapyr, glyphosate, 2,4-D and metsulfuron methyl would be done to remove patches of vegetation that could displace native plant communities on wetlands or spread form Reclamation lands to adjacent areas. Control of woody shrubs and trees on Reclamation lands and at facilities would be accomplished by spot applications with triclopyr, imazapyr, or picloram. Foliar applications to woody species could be done with imazapry, glyphosate, metsulfuron, or 2,4-D. Since the objective would be to selectively control invasive weeds, there would be minimal if any effect to non-target plant communities. The advantage of controlling exotic tree species with herbicides is that the roots are killed and long-term control results would be achieved. Mechanical treatments, such as mowing, do not kill the roots of exotic trees and they readily sprout and can produce more stems than prior to treatment. The effect of using the proposed herbicides will be evaluated with respect to their potential to damage or kill non-target vegetation.

Issue 3: Effects of the Alternative on Non-target Terrestrial and Aquatic Animals

- **Manual Control:** Selective control of individual plants or patches of invasive plants by manual methods on SJC Project sites and the office complex is not expected to have any adverse effects on terrestrial or aquatic animals.

- **Mechanical Methods:** The use of mechanical methods would have negligible effects on non-target terrestrial and aquatic animals. Mechanical treatments would be done on disturbed sites like along roadways, such as mowing stands of grasses and other plants around structures and at administrative sites. Another method that could be used is grading. Grading is accomplished by scraping of the soil surface with ridged blades to remove exotic and invasive species, such as kochia, Russian thistle, or to move soil. Grading is not commonly used by Reclamation to control undesirable plants, but it could be an option, especially when grading is being done to achieve other objectives. Grading could be done along roadways, at construction sites, and other sites assessable to where such equipment can safely operate. Since terrestrial animals mostly do not occupy such sites; the affects would be

expected relatively minor. This issue will be evaluated with regard to the possibility of the affects on terrestrial and aquatic animals.

- **Herbicidal Methods:** Herbicides have the potential of impact terrestrial animals and wildlife either directly through toxicities to animals, or indirectly through manipulation of habitat. Ground-based applications were not specifically analyzed in the 1992 Risk Assessment because they have a very low potential to affect wildlife. The likelihood of terrestrial animals receiving a direct spray of herbicide from ground applications or coming in contact with vegetation treated with ground application equipment is significantly lower than the exposure potential from aerial applications, which was the basis of analysis in the 1992 Risk Assessment. Consequently, the potential risks from ground applications would likely be much lower than the risks associated with aerial applications. In addition, for the herbicides proposed for use, there is little chance of bioaccumulation through the consumption of treated vegetation or prey species. The risk from herbicide use to threatened and endangered animals is no greater than that posed to other terrestrial animals. However, the EPA has set a standard twice as stringent as the "no observed effect level" for non-category animals. Habitat manipulations as a result of proposed herbicide applications would benefit some animals and potentially harm others. For example, the reduction of coyote willow along waterways could lead to a decline, albeit small, of species that depend on such shrubs for nesting or cover, but the reduction in shrubs could cause a slight increase in numbers of grass-adapted species. In general, the impact on terrestrial animals would depend on the herbicides used, their specific characteristics, and how and when they were used.

  The potential impact of herbicides proposed for use on 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 in waters managed by Reclamation. For this reason, biologists calculate a 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. 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 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 will 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 were cold water T&E or sensitive fish are present. In addition, 2,4-D products not labeled for aquatic use will not be sprayed in any location where there are T&E or sensitive aquatic invertebrate species. The majority of herbicide applications near water will be by hand backpack or truck mounted hand wand applications, and this will 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 and Best Management Practices will serve to reduce the potential for possible adverse effects to aquatic organisms.

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

Issue 4: Effects of the Alternative on Water Quality

- **Manual Control:** Selective control of individual plants or patches of invasive plants by manual methods on SJC Project sites and the office complex is not expected to have any adverse effects on water quality.

- **Mechanical Methods:** Mechanical treatments of vegetation could adversely affect water quality. However, it must be understood that SJC Project facilities are man-made structure that are inherently subject to erosion and disturbance. Control of weeds at a diversion dam or removing weeds along a roadway by mechanical methods would not result in unacceptable sedimentation of water, especially since there would be a buffer of vegetation along the edges of waterway that would trap the sediment. Scattered trees and

shrubs on the inner slopes along about nine (9) miles of the channelized portions of Willow Creek are proposed for removal. The Corps of Engineers indicated that tree discharge (even though some of this vegetation may be above the ordinary high water mark). Extracting trees in this manner is considered a sediment discharge because the roots are below the ordinary high water mark. Discussions during a field trip with the Corps of Engineers (Deanna Cummings), prior to the June 26, 2006, concluded that the average tree root wad was three feet in diameter or 7.07 square feet. Large thinleaf alders could be pulled using heavy equipment, but no more than 200 trees (0.5 acres total) would be removed per year to prevent an unacceptable discharge of sediment into the creek from disturbance of soil by root removal. Alders less than two (2) inches in diameter ground level and willows should be controlled by the application of herbicides. Scattered one-seed juniper trees can be controlled by cutting stems as close to the ground level as possible with a chainsaw. The analysis of effects will be based on possible increase of erosion and sedimentation that could result from the use of heavy equipment.

- **Herbicidal Methods:** Herbicidal 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 result in increased sedimentation of water. This issue will be evaluated by how and where herbicides will be applied and the mitigation measures and BMPs will be utilized to reduce the potential contamination of water.

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.

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 most recent data from the U.S. Bureau of Economic Accounts (2005), the annual per capita income for the States of Colorado and New Mexico in 2010 was $42,802 and $33,837 respectively.

Irreversible and Irretrievable Commitment of Resources of the Proposed Actions

This section describes unavoidable impact to the resources discussed within the EA that would occur with the implementation of the proposed actions. Unavoidable adverse impacts are impacts that are unavoidable and cannot be mitigated.

Materials, such as fossil fuels, labor and various products (e.g., herbicides) would be needed to accomplish the proposed work. Generally, these materials are not retrievable, but are not considered in short supply. Their use would not have an effect on the continued resource availability. Federal public funds, which are not retrievable, would be utilized for the proposed work.

Cumulative Impacts

The Council on Environmental Quality regulations (40 CFR Parts 1500-1508) implementing the procedural provisions of NEPA, as amended (42 USC∫4321 et seq.), define cumulative impacts as follows: "The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions "(40 CFR∫1508.7).

Chapter 4 ENVIRONMENTAL CONSEQUENCES

Predicted Effects on Each Relevant Issue and Resource

Issue 1: Effects of the Alternatives upon Human Health (public and workers)

- **Alternative A: No Action:** Since there would be no action taken to manage plant and animal pests on lands and facilities for the SJC Project, neither workers nor the public would be at risk from injury due to using manual and mechanical methods. In addition, workers and the public would not be subjected to any herbicide exposure. On the other hand, public and private lands adjacent to Reclamation facilities would be at risk from the invasion of exotic weeds like bull thistle and Canada thistle. Furthermore, Reclamation employees would be subjected to health and safety risks by selection of this alternative. Allowing weeds to develop unchecked could obscure structures and equipment at equipment and maintenance yards, which would pose a

safety risk through the operation of heavy equipment. Under the No Action Alternative, the cumulative effects from the spread and intensification of weeds would prevent Reclamation from achieving the objectives of inspecting and protecting the integrity of dams and other structures. Also, infestations of noxious weeds like saltcedar would continue to increase and threaten native plant and animal communities.

- **Alternative B: Preferred Alternative of Integrated Pest Management using a Combination of Manual, Mechanical, and Herbicidal Methods**

    - **Manual Methods:** Hand-pulling, grubbing, or cutting of a relatively small number of plants or patches of weeds would be primarily done around structures to control small infestations less than 1/10 acre in size. In some cases, hand-held power tools could be used, and this method would pose some risk, albeit small, of injury to employees. A more significant risk would involve operating chain saws, weed eaters, and power mowers. Employees must be properly trained to safely operate hand-held power tools, especially chain saws. Also, employees are required to use safety equipment (chaps, eye protection goggles, hard hats, and steel toe boots) when operating chain saws. Although training and use of safety equipment will mitigate the risk of employee injury, Reclamation managers will need to accept that a few employees could be injured using manual methods.

    - **Mechanical Methods:** The use of heavy equipment is a routine and typical operation by SJC Project employees for many different operations, and employees strictly follow safety requirements. Mechanical methods are not expected to be used extensively to manage vegetation; thus, using heavy equipment for vegetation management is not expected to significantly increase the rate of accidents or injury to employees or contractors.

    - **Herbicidal methods:** No toxic effects to public health are expected to occur from the proposed use of pesticides if applicators follow proper procedures and comply with the pesticide label and related aspects. Also, complying with Best Management Practices (Appendix A) and adhering to the Pesticide Safety and Spill Plan (Appendix B) would reduce the possibility of a pesticide misuse, which could result in the exposure of applicators and the public.

      Routes and duration of exposure are important factors determining effect of herbicides 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 or twice 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, 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, page 27 (1992 Risk Assessment, Table III-E-4, page E-III-8, 1992 Risk Assessment). 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 (1992 Risk Assessment, 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, two gallon of DMA® 4 IVM containing 53.7 percent inert ingredients is mixed with 98 gallons of water for a broadcast application. Thus, the concentration of the inert ingredients would be diluted with water by a factor of almost 100. 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 they would be informed and excluded from treatment sites during operations.

With respect to cumulative effects, the probability of Reclamation applicators (including cooperators and contractors) or the general public being exposed simultaneously to other herbicide 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) for any of the proposed herbicides.

Issue 2: Effects of the Alternatives on Non-target Vegetation

- **Alternative 1: No Action:** Selection of this alternative would pose a serious threat to native plant communities in southern Colorado and northern New Mexico. Noxious weed infestations would expand and result in significant reductions to native plant communities on Reclamation lands and adjacent federal, state, and private lands. Exotic species like saltcedar, Russian knapweed, and Canada thistle have the capacity to dominate sites and exclude native species. These invasive plants were introduced into the North American continent without their component of natural enemies. Thus, they are able to out-compete native species, especially on disturbed sites like riparian habitats and adjacent land of mixed ownership. Over the long term, there would be serious cumulative effects from selection of the No Action Alternative resulting in increasing expansion of exotic plant infestations, which would significantly reduce desirable native plant communities. The native vegetation in the wetlands would slowly disappear, which would adversely impact wildlife habitat.

- **Alternative 2: Preferred Alternative of Integrated Pest Management using a Combination of Manual, Mechanical, and Herbicidal Methods**

    - **Manual Methods:** 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. Manual methods would be used on sites like around structures and buildings to control individual plants or small patches of plants; thus, the use of such techniques would not have any significant effect on non-target plants. No cumulative impacts to non-target vegetation could be expected over the long-term from implementation of the proposed manual methods to control undesirable plants.

    - **Mechanical Methods:** Mechanical methods, such as mowing and grading, are much less selective than manual and chemical methods and adverse effects to non-target plants would occur. However, the adverse effects could be mitigated by restricting the use of mechanical methods where there are mostly undesirable species and a minimal number of native species. Nevertheless, the expanded use of mechanical methods for this alternative would have a greater potential to adversely effect non-target vegetation than through the use of manual methods or the use of selective herbicides.

      Grading or disking would involve disturbance of the soil surface, providing a favorable substrate for seed of undesirable species, especially noxious weeds, to thrive. Significantly, equipment can transport seeds and other plant parts capable of establishment on invasive species on disturbed soil surfaces and other sites. Undesirable vegetation is expected to continue to flourish on disturbed sites, and invasive species would probably spread to adjacent sites and lands of mixed ownership.

      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, and this adaptive ability would effectively minimize 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 (Appendix C).

No cumulative effects would be expected over the long term. Undesirable vegetation would not be controlled through the exclusive use of mechanical methods. Controlling undesirable plants with heavy equipment will have associative effects to non-target vegetation. However, this method will be only used on sites that have already undergone substantial disturbance, such as along roadways. Therefore, such sites are mostly invaded by invasive species like kochia, Russian thistle, and other exotic species. Since there are no threatened or endangered, or sensitive plant species in the project area, there would be no restrictions for controlling stands of undesirable plants that are assessable to operation of heavy equipment.

- **Herbicidal Methods:** 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 desirable plant species are known to occur.

Annual plants are generally more sensitive to herbicides, and annuals would be expected to 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.

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 desirable plant species. 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 threatened or endangered 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 perennial species, noxious weeds, and hard-to-control invasive plants utilizing herbicidal and other methods, under an IPM approach. If the proper IPM strategies would be implemented, noxious and invasive plant species would be effectively controlled, which would provide the best option to protect and restore desirable plant communities on Reclamation as well as adjacent lands of mixed ownership.

No cumulative impacts to native plant communities would be expected from the proposed use of the various herbicides proposed for use over the life span of this EA. Rather, selection of this alternative would offer the best protection of non-target vegetation.

Issue 3: Effects of the Alternatives on Non-target Terrestrial and Aquatic Animals

- **Alternative 1: No Action:** Failure to control of vegetation on diversion dam sites, roadways, and other disturbed sites on lands managed by Reclamation would have little if any significant positive or negative effects on non-target animals. Also, failure to control the expansion and intensification of invasive plant species like Canada thistle and saltcedar, which are capable of forming monotypic stands, would result in the progressive reduction of native plant communities, subsequently reducing the habitat for animals that rely on native plants for food and cover. For example, it has been shown that elk herds in Montana were substantially reduced by the extensive infestations of spotted knapweed and leafy spurge that depleted native plant communities that elk needed as a food source (Sheley, et al. 2005). Over time, the direct, indirect, and cumulative effects for this alternative would be greater than for the proposed alternative.

- **Alternative 2: Preferred Alternative of Integrated Pest Management using a Combination of Manual, Mechanical, and Herbicidal Methods**

    - **Manual Methods:** Selective control of individual plants or patches of undesirable plants at the diversion dam sites, around facilities, and the office complex is not expected to have any adverse effect on terrestrial and aquatic animals. The majority of the manual control would occur on disturbed areas where there are little or no native plant communities to support animals.

    - **Mechanical Methods:** The use of mechanical methods would have negligible effects on non-target terrestrial and aquatic animals. Mechanical treatments would be done on disturbed sites like along

roadways, such as mowing stands of grasses and other plants around structures and at administrative sites. Another method that could be used is grading. Grading is accomplished by scraping of the soil surface with ridged blades to remove exotic and invasive species, such as Russian thistle and kochia, or to move soil. Grading is not commonly used by Reclamation to control undesirable plants, but it could be an option, especially when grading is being done to achieve other objectives. Grading could be done along roadways, at construction sites, and other sites assessable to where such equipment can safely operate. Since terrestrial animals mostly do not occupy such sites; the affects would be expected relatively minor, including cumulative effects.

- **Herbicidal Methods:** Herbicides have the potential to impact terrestrial animals and wildlife either directly through toxicities to animals, or indirectly through manipulation of habitat. Ground-based applications were not specifically analyzed in the 1992 risk assessment because they have a very low potential to affect wildlife. The likelihood of terrestrial animals receiving a direct spray of herbicide from ground applications or coming in contact with vegetation treated with ground application equipment is significantly lower than the exposure potential from aerial applications, which was the basis of analysis in the 1992 risk assessment. Consequently, the potential risks from ground applications would likely be much lower than the risks associated with aerial applications. In addition, for the herbicides proposed for use, there is little chance of bioaccumulation through the consumption of treated vegetation or prey species. The risk from herbicide use to threatened and endangered animals is no greater than that posed to other terrestrial animals. However, the EPA has set a standard twice as stringent as the “no observed effect level” for non-category animals. Habitat manipulations as a result of proposed herbicide applications would benefit some animals and potentially harm others. For example, the reduction of trees and shrubs along Willow Creek could lead to a decline, albeit small, of species that depend on such shrubs for nesting or cover, but the reduction in shrubs could cause a slight increase in numbers of grass-adapted species. In general, the impact on terrestrial animals would depend on the herbicides used, their specific characteristics, and how and when they were used.

  The potential impact of herbicides proposed for use on 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 in waters managed by Reclamation. For this reason, biologists calculate a 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. 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.

The majority of herbicide applications near water will be by hand backpack or truck mounted hand wand applications, and this will 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 and Best Management Practices will serve to reduce the potential for possible adverse effects to aquatic organisms. 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. Directly, indirectly, and cumulatively, this alternative provides the greatest protection for terrestrial and aquatic animals, while achieving Reclamation goals and objectives. Aggressively managing noxious and invasive plants will provide the best protection of native plant communities that animals need as habitat.

Issue 4: Effects of the Alternatives on Water Quality

- **Alternative 1: No Action:** No significant adverse effect to water quality would be expected by selection of the no action alternative**.**

- **Alternative 2: Preferred Alternative of Integrated Pest Management using a Combination of Manual, Mechanical, and Herbicidal Methods**

    - **Manual Methods:** No effect would be expected by using manual methods, especially since this technique would mainly be undertaken near facilities to control undesirable plants.

    - **Mechanical Methods:** The potential impact to water quality would involve mechanical treatment conducted near or along the edges of water courses. Impacts of mechanical methods would include increased runoff, soil erosion, and sedimentation. Frequent use of heavy equipment for mechanical management of vegetation could result in slight soil disturbance or compaction, although extensive use of this method is not expected. 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 cutting juniper trees on the banks of the Willow Creek Conveyance Channel, could improve the vegetative cover (grasses) and the vegetative buffer would help to intercept sediments and contaminants.

      The greater the precipitation, the greater the likelihood would be for experiencing runoff in water. 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 vegetation to filter sediments from storm water before it could reach a stream.

Management practices that lead to a decrease in grass and other plant species that have good soil binding root systems could result in a slight adverse effect on water quality. Nevertheless, it is not likely that water quality would be substantially impacted on these sites through selection of this alternative. It must be understood that SJC Project facilities are man-made structures, and they are inherently subject to erosion during rain storms. The increase of sedimentation from mechanical treatments is not expected to cause any substantial increase in water quality.

Cumulatively, this technique would not be as effective in controlling undesirable vegetation and erosion leading to sediments in water at SJC Project sites.

- **Herbicidal methods:** Impacts of herbicidal vegetation control to terrestrial and aquatic organisms include direct toxicological effects and indirect effects. 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 A) would 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 dicamba. 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 (mg/L)	Half Life in Soil	Potential for Surface Runoff	Potential for Leaching
Aminopyralid		35 Days		
Clopyralid	1,000 (Acid) 300,000 (salt)	40 Days	Moderate	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
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.

No direct, indirect, or cumulative effects to water quality would occur by the proposed use of herbicides.

Indian Trust Assets

- **Alternative 1: No Action:** No impacts would occur; however, if deep rooted woody plants were allowed to grow, they could potentially damage an existing archaeological site.

- **Alternative 2: Preferred Alternative of Integrated Pest Management using a Combination of Mechanical, Manual, and Chemical Methods:** No known site are present however, precautions would be taken if mechanical treatments were considered for implementation. See Mitigations section on page 46.

Environmental Justice

- **Alternative 1: No Action:** No effect of any kind is expected for the local population. Also, no adverse effects to low-income or minority populations are anticipated.

- **Alternative 2: Preferred Alternative of Integrated Pest Management using a Combination of Mechanical, Manual, and Herbicidal Methods:** No adverse effects to the local population or minority populations were identified or expected under the proposed action alternative.

Irreversible and Irretrievable Commitment of Resources

No irreversible or irretrievable commitments of resources are expected by adopting Alternative 2, IPM using a combination of manual, mechanical, and herbicidal methods. Even under a worst-case scenario, the effects of the proposed action to use herbicides would be negligible.

Cumulative Impacts

The probability of Reclamation applicators (including cooperators and contractors) or the general public being exposed simultaneously to other herbicide applications would be very remote. Once the spray mixture dries on plant surfaces 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. The herbicides being considered for use do not persist 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 program done in the past, and the

possible exposure from the proposed operations, would not likely approach the acceptable daily intake (ADI) of any of the proposed herbicides.

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

The most significant cumulative effects to terrestrial wildlife and aquatic species over the long term would come from the adoption of Alternative 1 (No Action). This alternative would results in habitat loss in wetlands and invasion of exotic weed infestations to areas adjacent to SJC Project sites. Monocultures of invasive weeds would develop, and palatable forage for game animals 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 weed infestations would lead to a reduction in populations of some animals. However, no cumulative impacts would be expected under Alternative 2, IPM using a combination of manual, mechanical, and herbicidal methods.

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

Under the Proposed Action, no cumulative impacts to water quality would be expected to occur, especially if herbicide labels, BMP's (Appendix A) mitigations (Chapter 5), and the requirement of the safety and spill plan (Appendix B) are followed.

CHAPTER 5 ENVIRONMENTAL COMITTMENTS

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:

Mitigations

- All herbicide label requirements will be followed.
- Prior to doing any mechanical treatments, especially removal of large trees and/or shrubs, contact the Albuquerque Area Office Environment Division‘s Archaeologist to determine if the State Historic Preservation Office will require consultation.
- All BMPs will be followed.

- Herbicides 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 five (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 are present (over 85° Fahrenheit) since this can cause volatilization.
- 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 C).
- Herbicides will be secured (lock and key) at all times.
- Herbicides will be transported according to safety requirements.

CHAPTER 6 CONSULTATION AND COORDINATION

Reclamation has issued scoping letters to interested state and federal agencies to obtain their input. Reclamation has issued a scoping letter to interested federal and state agencies. The Draft EA and IPM plan will be posted on Reclamation's website at: http://www.usbr.gov/uc/albuq/envdocs/index.html

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, Pesticides
Nancy Umbreit	Environmental Protection Specialist, Integrated Pest Management Coordinator, and NEPA Project Manager	B.S. Biology; 33 years professional experience.	NEPA, IPM

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APPENDIX A: BEST MANAGEMENT PRACTICES

Pre-spray BMPs

- Comprehensive project files will be maintained.
- Non-herbicidal techniques will be evaluated for use when they are known to provide acceptable control (over 80%) at a reasonable cost.
- Herbicides will only be used when they provide the most effective control relative to cost and do not present unacceptable environmental or safety risk.
- Herbicides 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 rate for herbicides will be used.
- Treatment sites will be checked to ensure they are not occupied by threatened, endangered, or sensitive species.

Herbicide Spraying BMPs

- Individuals spraying herbicides will receive safety and application training prior to doing any treatment.
- Spraying will not be done when the average wind speed exceeds ten (10) 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 will not be done near water, recreation sites, residences, or areas frequented by the public.
- Applicators will use appropriate personal protective equipment (PPE).

Herbicide post-spray BMPs

- Treatment areas will be checked 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 B: HERBICIDE SAFETY AND SPILL PLAN

Information and Equipment

- All individuals applying herbicides will be required to receive adequate training on safety and application procedures prior to spraying. Proper state certification, within the proper categories is required when restricted use pesticides are being applied.

- A copy of herbicide labels and MSDS will be available at all times during project operations, and applicators will be completely familiar these documents.

- Required Personal Protective Equipment (PPE) will be worn at all times when herbicides are being mixed and applied.

- An emergency spill kit, with directions for use, will be present when herbicide 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:

    - Clean water and soap
    - Shovel
    - Broom
    - Ten pounds of absorbent material, such as kitty litter
    - Box of plastic bags
    - Nitrile gloves

Procedures for Herbicide 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 herbicides:

- 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 herbicide 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 herbicide 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 herbicide 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 Herbicide Mixing, Loading and Disposal

- Mixing of herbicides 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 herbicide 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 herbicide will wear the maximum personal protective equipment 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 herbicide will be stored in a locked facility in accordance with herbicide storage instructions provided by the manufacturer, and in accordance with the Colorado or New Mexico Department of Agriculture regulations (dependent on where action is taking place).
- Empty and rinsed herbicide containers will be punctured and disposed of according to label instructions.

Transportation and Security

- Transport only the quantity of herbicide needed for the day's operation.
- Do not leave vehicles being used to transport pesticides unattended unless the herbicides are secured in a locked area.
- Keep herbicides separated from drivers and passengers when they are being moved from storage sites to field locations

- Do not transport open container with herbicides.
- Make sure all lids or bungs are tight on herbicide containers prior to transport.
- Maintain security of herbicides at field sites.

APPENDIX C: 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.