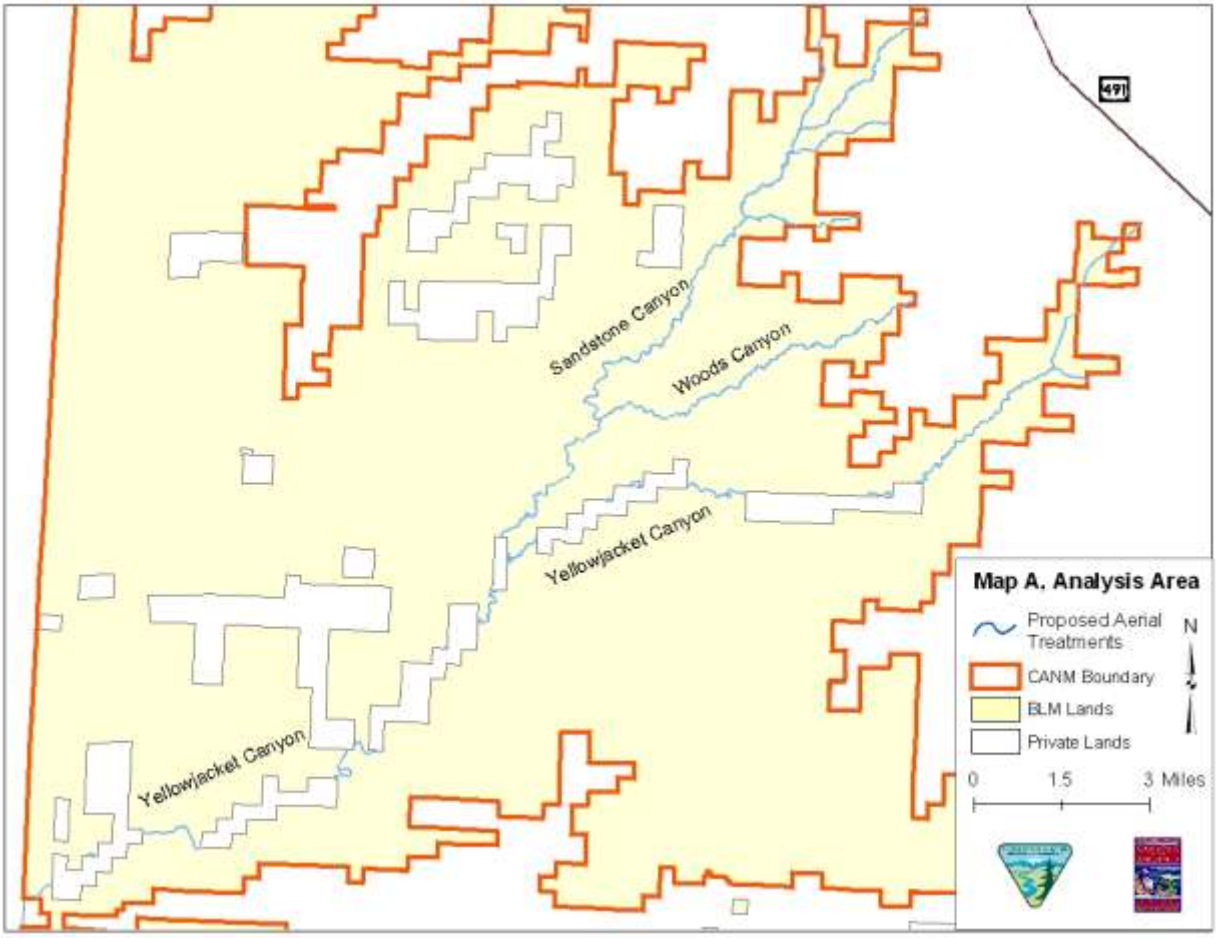
Canyons of the Ancients National Monument

Aerial Tamarisk Treatment of
Yellowjacket Canyon and Tributaries
Environmental Assessment (EA)
June 2008

EA Number	CO-800-2007-094

1.0 INTRODUCTION

The Canyons of the Ancients National Monument (Monument) proposes aerial treatment of tamarisk on BLM lands within Yellowjacket Canyon and its tributaries as shown on Map A, Analysis Area. This Environmental Assessment (EA) analyzes potential impacts on the natural and human environment that may occur as a result of the proposed action and alternatives.



2.0 CONFORMANCE WITH APPLICABLE LAND USE PLAN

The proposed action is subject to the *San Juan/San Miguel Planning Area Resource Management Plan* approved September 1985. Although the proposed action is not specifically provided for, it

is clearly consistent with the RMP decision to improve aquatic and riparian habitat. The RMP specifies that management actions within flood plains and wetlands will include measures to preserve, protect, and if necessary, restore their natural functions.

Relationship to statutes, regulations, and other plans

The Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 1712) states that the BLM must manage public lands according to the principles of multiple use and sustained yield. The Public Rangelands Improvement Act of 1978 requires that BLM manage, maintain, and improve the condition of the public rangelands so that they become as productive as feasible. The Carson-Foley Act of 1968 directs agency heads to enter upon lands under their jurisdiction with noxious plants and destroy noxious plants growing on such land.

The Tamarisk Control and Riparian Restoration Act of 2003 directs the Secretary of the Interior to establish a program to control or eradicate tamarisk in the Western States. BLM Departmental Manual 517 prescribes policy for the use of pesticides on the lands and waters under its jurisdiction, and for compliance with the Federal Insecticide, Fungicide, and Rodenticide Act, as amended. BLM Departmental Manual 609 prescribes policy to control undesirable or noxious weeds on the lands, waters, or facilities under its jurisdiction to the extent economically practicable, and as needed for resource protection and accomplishment of resource management objectives. BLM Manual 9011 and Handbook H-9011-1 provide policy for conducting chemical pest control programs under an Integrated Pest Management approach.

A programmatic environmental assessment of the impacts related to noxious weed treatment in the San Juan Resource Area was completed in 1999 (*Integrated Weed Management in the San Juan Field Office*, EA # CO-038-99-051, USDI Bureau of Land Management, 1999). At that time, the San Juan Resource Area included BLM lands within the analysis area. Also in 1999, the President issued Executive Order 13112, which directed federal agencies to "detect and respond rapidly to and control populations of [invasive] species in a cost-effective and environmentally sound manner." Since that time, tamarisk populations have expanded on lands within the analysis area.

This EA is tiered to the Final Environmental Impact Statement, *Vegetation Treatment on BLM Lands in Thirteen Western States* (USDI Bureau of Land Management, 1991) which outlines vegetation treatment using Integrated Pest Management methods. This EA is also tiered to the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Final Programmatic Environmental Impact Statement* (USDI Bureau of Land Management, 2007). The BLM National Interim Management Guidelines for all National Monuments are applicable to lands within the Monument. In addition, the BLM Colorado State Office has prepared Interim Guidelines for Management of the Monument. The proposed action utilizes the guidelines, mitigation measures, and approved vegetation management methods from these documents.

The following documents are also incorporated by reference: *Integrated Weed Management in the San Juan Field Office*, EA # CO-038-99-051, USDI Bureau of Land Management, 1999), *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western*

States Final Programmatic Environmental Impact Statement (USDI Bureau of Land Management, 2007).

3.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the project is to aerially treat tamarisk and Russian olive on public lands within Yellowjacket Canyon and its tributaries to promote species diversity, and improve wildlife habitat and hydrologic function. The project is needed because riparian lands in the project area have been severely impacted by the invasive plant tamarisk (*Tamarix spp.*, also known as salt cedar). Private landowners within the Yellowjacket drainage have conducted tamarisk treatments on their lands, and BLM would like to treat tamarisk on adjacent public lands to help ensure the success of the private land treatments.

Tamarisk is a tenacious shrub/small tree that has a deep root system (up to 100 feet) and leaves a salt residue on the soil surface. These characteristics enable it to quickly replace native cottonwoods, willows, grasses, and forbs. The resulting tamarisk thickets provide poor wildlife habitat; increase fire hazards; limit human use of waterways, and generally use more water than native vegetation. Infestations in Colorado are roughly estimated to occupy 55,000 acres and consume 170,000 acre-feet of water per year more than the native replaced vegetation (Colorado Department of Natural Resources, 2004). Infestations within the analysis area are estimated to occupy about 534 acres.

Russian olive is another invasive species, and co-habits with tamarisk on public lands. If only tamarisk is controlled, the potential for Russian olive to take over much of the riparian areas is high. Therefore, within the context of this EA, whenever the term "tamarisk" is used it also includes Russian olive as another species that would be aerially treated within riparian areas.

The Tamarisk Coalition (November 2006) has estimated treatment costs associated with various tamarisk control methods. Their figures indicate that aerial treatment costs for heavy infestations (greater than 50% canopy cover) and narrow infestation widths (less than 50 feet) range from $200-250 per acre. Their estimate of cut-stump treatment costs of similar infestations was $5000 per acre, and mechanical removal with cut stump treatment costs were estimated at $700-800 per acre.

Current infestations in some parts of the analysis area are extensive enough to make aerial application of herbicide a cost-effective treatment method. Other areas contain tamarisk without sufficient canopy densities to justify aerial treatment on their own, but aerial treatment of these areas may be economical when they are combined with other heavy infestations. This EA provides supplemental documentation of impacts associated with aerial application of herbicides for tamarisk treatments.

4.0 DESCRIPTION OF THE ALTERNATIVES

Proposed Action

The BLM proposes to conduct aerial tamarisk treatments within the analysis area on tamarisk infestations with crown covers greater than 50 percent and in areas with poor vehicle access.

These methods are described below. The proposed treatment areas are not within Wilderness Areas or Wilderness Study Areas (WSAs).

Applications of imazapyr herbicide would be made with a helicopter at airspeeds of 40 to 50 miles per hour, and about 30 to 45 feet above the ground. The imazapyr formulation would be labeled for aquatic use, and would be applied at a rate of one pound active ingredient per acre in 15 gallons of water with nozzles that produce droplet sizes of 800 to 1000µm. Tamarisk treatments would occur in active drainages and associated terraces. Tamarisk stands targeted for aerial treatment would be relatively pure tamarisk stands without other native woody vegetation. Individual tamarisk trees or stands less than six feet in diameter would not be treated, to avoid damage to non-target species. The air speeds and height above ground specifications above are from *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States, Final Programmatic Environmental Impact Statement*, USDI Bureau of Land Management, 2005, page 2-17. The herbicide application rate and droplet size specifications shown above are from *Saltcedar Control with Rotary and Fixed Wing Aircraft*, McDaniel, et al, 2006, and *Aerial Application Methods to Reduce Imazapyr Impacts on Riparian Restoration*, Nissen, et al, 2006.

Continue Existing Treatments Alternative (No Action)

Under this alternative, no aerial treatments of tamarisk would occur. Tamarisk would continue to be treated by mechanical, non-aerial chemical methods, and biological control methods, as specified in the current programmatic noxious weed treatment environmental assessment, EA # CO-038-99-051, pages 3-6 (USDI Bureau of Land Management, 1999).

Mechanical treatments employed would include root crown removal by excavator, and mulching with herbicide application. The root crown removal by excavator method uses a large excavator to pluck individual trees from the ground. The mulching method uses a large mower to grind the trees, and a triclopyr herbicide is applied to the cut stumps. Costs range from $150-600 per acre for the root crown removal by excavator, and from $220-800 per acre for the mulching with herbicide application. Mechanical treatments could not be used in areas inaccessible by road, or in drainages with steep side slopes.

Non-aerial chemical methods would include cut stump treatments, basal bark treatments, and foliar treatments. The cut stump and basal bark treatments would generally use a triclopyr herbicide, and foliar applications would generally use an imazapyr herbicide. Cut stump and basal bark triclopyr application rates would be two pounds acid equivalent per acre. Foliar applications of imazapyr would be at one pound active ingredient per acre. Costs for these methods range from $1500-5000 per acre. Foliar applications using ground equipment are not suited for trees over about ten feet in height, and all of these non-aerial chemical methods are unsuitable for dense stands of tamarisk, due to the high costs per acre.

The above descriptions of tamarisk control methods are from *Options for Non-Native Phreatophyte Control* (Tamarisk Coalition, March 2006).

Activities Common to Both Alternatives

Biological control of tamarisk using the Chinese leaf beetle (*Diorhabda elongata*) would occur under both alternatives. Although these beetles have demonstrated success in defoliating tamarisk in research trials, the beetles are currently unavailable for general release. One release has been made on a test site on McElmo Creek. Observations of beetle defoliation from releases near Gateway, Colorado and Moab, Utah indicate plant selectivity by the beetles. In some areas, nearly all tamarisk is defoliated, while nearby tamarisk is untouched. Thus some level of chemical control will likely be required even with establishment of Chinese leaf beetle populations.

All tamarisk treatments would be monitored for effectiveness and to determine the need for revegetation measures to prevent accelerated erosion or reinvasion by invasive species.

5.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

The affected environment is described in EA # CO-038-99-051 (USDI Bureau of Land Management, 1999), pages 7-10. This document is available for review at the Dolores Public Lands Office.

The following table summarizes the potential environmental impacts that have a reasonable potential to be associated with the proposed action.

Critical Element	Affected by proposed Action?			Critical Element	Affected by proposed Action?	
	Yes	No			Yes	No
Air Quality		X		Native American Religious Concerns		X
Areas of Critical Environmental Concern (ACEC)		X		Threatened or Endangered (T&E) Species	X	
Cultural Resources		X		Hazardous or Solid Waste		X
Environmental Justice		X		Water Quality (Surface and Ground	X	
Farm Lands (Prime & Unique)		X		Wetlands & Riparian Zones	X	
Floodplains	X			Wild & Scenic Rivers		X
Invasive, Non-Native Species	X			Wilderness		X
Migratory Birds	X					

5.1 Description of Impacts (Quantitative):

In the final environmental impact statement *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States* (USDI Bureau of Land Management, 2007), BLM evaluated 24 herbicide active ingredients for potential environmental impacts. Imazapyr was evaluated to assess the potential for risks to human health and the environment. The following impacts are summarized from the EIS.

Soil Resources

Proposed Action Impacts. Imazapyr is water soluble, and has a half-life of 25-180 days. Imazapyr does not readily bind to mineral or organic soils, and is therefore classified as highly mobile and

can travel through soil with water. It can also move with runoff and enter surface water however its low application rates minimize potential impacts on surface and groundwater (Buchwalter *et al*. 2002). Imazapyr may persist in soil for a prolonged period in relatively arid regions, and does not bind tightly to alkaline soils with low organic matter. Residues in soil may increase after initial application and continue to increase for some time due to runoff of residues from plant surfaces following rainfall and due to releases of residues from decaying plant matter (Tu *et al*. 2001). Thus, the potential for longer-term effects on non-target species and down gradient systems exists within the analysis area. However, soils along drainages would not be as arid as more upland soils, and would have relatively more organic matter. Thus persistence and off-site movement should be less than that from imazapyr application to upland vegetation.

Continue Existing Treatments Alternative (No Action) Impacts. Cut stump and basal bark treatments would use the herbicide triclopyr. Triclopyr has a half life of 30 to 90 days in soil. Triclopyr can be persistent in plants, resulting in soil activity when plants containing triclopyr die and biodegrade releasing triclopyr to the soil where it can be taken up by plants.

Root crown removal by excavator would cause soil disturbance and accelerated erosion until areas revegetate. Mulching with herbicide application would minimize accelerated erosion.

Impact Comparison. In areas of dense tamarisk infestations, triclopyr residues from basal bark and cut stump treatments could cause greater impacts to non-target species than foliar applications of imazapyr (especially if the intended use rate of triclopyr is inadvertently exceeded).

The proposed action and the no action alternative would cause essentially the same impacts on soil resources, unless the root crown removal by excavator method is used. This method would cause a slight loss of soil until the affected areas are stabilized.

Water Resources and Quality

Proposed Action Impacts. Imazapyr is registered for use in aquatic systems, including brackish and coastal waters, to control emergent, floating, and/or riparian and wetland plants. Imazapyr is a water soluble and potentially mobile herbicide (SERA 2004 *cited in* USDI Bureau of Land Management, 2007). Imazapyr is rapidly degraded by sunlight in aquatic solutions, and has a half-life of less than two days in water with high pH (which is characteristic of most waters within the project area). It is not known to be a groundwater contaminant, although little is known about its occurrence, fate, or transport in surface water or groundwater. In one study, imazapyr (from terrestrial applications) was detected in 4% of the 133 samples taken from streams, but was not detected in reservoirs or groundwater.

Aerial application of imazapyr will defoliate tamarisk but will leave skeletons and root structures in place for many years following treatment (Miles, personal communication 2008). The remaining below ground biomass would continue to provide bank stability and therefore changes to channel morphology would not be expected in the immediate future. The remaining above ground biomass would continue to dissipate floodwaters and provide shade that would be conducive to native species establishment. Establishment of streambank vegetation is essential in order to maintain streambank stability and floodplain functionality over the long-term but success is largely dependent upon flow regime and connectivity to the water table.

Unless (and until) tamarisk control is successful in eliminating the upstream production of viable tamarisk seed, the timing of peak discharges will determine whether native species or tamarisk will re-establish. Tamarisk invasion and establishment is favored if peak discharges occur during the summer months. When peak discharge occurs during the spring months, species such as cottonwood is favored (Everitt 1980 *in* Frasier and Johnsen 1991). In the areas proposed for treatment, peak discharges occur in the spring but are also common in the summer months due to monsoonal weather patterns.

Assuming the presence of viable tamarisk seed, connectivity to the water table will also determine whether native species or tamarisk will re-establish. In comparison to cottonwood and willow, tamarisk is able to harvest water from deeper in the soil profile; therefore in riparian areas where the stream channel has downcut resulting in higher terraces, tamarisk will continue to out-compete cottonwood and willow. Additionally, high salinities may persist in higher terraces along rivers whose banks were dominated by tamarisk because floodwaters rarely reach those areas, making it difficult for native plants to colonize those areas once tamarisk is controlled, unless salt tolerant species are present in adjoining untreated areas.

Continue Existing Treatments Alternative (No Action) Impacts. Triclopyr is soluble in water and would photo degrade in several hours with adequate sunlight. Field studies have shown triclopyr and its metabolites dissipated from water, with half-lives ranging from 0.5 to 10 days and sediment dissipation half-lives ranged from 3 to 13 days (Petty et al. 2003). The rate of degradation in water is generally dependent on water temperature, pH, and sediment content. Root crown removal would result in soil disturbance leading to an increase in suspended sediment until affected areas stabilize.

Non-aerial chemical methods will defoliate tamarisk but will leave skeletons and root structures in place for many years following treatment which would provide bank stability, dissipate floodwaters and provide shade that is conducive to native species establishment. Again, the success of native species establishment is largely dependent upon flow regime and connectivity to the water table, as discussed above.

Mulching would remove the above ground biomass that would dissipate floodwaters. This could result in higher velocity flood flows which could lead to stream channel adjustment if comparatively large areas of tamarisk were treated. Root crown removal would remove above and below ground biomass which could also lead to stream channel adjustment depending upon the size of the area treated.

Impact Comparison. The proposed action and alternative would cause essentially the same impacts on water quality, unless the root crown removal by excavator method is used. This method would cause a slight increase in suspended sediment until the affected areas stabilize. The effects to water resources, namely the hydrology, would be different because the aerial application of imazapyr would leave the above and below ground biomass that allows for floodplain functionality. Mulching or root crown removal, if the treatment areas were comparatively large, would reduce the overall biomass and decrease floodplain functionality.

The proposed action and alternative would cause essentially the same impacts on water resources and quality, unless the root crown removal by excavator method is used. This method would cause a slight increase in suspended sediment until the affected areas stabilize.

Vegetation and Special Status Plant Species

Proposed Action Impacts. Imazapyr is a non-selective, broad spectrum systemic herbicide absorbed by foliage and roots. As it is relatively slow acting and does not readily break down in the plant, it is particularly good at killing large woody species. Imazapyr kills a wide variety of plants, can be relatively persistent, and remains available in soils. As a result, damage to non-target species is likely (Tu *et al*. 2001). Tamarisk eradication in areas that contain substantial numbers of interspersed, desirable shrubs and trees is problematic. Depending on site condition, it may not be possible to rapidly kill tamarisk plants without also killing desirable shrubs and trees (Colorado State Parks, 2005). After tamarisk plants are killed, other vegetation should be established to protect the soil resource and to prevent or retard tamarisk re-invasion. Establishing a canopy cover with seeded grasses and willow or cottonwood cuttings should reduce the chances of tamarisk successfully re-invading an area (Colorado State Parks, 2005).

Even "tolerant" plants that are directly sprayed with imazapyr at normal application rates are likely to be damaged (SERA 2004 *cited in* USDI Bureau of Land Management, 2007). In this risk assessment, direct broadcast spray resulted in high risk to sensitive plant species and moderate risk to tolerant species. Off-site drift of imazapyr may cause damage to sensitive plant species at distances of more than 900 feet from the application site after aerial application at the one pound a.i./acre rate, depending on several site-specific conditions, such as wind speed and foliar interception. Tolerant species are not likely to be affected by off-site drift of imazapyr from aerial application, except drift following application at distances of 100 feet or less.

When applied to areas in which runoff is favored (e.g., clay soils over a wide range of rainfall rates), damage from runoff appears to pose a greater hazard than drift. At the one pound a.i /acre rate, the risk assessment predicted moderate risk with clay soils in areas with 15 to 25 inches of precipitation/year. In relatively arid areas in which microbial degradation may be the predominant factor in the decline of imazapyr residuals in soil, residual toxicity to sensitive plant species could last for several months to several years (estimated at 10 months to 5.5 years).

Riparian vegetation composition within the proposed treatment area is variable. Some areas contain nearly pure tamarisk stands while others contain stands mixed with willows and cottonwoods. Based on results of recent aerial application of imazapyr on adjacent private land, in general only the target species were killed by the herbicide and there was little drift or run-off effects on non-target species (cottonwoods and willows). Substantial willow sprouting was evident in areas that had been sprayed. In addition, implementing the design criteria that specifies only spraying relatively pure stands over 6 feet in diameter should adequately limit damage to non-target species.

Tamarisk is present in the current floodplain, and also on some terraces that no longer experience connectivity with the floodplain. On the terraces, it is unlikely that native riparian vegetation could re-establish after aerial herbicide treatment even with seeding or transplanting, because hydrologic function is impaired and flooding would not reach the terraces. In these areas,

restoration should involve upland plant species, and may need to include those with tolerance of saline soils.

Special Status Plant Species

There are three undeveloped springs or seeps within the project area, in which habitat for the BLM Sensitive species *Epipactis gigentea* may exist. No known occurences are present. A population on private land was recently found between Dolores and Cortez. This large population was found in a seep draining into a small free flowing creek but was not associated with the creek itself. Most known populations in this area are associated with protected seeps in sandstone outcrop. Two of the springs or seeps may fit this description, the one in T37N R17W NESE 18 (seep 1), and the one in T37N R18W SWNE19 (seep 2). These seeps will be avoided by not spraying in their vicinity (see Design Features). The Proposed Action may impact individuals but is not likely to cause a trend to federal listing or loss of viability on BLM sensitive species and their associated habitats.

Continue Existing Treatments Alternative (No Action) Impacts. While triclopyr herbicide is toxic to most woody plants and forbs, grasses are generally tolerant of direct application. As with imazapyr, off-site drift of triclopyr may cause damage to sensitive plant species at distances of more than 900 feet from the application site.

Root crown removal by excavator would create sites for new infestations of noxious weeds, including Russian knapweed, Canada thistle, and musk thistle. Mulching with herbicide application would not cause substantial surface disturbance, and thus would not create a greater potential for new infestations of noxious weeds compared to other methods. All tamarisk treatments have the potential to provide for the release of other noxious weeds, through reduction of canopy cover. Thus all tamarisk treatments should also include the treatment of other noxious weeds, with follow up for at least three years.

Impact Comparison. Both alternatives have potential for damaging non-target vegetation. Aerial application of imazapyr in areas with interspersed non-target trees and shrubs would kill the non-target vegetation. Foliar spraying of imazapyr by hand may also impact non-target species but is less likely since tamarisk can be more directly targeted. Basal bark and cut stump treatments (using triclopyr) are not likely to damage non-target species.

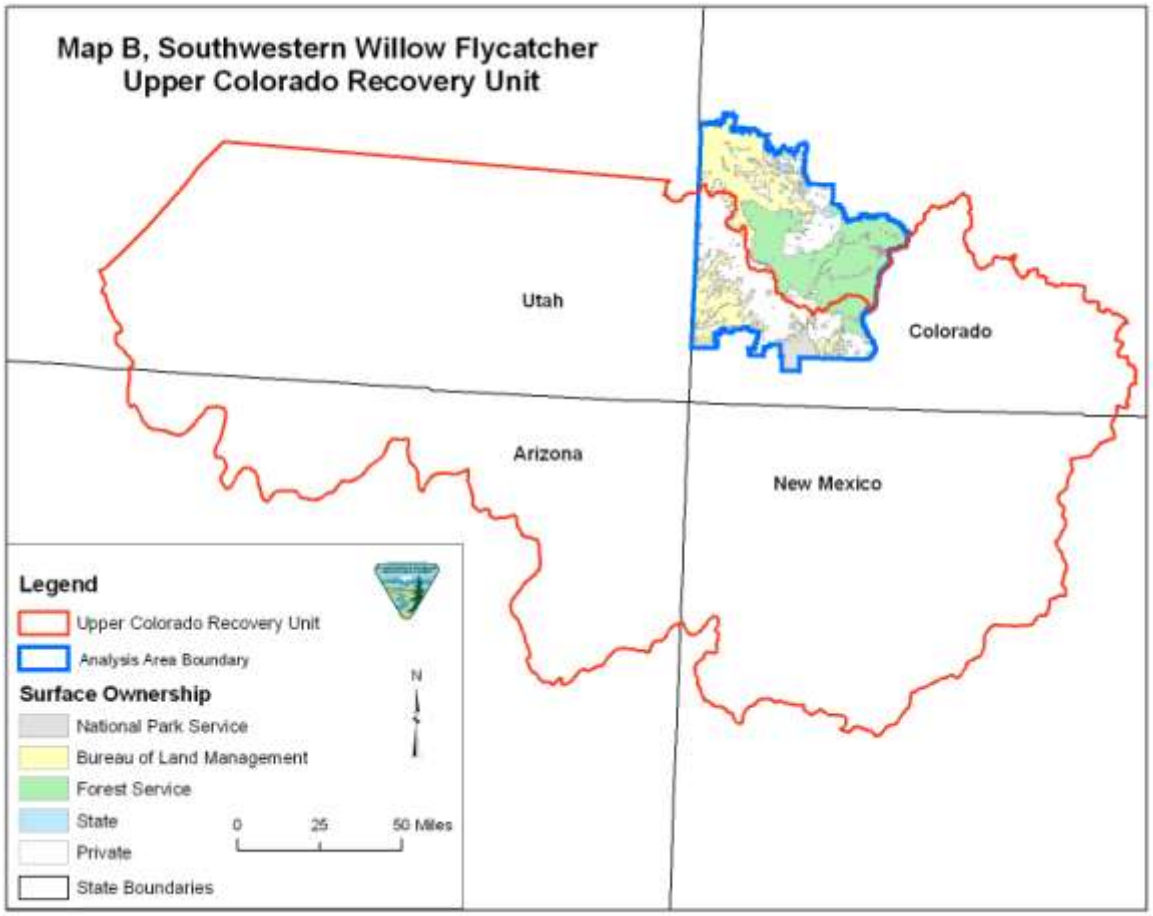
Impacts to vegetation would depend on the existing cover of tamarisk and degree of interspersion of other non-target woody vegetation. Areas dominated by tamarisk with few other species would be most efficiently treated though the use of aerial application of imazapyr. Areas with multiple species in the canopy are best treated through other treatment methods.

Non-target vegetation and special status species could be affected by herbicide drift from aerial applications. New infestations of noxious weeds could be greater from the root crown removal by excavator method.

Wildlife Resources

Proposed Action Impacts. Tamarisk treatments in southwest Colorado have the potential to impact the federally listed Southwestern Willow Flycatcher. In the *Southwestern Willow Flycatcher Recovery Plan* (U.S. Fish and Wildlife Service, 2002) the Fish and Wildlife Service (FWS) found the breeding range of the flycatcher encompasses all or portions of seven states. The FWS established six Recovery Units to characterize flycatcher populations, structure recovery goals, and facilitate effective recovery actions.

About 13% of the BLM lands administered by the DPLO, and the entire Monument, lie within the Upper Colorado Recovery Unit (see Map B, Southwestern Willow Flycatcher Upper Colorado Recovery Unit).



On page 15 of the *Recovery Plan*, the FWS states:

> Tamarisk eradication can be detrimental to willow flycatchers in mixed and exotic habitats, especially in or near occupied habitat or where restoration is unlikely to be successful. Risks to the flycatcher increase if the tamarisk control projects are implemented in the absence of a plan to restore suitable native riparian plant species or if site conditions preclude the re-establishment of native plant species of equal or higher functional value. Threats also

increase if the eradication projects are large-scale in nature, thus possibly setting the stage for large-scale habitat loss.

Much of the tamarisk within the analysis area is found in patches, and in association with native willows and cottonwoods. Treatments are being spread out over a broad area and no area larger than 10 acres would be treated under the proposed action.

In consultation with the U.S. Fish and Wildlife Service it was determined the project may affect but was not likely to adversely affect the Southwest willow flycatcher. Treatments are planned to be spread out over stream systems and adjacent patches of suitable habitat would not be impacted, allowing for nesting opportunities under the proposed action.

Imazapyr does not pose substantial risks to terrestrial animal species, but there are low risks associated with several exposure scenarios, mostly for herbicide applications at the maximum application rate (SERA 2004 *cited in* USDI Bureau of Land Management, 2007). At the one pound a.i./acre rate, the following scenarios pose a low risk to wildlife receptors: direct spray of the small animals and insects, consumption of contaminated vegetation by large mammals and large birds, and consumption of contaminated insects by small mammals and small birds. There are no studies or data available to determine the potential impacts to amphibians. No sensitive amphibian species are known to occur in these waterways but several desert-dwelling amphibians such as the New Mexico spadefoot toad and red-spotted toads may be found. Based on studies on other riparian-associated species, it is likely that there is low toxicity to these animals.

The Migratory Bird Treaty Act provides oversight for the taking of native birds. Concern would be in regard to disturbance and destruction of nesting birds. The Birds of Conservation Concern (U.S. Fish and Wildlife Service 2002) which may be in this project's vicinity are: Wilson's phalarope, northern harrier, short-eared owl, yellow-billed cuckoo, and Lewis' woodpecker. Birds within the project area are typical of those associated with riparian habitats. Birds in this environment are primarily influenced by extreme and irregular fluctuations in precipitation and ecosystem productivity. As a result, they are highly opportunistic and ecologically adaptable (Brock et al. 1993). If treatments occur during the nesting season, there is low potential that a nesting bird or nestlings would be impacted. A mitigation measure has been proposed that would restrict treatment during the breeding season, in which case there would be no impact.

Ten different fish species were sampled in Yellow Jacket Canyon in 2007, including the federally endangered Colorado pikeminnow and three BLM sensitive species: bluehead sucker, flannelmouth sucker, and roundtail chub. The finding of the Colorado pikeminnow is not totally unexpected. Research has documented Colorado pikeminnow traveling 200 miles to spawn, and were once abundant in the San Juan and Dolores basins. Studies indicate that application of imazapyr has low toxicity to fish (Vegetation Treatments Using Herbicides EIS 2007). BLM has determined, in consultation with the U.S. Fish and Wildlife Service, the project should have no effect on the Colorado pikeminnow.

Since imazapyr would primarily be used in riparian zones and is relatively costly to use in the management of upland vegetation, large-scale impacts to wildlife are unlikely. Wildlife species that reside mostly within the riparian zone would be most at risk from application of imazapyr.

Continue Existing Treatments Alternative (No Action) Impacts. Potential impacts to all wildlife and fish species from other treatment methods would be similar to those under the proposed action. The other treatment methods would cause slightly less impact on wildlife species that reside mostly within the riparian zone, since there would be less direct spray of small animals and less consumption of contaminated vegetation and insects.

Impact Comparison. Short-term impacts (less than three years), on wildlife would probably be greater from the proposed action than from the other treatment methods. These impacts should be offset by the longer term benefits resulting from benefits to wildlife habitat resulting from a reduction in tamarisk and other noxious weeds.

Cultural Resources

Proposed Action Impacts and Continue Existing Treatments Alternative (No Action) Impacts. While herbicide treatments may affect buried organic cultural resources, deposits containing such materials are not generally found in drainage bottoms. Traditional cultural practices of gathering plant foods or materials important to local tribes or groups in areas treated may be temporarily altered due to treatments, however the likelihood plant species used occurring in areas of heavy tamarisk infestation is very low. The effect of herbicide treatments on cultural resources depends on the method of herbicide application and the herbicide type used. Some chemicals can cause soil acidity to increase, which would result in deterioration of artifacts—even some types of stone from which artifacts are made. Application of chemical treatments can also result in impacts such as altering or obscuring the surfaces of standing wall masonry structures, pictograph or petroglyph panels, and organic materials. However, tamarisk treatments along drainages should not generally have impacts on standing wall masonry structures, pictograph or petroglyph panels, since these features are not usually found in drainage bottoms.

Human Health and Safety

Proposed Action Impacts. Most exposures to imazapyr at either the typical or the maximum application rate do not present substantial risks to either workers or members of the general public, suggesting that workers and the general public would generally not be at any substantial risk from longer-term exposure to imazapyr even at the upper range of the application rate considered in the risk assessment (SERA 2004 *cited in* USDI Bureau of Land Management, 2007). From a practical perspective, eye irritation is likely to be the only overt effect as a consequence of mishandling imazapyr. This effect can be minimized or avoided by prudent industrial hygiene practices during the handling of the compound.

Continue Existing Treatments Alternative (No Action) Impacts. Root crown removal by excavator would not pose a chemical hazard to workers or the public. Mulching with herbicide application would present similar chemical risks to workers and the general public as the proposed action. In addition, this method also presents risks to workers from flying debris from the mulching operation.

Cut stump treatments and basal bark treatments would use triclopyr herbicide. At the upper ranges of exposures for triclopyr, workers face low risk at the maximum application rate from directed and broadcast ground spray and aerial applications. For workers who may apply triclopyr

repeatedly over a period of several weeks or longer, it is important to ensure that work practices involve reasonably protective procedures to avoid the upper extremes of potential exposure. Since cut stump and basal bark applications utilize a concentrated solution of the herbicide triclopyr, accidental exposure carries a greater health risk than exposure to more dilute concentrations.

Foliar imazapyr treatments using ground equipment would have similar impacts to workers and the general public as aerial applications.

In addition to hazards associated with chemical exposure, ground application of chemicals has risks associated with the use of chainsaws, ATVs, and working on steep slopes.

Impact Comparison. All of the chemical treatment methods present some risk to workers and the public. Aerial treatment methods generally present fewer risks (compared to cut stump, basal bark, and foliar treatment from the ground) to workers and a slightly greater risk to the general public (from herbicide drift). Of the ground treatment methods, the root crown removal method by excavator would present the least risk to workers and the general public. Cut stump and basal bark treatments present the greatest risk to workers, since they utilize a concentrated herbicide solution.

Recreation Resources

Proposed Action Impacts. A variety of dispersed recreation occurs within Yellowjacket, Woods, and Sandstone canyons. Horseback riding, backpacking, hiking, hunting, rock climbing, and camping occur year-round in different portions of these canyons. Effects from either direct or residual spray may be avoided by the following mitigation measures (also reference Section 6.0 Design Criteria/Mitigation Measures): posting/signing any access route within one-mile of treatment areas; and contacting recreation permittees at least seven days prior to treatments.

No Action Impacts. There is a lesser risk of direct or residual spray under existing treatment methods. Mitigation measures as described above are typically followed for mechanical treatments. Mitigation measures would not be required for non-aerial and/or biological methods for the proposed remote locations since there is no potential for off-site drift of up to 900 feet.

Impact Comparison. Both alternatives have potential for effecting people that may be utilizing these canyons for dispersed recreation activities. Appropriate mitigation measures shall be adhered to for either alternative

5.2 Residual Impacts (cumulative, irreversible, and irretrievable impacts)

1. Cumulative. Tamarisk treatment within the analysis area would complement tamarisk treatments on private lands and on National Forest System lands around McPhee Reservoir. The Dolores River Tamarisk Action Group has been instrumental in developing a region-wide approach to tamarisk control among various landowners and public agencies. The cumulative effects of coordinated tamarisk treatments should increase wildlife habitat, provide greater species diversity, and possibly increase stream flows. Aerial tamarisk treatments (the proposed action) would provide a faster realization of these impacts than other treatment

methods (the no action alternative), since aerial treatments can be accomplished at a lower cost per acre.

Cumulative impacts on non-target vegetation should be minimal. Although some loss of non-target vegetation would occur, treatment patches of less than 10 acres should allow colonization from adjoining vegetation. Revegetation of patches greater than 5 acres in size would also replace any loss of non-target vegetation.

Cumulative impacts of herbicide exposures (chronic toxicity) on humans have not been well studied. The use of personal protective equipment to reduce worker exposure to herbicides should prevent cumulative impacts to workers.

2. Irreversible and Irretrievable Impacts. No known irreversible or irretrievable impacts are expected from either of the alternatives.

6.0 DESIGN CRITERIA/MITIGATION MEASURES

Aerial Treatments

1. Treatments would not be conducted during periods of adverse weather conditions (snow or rain imminent, fog, or air turbulence), or when sustained wind speeds exceed 6 miles per hour.

2. Drift reduction agents would be used as necessary to reduce the drift hazard to non-target species or adjacent lands.

3. Spray equipment would be turned off at the completion of spray runs and during turns to start another spray run.

4. All permittees and landowners within one mile of treatment areas would be given notice at least seven days prior to treatments.

5. Potential impacts to any unknown occurrences of the BLM Sensitive Plant Species *E. gigantea* in Seep 1 can be avoided by halting spraying in its immediate vicinity if the wind is blowing in a SW, W, or NW direction. Spraying should be halted in the immediate vicinity of Seep 2 regardless of wind, since the seep is so close to the creek itself. Exact buffer distances will be determined in discussion with the pilot and considering current weather conditions and spraying accuracy.

6. No treatment would occur from 5/1 through 8/15 to protect nesting birds, including the Southwest willow flycatcher.

7. Treatments would not be conducted within ¼ mile of human residences.

8. Tamarisk would be treated in patches no greater than 10 acres in size, to minimize impacts on riparian wildlife species (including the southwestern willow flycatcher).

9. Only relatively pure patches of tamarisk will be targeted. Patches with non-target woody species comprising more than 10 percent of the complex will not be treated aerially with imazapyr.

10. Willow cuttings will be planted and the area seeded with herbicide and saline tolerant warm season grasses following tamarisk treatment of patches greater than 5 acres in size, unless a determination is made that the plantings are unnecessary due to an existing source of willows, or with only upland plants in sites that are not suited for willow establishment. Planting and seeding should not occur earlier than the spring following application due to the persistence of imazapyr. Based on post-treatment assessment, areas of smaller acreage may also be planted and/or seeded if necessary to protect resource values.

11. A spill contingency plan will be prepared in advance of treatment.

12. Helicopter loading and refueling operations will be conducted on existing roadways or previously disturbed areas.

13. At least seven days prior to treatments, all access routes within one-mile of treatment areas would be posted and/or signed appropriately, informing the general public about the project (including but not limited to, proposed date(s) of treatment, location of treatment areas and/or map, and any appropriate warnings about human health and safety). To determine which access routes need posting/signing, reference the CANM Transportation Inventory Map.

All Herbicide Treatments

1. Herbicide applicators would hold an appropriate license from the Colorado Department of Agriculture.

2. Herbicides would be applied during periods of low human use, when feasible.

3. Treated areas would be posted with appropriate signs at common public access areas.

4. Public notification of treatments would be announced in newspapers or other media when deemed appropriate.

5. Consultation would be undertaken with tribes and groups to locate any areas of vegetation that are of importance to the tribe and that might be affected by chemical treatments.

7.0 OTHER PERSONS/AGENCIES CONSULTED

Steve Miles, Dolores Soil Conservation District and Dolores River Tamarisk Action Group.
Kelli McClelland, Natural Resource Conservation Service.

8.0 PREPARERS AND DATE PREPARED

Name	Title	Office	Date
Lind Farnsworth	Archaeologist	Canyons of the Ancients National Monument	February 14, 2008
Vince McMillan	Archaeologist	Dolores Public Lands Office	January 24, 2008
Roger Baker	Range Specialist / Weeds	Dolores Public Lands Office	March 31, 2008
Kathy Nickell	Wildlife Biologist	Dolores Public Lands Office	March 28, 2008
Leslie Stewart	Ecologist	Dolores Public Lands Office	August 1, 2007
Cara Gildar	Ecologist	Dolores Public Lands Office	May 6, 2008
Shauna Jensen	Hydrologist	Dolores Public Lands Office	February 11, 2008
Pauline Adams	Hydrologist/Fisheries Biologist	Dolores Public Lands Office	April 15, 2008
Penny Wu	Recreation Specialist	Dolores Public Lands Office	May 14, 2008

9.0 REVIEWERS AND DATE REVIEWED

Name	Title	Office	Date
LouAnn Jacobson	Manager	Canyons of the Ancients National Monument	July 26, 2007
Mark Tucker	Range Program Lead	San Juan Public Lands Center	July 20, 2007
Eric La Price	NEPA Coordinator	Dolores Public Lands Office	February 12, 2008

References

Buchwalter, D., J. Jenkins, N. Kerkvliet, and P. Thompson 1996, updated by Trevathan 2002. Agricultural Chemistry Research and Extension, Oregon State University, Imazapyr Fact Sheet

Colorado State Parks, 2005. Best Management Practices Weed Profile, Saltcedar (Tamarisk).

Everitt**,** 1980 *in* Frasier and Johnsen 1991. Page 6 – water resources.

Frasier, G.W., and T.N. Johnsen, Jr., 1991. Saltcedar (Tamarisk): Classification, Distribution, Ecology, and Control. *In*: James, L.F., J.O. Evans, M.H. Ralphs, and R.D. Child (eds.). Noxious Range Weeds. Westview Press, Boulder, Colorado.

McDaniel, Kirk C., Charles R. Hart, and Alan McGinty, 2006. Saltcedar Control with Rotary and Fixed Wing Aircraft. In: Tamarisk Research Conference: Current Status and Future Directions October 3-4, 2006. Fort Collins, CO.

Miles, Steve, 2008. Dolores Soil Conservation District and Dolores River Tamarisk Action Group, personal communication.

Nissen, Scott J., Galen R. Brunk, and Dale L Shaner, 2006. Aerial Application Methods to Reduce Imazapyr Impacts on Riparian Restoration. In: Tamarisk Research Conference: Current Status and Future Directions October 3-4, 2006. Fort Collins, CO.

Petty, D.G., Getsinger, K.D., and Woodburn, K.B., 2003. "A Review of The Aquatic Environmental Fate of Triclopyr and its Major Metabolites". Journal of Aquatic Plant Management 41: pp 69-75.

Syracuse Environmental Research Associates, Inc. (SERA), 2004**.** Imazapyr – Human Health and Ecological Risk Assessment Final Report. SERA TR 04-43-17-05b. Prepared for the U.S. Department of Agriculture Forest Service, Arlington, Virginia. Fayetteville, New York.

Tamarisk Coalition, March 2006. *Options* for Non-Native Phreatophyte Control.

Tamarisk Coalition, November 2006. Cost Components for Non-Native Phreatophyte Control.
Tamarisk Coalition, 2006. San Juan River - Montezuma County Tamarisk Mapping & Inventory Summary (unpublished report).

Tu, Mandy, C. Hurd and J. Randall, 2001. Weed Control Methods Handbook, Tools and Techniques for Use in Natural Areas, The Nature Conservancy.

USDI Bureau of Land Management, 1985. San Juan/San Miguel Planning Area Resource Management Plan.

USDI Bureau of Land Management, 1991. Vegetation Treatment on BLM Lands in Thirteen Western States, Final Environmental Impact Statement.

USDI Bureau of Land Management, 1999. Environmental Analysis No. C0-038-99-051, Integrated Weed Management in the San Juan Field Office.

USDI Bureau of Land Management, 2007. Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States, Final Programmatic Environmental Impact Statement.

U.S. Fish and Wildlife Service, 2002. Southwestern Willow Flycatcher Recovery Plan.