

Environmental Assessment

For Biological Control of the Invasive Tree Saltcedar (*Tamarix chinensis*) on Bitter Lake National Wildlife Refuge on the Pecos River (New Mexico)

July 2007

**U.S. Fish and Wildlife Service
Bitter Lake National Wildlife Refuge
4065 Bitter Lakes Road
Roswell, New Mexico 88201**

**Environmental Assessment for
Biological Control of the Invasive Tree Saltcedar (*Tamarix chinensis*)
on Bitter Lake National Wildlife Refuge on the Pecos River (New Mexico)**

I. Purpose and Need for Action

The purpose of this Action is to provide for biological control of the widespread invasive tree/shrub, saltcedar (*Tamarix chinensis*), which has been present on Bitter Lake National Wildlife Refuge (NWR) since the refuge was established in 1937, by allowing release of saltcedar leaf beetles (*Diorhabda elongata*) on selected areas of the refuge. Saltcedar is present through most of the Pecos River valley, and indeed throughout most of the western United States, where it has been battled for decades due to its prodigious consumption of water, its tendency to increase soil salinity and to outcompete and replace many native plants, its poor value as wildlife habitat, and its proclivity to promote wildfires, which it is able to tolerate better than most native trees and shrubs. Saltcedar has a tremendous impact on water users and on the native habitats that it invades. It reproduces and spreads rapidly and forms nearly impenetrable, monotypic stands in many riparian and wetland areas. It threatens the fish and wildlife habitat of Bitter Lake NWR that is essential to fully meet the purposes for which the refuge was established. The Refuge's Comprehensive Conservation Plan (CCP) calls for the Refuge to control saltcedar, including cooperating with USDA and others to implement biological control (Goal 5.2, Objective 3., Strategies 4 and 6).

The U.S. Fish and Wildlife Service (Service) has a need to fulfill its responsibilities to protect refuge resources, including migratory birds, endangered species, and fish and wildlife habitat necessary for maintaining healthy, productive, ecosystems. Saltcedar threatens the health of many of these resources on the refuge. The refuge, the Bureau of Land Management (BLM), Bureau of Reclamation (BOR), the Carlsbad Irrigation District, and others have gone to great lengths to control saltcedar in the Pecos Valley. Its presence in an essentially uncontrolled state on the north and south tracts of the refuge, and in areas of the middle tract that have proven difficult to access for more standard means of control, increases the risk that it could expand back into areas from which it has been removed in the past. Such renewed spread could impact waterfowl and other migratory bird habitat, as well as threatened and endangered species.

Use of biological control organisms is potentially an environmentally friendly, economical, sustainable method to protect, restore, and enhance refuge resources by effectively controlling this invasive species. In past years when the refuge was fully staffed, resources were insufficient to devote any attention to saltcedar on the north or south tracts of the refuge. Even where management attention has been focused, on the middle tract, conventional treatments have not been possible along steep banks of the Pecos River and oxbow lakes and in other areas that are difficult to access with heavy equipment and too extensive to treat by hand. In the present budgetary climate, the refuge's heavy equipment operator position has been lost and there is little hope that the position will be refilled in the near term. This position formerly performed most of

the saltcedar control on the refuge (in terms of total acreage treated). We now face the prospect that saltcedar will reinvade much of the area where it has been eliminated through decades of effort. If permitted to expand back into these habitats, refuge water resources, waterfowl and other migratory birds, endangered species, and other fish and wildlife and their habitats may be seriously impacted.

Communities within the Pecos River system, irrigation districts, and the general public have a need for water- and wildlife-oriented recreational opportunities that the refuge provides. They also have a need for water from the Pecos River and the Roswell artesian aquifer for agricultural and municipal uses, and for delivery to the State of Texas under the Pecos River Compact. The refuge provides numerous recreational opportunities for thousands of people. The New Mexico Department of Game and Fish has a need to provide for the management of healthy populations of fish and wildlife along the Pecos River, and to provide for fish and wildlife-oriented recreation. BLM has a need to manage its riparian and other lowland habitats for maintenance of healthy native ecosystems. BOR has a need to mitigate the effects of its river operations, which result in creation of conditions that can favor saltcedar. The Carlsbad Irrigation District has a need to provide water to its users. The Interstate Stream Commission needs to provide water to the state of Texas. Presence of saltcedar on the refuge could serve as a reservoir for spread to other areas, where it could impact fish and wildlife habitat, the availability of recreational opportunities, and the quantity of water for agricultural and municipal uses.

BLM, BOR, the Interstate Stream Commission, the Carlsbad Irrigation District, and others have responsibilities for management of water and natural resources related to the Pecos River or adjacent lands. Those agencies have actively worked to control saltcedar. Failure to control the species on the refuge could affect the ability of those agencies to control it on areas under their management, and to accomplish their missions and fulfill their land and water management responsibilities.

This document is a site-specific Environmental Assessment tiered down from a programmatic Environmental Assessment prepared by the USDA Animal and Plant Health Inspection Service (APHIS, the action agency): **Field Release of a Nonindigenous Leaf Beetle, *Diorhabda elongata* (Coleoptera: Chrysomelidae), for Biological Control of Deciduous Saltcedar, *Tamarix ?ramosissima* and *T. parviflora* (Tamaricaceae)**, Finding of No Significant Impact signed July 7, 1999. Proposed releases would be conducted by Dr. David C. Thompson and Kevin T. Gardner, Department of Entomology, Plant Pathology and Weed Science, New Mexico State University, under USDA-APHIS permit # P526-060731-050. Furthermore, this action could arguably tier down from NEPA prepared for the Refuge's CCP. While the CCP specifically calls for implementation of biological control, the EA prepared only mentions control of saltcedar, without specifically mentioning use of biological control agents. We have therefore prepared this EA to cover the proposed action more explicitly.

II. Affected Environment

Aerial photography and satellite imagery are currently being used to more accurately map saltcedar infestations on the refuge, but a crude estimate would be several hundred acres of high density saltcedar and several thousand acres of moderate to low density. The initial release would take place near the edge of a high density patch of saltcedar on the west side of the Pecos River, near the south boundary of the refuge's north tract. If the release is successful, there should be a strong chance for expansion of this population across the river and both up and down stream from the release site.

Spread to the south would probably be limited due to reduced density of saltcedar on BLM land, where it has been mechanically removed. Spread to the north could continue to the refuge boundary, but would be limited further north due to past aerial spraying on private lands. The beetles might also expand westward from the Pecos up the Salt Creek drainage. They could potentially move a few miles west of the refuge until they reach areas of the drainage where agricultural development on private lands has reduced saltcedar densities. Dispersal of saltcedar leaf beetles appears to be strongly affected by winds. Because the refuge typically experiences frequent moderate to strong winds from a variety of directions, the beetles can be expected to disperse to suitable nearby habitat in any direction from the release site.

Because USDA-APHIS has issued NMSU a permit to release beetles along the entire Pecos River, it is likely that the beetles will eventually reach the refuge on their own, even if they are never released directly on the refuge. The release proposed here would result in quicker establishment on the refuge, at a time when our options for control of saltcedar are limited, and in an area where we have never before been able to actively pursue control.

The Roswell artesian aquifer and the Pecos River provide water for agricultural, industrial, residential, and recreational use for much of southeastern New Mexico and west Texas. The river and associated wetlands provide essential breeding, wintering, and migratory habitat for tremendous numbers and diversity of wildlife, including one of the highest concentrations of endangered and sensitive species in the state of New Mexico. Water availability and habitat quality are strongly impacted by saltcedar infestation. If this action is not taken, progress in controlling saltcedar on the refuge will essentially come to a halt, and some past gains may be lost because current funding constraints may not allow control efforts to continue at the levels implemented in past years.

III. Alternatives, Including Proposed Action

Alternative 1. No Action

This alternative would result in continued efforts to control saltcedar on the middle tract of Bitter Lake NWR by conventional mechanical and chemical treatments, but no direct action would be taken to control the species on the north or south tracts of the refuge. This alternative would continue the moderate to low current level of control effort on the middle tract, with Carlsbad Irrigation District removing saltcedar from areas that can be safely accessed using their

equipment and the refuge removing saltcedar from selected areas using chainsaws, chemical treatment, and hand pulling, subject to the availability of funds and personnel.

Alternative 2: Biological Control (Preferred Alternative)

This alternative would implement biological control of saltcedar by allowing personnel from New Mexico State University, Dept. of Entomology, Plant Pathology and Weed Science (NMSU), to release saltcedar leaf beetles (*Diorhabda elongata*) at selected sites throughout the refuge. Mechanical and chemical treatment of saltcedar would continue at selected sites on the middle tract, as allowed by funding and personnel availability. The initial release of beetles would occur on the north tract of the refuge. After evaluating its effectiveness there, additional releases would be considered at appropriate sites on all three refuge tracts. USDA has already completed NEPA and permitting for releases generally throughout the west and NMSU has a USDA-APHIS permit in place for releases throughout the Pecos River valley of New Mexico. This permit has also been approved by the State of New Mexico.

Beetle releases entail building a temporary tent-like enclosure around one or a few saltcedar trees. A few thousand beetles are then released into the enclosure and allowed to reproduce and begin building a larger population. Saltcedar leaf beetles tend to congregate in large numbers, stimulated by pheromones that the beetles produce. If beetle numbers are too low, the pheromone concentrations are inadequate to keep the beetles together. They then disperse from the release sight and fail to find mates, resulting in an unsuccessful release. Within the enclosure, the initially released beetles are allowed to reproduce and begin to build a larger population. After one or two generations (normally about one month per generation), the population within the enclosure should be large enough for the pheromone based social system to keep the beetles together in sufficient numbers to maintain a reproducing population. The enclosure will then be removed and the beetles will begin to disperse gradually to neighboring saltcedar trees. The success of releases and the rate of expansion of newly established populations have been variable, depending on location, strain of beetle released, and unknown factors. Expansion rates of newly established populations are unpredictable. Smaller numbers of beetles may be placed within net bags that cover only one or a few branches of several saltcedar trees near the larger enclosure. This may help to increase the probability of success of the introduction and enhance spread of the beetles after enclosures are removed. We will observe the site(s) for a year or more after initial releases before deciding on future releases within the refuge.

If the release is successful (a self-sustaining and expanding population of the saltcedar leaf beetle is established on the north tract of the refuge), it can be expected that in the summer of the release the beetles will defoliate saltcedar trees in about one acre or so around the release site. Rate of expansion of released populations has varied greatly, but perhaps 10 acres of saltcedar may be defoliated the year after the release. The beetles defoliate saltcedars each year. Depending upon the health of the individual, trees often begin to die after three successive seasons of defoliation. New saltcedars will continue to germinate, but it is expected that most established trees and new seedlings would not survive in the long term. The saltcedar population

would be reduced significantly and possibly eliminated from some areas. Even if some saltcedars survive, their competitive edge over native species would be reduced and possibly reversed. This would allow establishment of more native plants, with saltcedar forming only a small component of the final, more natural, plant community. Past experience has shown that the native plant communities of the refuge rapidly colonize areas where saltcedar has been cleared using mechanical or chemical control methods. A similar response is expected with biological control.

Alternative 2 would include an educational outreach display at the Bitter Lake NWR Visitor Center to inform the public about the need for biocontrol of saltcedar, how it will be implemented, and the specificity of the biocontrol agent that ensures minimal impact to non-target plant species.

Other Alternatives Considered

Over the years, a number of alternatives have been considered and used for treatment of saltcedar on the refuge. For the north tract, funding and personnel have not been available to implement chemical or mechanical treatment, and we have no reason to believe that such resources will become available at any point in the foreseeable future. Aerial spraying, funded by BOR, was rejected as an option because of its broad spectrum impact to vegetation. Because saltcedar is intermixed among desirable native plant species in many areas of the river corridor, and because aerial spraying is not very surgical in nature, it was judged that collateral damage to desirable species would be too great to justify this method. BLM also rejected this option, but much of the private land along the lower Pecos River corridor of New Mexico was sprayed in 2003.

Mechanical treatment using heavy equipment has been used for decades to treat saltcedar on the middle tract of the refuge. Most areas that are accessible to heavy equipment have been cleared. The remaining saltcedar on the middle tract is mostly on the steep banks of ditches, oxbows, or the Pecos River, in areas that are too wet and muddy to support heavy equipment, or within a large area where sinkholes are too common to safely operate heavy equipment. The refuge recently lost its heavy equipment operator and has been told that the position will not be refilled until funding levels increase. Furthermore, fuel expenses are high enough to make this type of control more expensive than in the past. BLM has contracted to have heavy equipment remove saltcedar along the banks of the Pecos River on their land. Again, current budgetary constraints make this option unworkable at this time. So, even on the middle tract of the refuge, mechanical removal of saltcedar has essentially been discontinued.

More extensive use of chemical control of saltcedar has been considered for the middle unit. This generally involves cutting trees with a chainsaw and treating the stump with Garlon. This method is very labor intensive and the herbicide is fairly expensive. Nevertheless, the refuge has had some success in obtaining funds for chemical control. Use of this method will continue, as long as funds and personnel are available, to treat selected areas of the middle tract. This method allows very specific treatment of saltcedar, even in difficult terrain, with minimal ancillary

impacts to desirable vegetation. To date, funding availability for personnel and herbicides has allowed limited chemical treatment, only on the middle tract.

IV. Environmental Consequences.

Alternative 1: No Action

Impacts on Fish and Wildlife and Habitat

Saltcedar populations on the north tract of the refuge are probably somewhat stable. In the absence of any action to control them, infested habitat would continue to be suboptimal for those species that should occur naturally in the area. A few species of songbirds make limited use of saltcedar on the refuge. Western kingbirds, Bullock's orioles, blue grosbeaks, ladder-backed woodpeckers, summer tanagers, yellow-breasted chats, and yellow-billed cuckoos have been recorded using this habitat on the refuge. The first five species are of little conservation concern and the first three are common breeders in other habitat types on the refuge. The yellow-breasted chat seems to be fairly common in saltcedar, but it is of only moderate conservation concern and it may do well in stands of coyote/sandbar willow (*Salix exigua*) that can be expected to become established in some of the areas where saltcedar will be reduced. Although the yellow-billed cuckoo is not a listed species, it is of conservation concern. It has been recorded on the refuge and probably nested in extensive stands of saltcedar on the middle tract before they were mechanically reduced. There have been no recent nesting records of the species on the refuge and we would not expect them to return unless large stands of cottonwood become established.

Saltcedar thickets are known to serve as shelter for feral hogs, which are present on both the north and middle tracts of the refuge. This invasive exotic species causes significant damage to native plants and animals due to its omnivorous habits and the high degree of physical disturbance caused by its rooting behavior when it feeds.

Impacts on Endangered and Threatened Species

Several federally threatened and endangered species occur regularly on the refuge, primarily on the middle tract: the Pecos puzzle sunflower (*Helianthus paradoxus*), Roswell springsnail (*Pyrgulopsis roswellensis*), Koster's springsnail (*Tryonia kosteri*), Pecos assiminea (*Assimineia pecos*), Noel's amphipod (*Gammarus desperatus*), Pecos bluntnose shiner (*Notropis simus pecosensis*), Pecos gambusia (*Gambusia nobilis*), and interior least tern (*Sterna antillarum*). Failure to reduce or remove present stands of saltcedar would leave habitat for these listed species in the same condition as currently present. If saltcedar invaded springs and spring runs where it is now absent, shading and water reduction could negatively impact the four invertebrates and Pecos gambusia. Renewed invasion of wetlands could negatively impact Pecos puzzle sunflower. The interior least tern and Pecos bluntnose shiner would be largely unaffected.

Impacts on Water Quantity and Quality

Water quantity and quality would be expected to remain static or decline if saltcedar remains present at current densities or expands. The species is well known for its high rate of water transpiration.

Impacts on Aesthetic and Visual Resources

Saltcedar is highly visible in comparison to the native plants that would likely be present in refuge spring and wetland habitats in its absence. On the banks of the Pecos River, it is possible that cottonwoods might establish in limited areas if saltcedar were removed. These are just as visible as saltcedar, but most people would find them more attractive, and certainly more natural. The continued presence of saltcedar under the no-action alternative would preclude this.

Impacts on Socioeconomic Resources

High rates of evapotranspiration due to saltcedar infestation would continue. If saltcedar expands, then this loss of water would increase. Spring flows from the refuge are an important source of water for the Pecos River, which supplies water for irrigation and other uses in the Carlsbad Irrigation District and in Texas.

Alternative 2. Biological Control (Preferred Alternative).

Impacts on Wildlife and Habitat

If *Diorhabda* beetles are successfully established on the north tract of the refuge, it is expected that perhaps a few acres of saltcedars will be defoliated in the first year. The beetles might spread both upstream and downstream as far as continuous infestations of saltcedar allow. Individual saltcedars generally die after three to five years of defoliation by the beetles. It is hoped that native riparian vegetation, such as coyote willow, will begin to establish in areas where saltcedars have died or been reduced to low density. The loss of saltcedar may impact a few species of songbirds that use them for nesting, as described under Alternative 1.

Feral hogs, mule deer, and perhaps white-tailed deer, use saltcedar thickets for cover. It is not known how important this cover is for their survival. Reduction in saltcedar density will presumably impact both hogs and deer to some extent.

Impacts on Endangered/Threatened Species

The main effects of saltcedar reduction that are likely to affect listed species would include the possibility of moderately increased spring and river flows, reduced river bank stability, and reduced shading of springs and spring runs. As far as is known, these changes would be favorable for the four listed invertebrates and the two listed fishes. Three of the invertebrates (all

but Pecos assiminea) and Pecos gambusia favor the running waters of spring vents and/or spring runs. Any increase in spring flows is therefore likely to be beneficial to these species. Because the initial release is on the north tract, and known populations of the listed species are limited to springs and spring runs on the middle tract, there is likely to be little or no immediate benefit to them. However, if the initial release proves to be effective, releases would be considered on the middle tract, providing potential improvement of their habitat.

The Pecos bluntnose shiner is limited to the Pecos River. Saltcedar reduction on the refuge is likely to have limited effects on river flows, but any increase would presumably be beneficial. Effects on bank stability and shading are likely to be more pronounced. Less stable banks would result in a more dynamic river channel, which would create or enhance shiner habitat. Reduced shading would bring habitat conditions back to a more natural state.

The only likely effect on the Pecos puzzle sunflower would be reduced competition for space. It is possible that some of the habitat vacated or opened by saltcedar reduction could be colonized by the sunflower. Such opportunities for expansion are mostly on the middle tract of the refuge.

Impacts on Water Quality

Impacts on water quality would be minimal. There might be very small short-term increases in the amount of woody debris in the Pecos River, resulting from bank destabilization. In the long-term, woody debris would probably decrease as the total population of saltcedar is reduced. Turbidity might also increase in the Pecos due to reduced bank stability. Again, this would bring the river closer to its natural state and improve habitat quality for native fishes, including the Pecos bluntnose shiner. A similar short-term increase, but long-term decrease in woody debris would be expected for springs and spring runs where saltcedar reduction occurs.

Impacts on Aesthetic and Visual Resources

There would be minimal impact on aesthetic and visual resources. To most people, saltcedar is not especially attractive for most of the year, and many find it unattractive. Reducing saltcedar will also result in a more naturally appearing landscape.

VI. Consultation and Coordination

Document prepared by Jeff Howland, Refuge Manager, Bitter Lake National Wildlife Refuge, U.S. Fish and Wildlife Service, Roswell, NM.

Agencies, individuals, and resources, consulted in the preparation of this document include

Dr. C. Jack DeLoach, Research Entomologist, USDA Ag. Res. Station, Temple, TX.
Dr. David C. Thompson, Professor, New Mexico State University, Las Cruces, NM.
Kevin Gardner, Senior Research Specialist, New Mexico State University, Las Cruces,

NM.

Don Kearney, Prescribed Fire Specialist, Sevilleta NWR, Socorro, NM.

Mike Goddard, Refuge Manager, Stillwater National Wildlife Refuge, Fallon, NV.

Bill Henry, Wildlife Biologist, Stillwater National Wildlife Refuge, Fallon, NV.

April Fletcher, Invasive Species Coordinator, U.S. Fish and Wildlife Service, Region 2,
Albuquerque, NM.

Appendix A:

**Map of the Affected Area of Bitter Lake National Wildlife Refuge
and the Pecos River Valley**