

EXECUTIVE SUMMARY

Unit 8 Burned Area Fire Rehabilitation Plan

Unit 8 Fire, 2000 #2478, Bosque del Apache NWR, N.M.

Between 28 and 30 March, 2000, a wildfire consumed 103 acres of the Bosque del Apache National Wildlife Refuge. Fuel consumption was estimated at 70-90%. The fire occurred in valuable riparian forest and wetland habitat dominated by cottonwoods and associated native understory. Varying degrees of exotic Russian olive and saltcedar vegetation were also present at the site. Wildlife use prior to the burn included species characteristic of native riparian habitat including many neotropical migrant and breeding songbirds, and unique species such as Rio Grande turkeys, mule deer, and several species of raptors. These biotic communities must be stabilized through the control of exotic species and revegetation with native species. To control exotic invasion in a small riparian wetland affected by the fire, water control must also be established. These are appropriate wildfire rehabilitation expenditures as outlined in the U.S. Fish and Wildlife Service Fire Management Handbook (3/95) and more recent guidance outlined in section 095 FW 3 (2/00). Monitoring and evaluation of the rehabilitation effort will also occur. Data generated will be disseminated in reports and publications. Requested funds to accomplish outlined tasks total \$ 76,927.

Unit 8 Burned Area Fire Rehabilitation Budget Summary Bosque del Apache National Wildlife Refuge	
Budget Item	Cost
Russian Olive and Saltcedar Control	\$50,527
Revegetation to Stabilize Biotic Communities	22,400
Water Control Development	4,000
Total	\$76,927

Burned Area Fire Rehabilitation (BAER) Plan

Unit 8 Fire, 2000 #2478

Bosque del Apache NWR

I. Background

A. Fire Description

1. Location and size: Bosque del Apache National Wildlife Refuge, 8 miles south of Socorro, New Mexico, Latitude 33:49, Longitude 106:53. Township 5S, Range R1E, Section 19, 103 acres (Figure 1 and 2).
2. Soils within the burn area are primarily floodplain Gila- Vinton-Glendale loams, sands and clays. Soil borings reveal a sand overburden, with clay lenses of variable width occurring to the water table.
3. Topography: Topography consists of a 0-2% slope in floodplain areas with an elevation of approximately 4500'.
4. Climate: Area climate is semi-arid with hot summers (Maximum 100 F) and mild winters (minimum 00 F). The mean temperature ranges from 38 F in winter to 76 F in summer. Precipitation over the last 10 years has averaged 11 inches per year with 50% of the total occurring during the months of July, August and September. Rainfall is heavy during this time, usually the result of thunderstorms which cause localized flooding. Snowfall is uncommon generally melting within a three or four day period.
5. Vegetation prior to fire: In 1993 and 1994, a detailed vegetation map of riparian habitats was developed for the refuge emphasizing forest structure, which is a particularly important habitat attribute for forest songbirds. This map was derived from aerial photos and extensive ground surveys and was digitized as a data layer into the refuge Geographic Information System. This vegetation classification system describes predominate woody species, relative dominant species densities and species prevalence in various canopy layers. Figure 3 shows 103 acres of habitat which was consumed in the wildfire. Based on this mapping system, 96 acres were dominated by cottonwoods (*Populus fremontii*) and Russian olive (*Elaeagnus angustifolia*) with an understory of saltcedar (*Tamarix ramosissima*), and seepwillow (*Baccharis glutinosa*). Additional understory species included coyote willow (*Salix exigua*) and wolfberry (*Lycium pallidum*), screwbean mesquite (*Prosopis pubescens*) and 4-wing saltbush (*Atriplex canescens*). Remaining acreage consisted of a riparian fringed wetland 7 acres in size.
6. Intensity of fire: Moderate humidity (20%), moderate environmental temperatures (75) and low fuel moistures (17%) characterized conditions prevalent during the fire. Winds were light (5 mph) from the west, but brief gusts of up to 21 mph during mid-afternoon fanned the blaze. The

Unit 8 Fire was a very high intensity burn with 70-90% fuel consumption prevalent over the area. Most native tree and brush species did not survive the fire.

7. Hydrology: The Rio Grande is the major influencing factor on area hydrology. Historically, the river was uncontrolled allowing for seasonal flooding of bottomland cottonwood/black willow forest habitat. Spring flooding perpetuated this community by providing sufficient moisture for seed germination. It also enhanced litter decomposition and swept away accumulated fuels reducing or eliminating the threat of fire. As river control was achieved a large portion of the floodplain was isolated from the active river channel through the construction of a river levee. The Unit 8 burn is such an area and has not experienced river flooding for at least 50 years. A considerable amount of down and dead fuel contributed to the intensity of the fire as well as a large amount of saltcedar which has invaded the area over the last 50 years. Saltcedar is an exotic plant which was introduced as an ornamental in the early 1900's. By 1940, the plant had escaped into the Rio Grande drainage occupying available plant niches vacated by declining native cottonwoods and willows. Russian olive, another exotic invasive species introduced more recently, is also competing aggressively with native vegetation. Extremely dry conditions prevailed at the time of the fire. Despite average rainfall in spring and summer, 1999, only 2.1" of precipitation fell over the winter contributing to very dry conditions.

8. Land ownership: Federal; National Wildlife Refuge

B. Resource Uses: The unit 8 fire area occurred in a sanctuary portion of the refuge closed to public use. The area was a prime roosting and nesting area for Rio Grande turkeys (*Meleagris 2.alloovo intermedia*) and harbored large numbers of mule deer (*Odocoileus hemionus*). Vegetation in the area afforded optimum canopy layering for migrant and breeding neotropical birds, and before the fire supported varying diversities and densities of other wildlife. The major habitat types included a cottonwood dominated forest, and a riparian wetland.

1. Cottonwood forest (95.8 acres): The forest canopy in this habitat type is either dominated by cottonwood, or shared with Russian olive. Understory vegetation is comprised of saltcedar and native species including coyote willow, seepwillow, wolfberry, screwbean mesquite, and 4-wing saltbush. Songbird communities include many neotropical migrants which are unique to native riparian vegetation and are species of concern in the Americas. Examples are many warbler, tanager, vireo, goldfinch, flycatcher, phoebe, bunting and sparrow species. Major reptiles and amphibians in this habitat include salamanders, toads, whiptails, fence lizards, garter snakes, rattlesnakes and other snake species. Small mammal species include white-footed mice (*Peromyscus leucopus*), hispid cotton rats (*Sigmodon hispidus*), Ord's kangaroo rats (*Dipodomys Ordii*), and western harvest mice (*Reithrodontomys megalotis*). The cottonwood/black willow bottomland forest community also provides habitat for unique refuge wildlife including raccoons (*Procyon gJ!!!*), porcupines (*Erethizon dorsatum*), Rio Grande turkey, Gambel's quail (*Lophortyx gambelii*), mule deer, and various raptor species. These include Swainson's hawks ~ *swainsoai*, Cooper's hawks (*Accipiter cooperii*) and the threatened bald eagle (*Haliaeetus leucocephalus*) and peregrine falcon (*Falco peregrinus*).

2. Riparian wetland (6.8 acres): The wetland in the burn area was constructed prior to 1945 and

was comprised of cottonwood, coyote willow, and saltcedar vegetation along the periphery. This vegetation was enhanced by drain water from adjacent moist soil management units. Emergent wetland vegetation is predominately cattail (*Typha spp.*) with some production of annual millet (*Echinochloa spp.*), sprangletop (*Leptochloa fascicul/aris*), and smartweed (*Polygonum lapathifolium*). This wetland supports waterfowl during fall, winter and spring months while nesting habitat is available for bitterns, coots, moorhens and breeding waterfowl. Riparian vegetation along the wetland fringe supported similar avian species as described above.

II. Evaluation and Analysis

A. Damages to watershed and vegetatiOn: Minimal slope (< 2%) will limit the degree of water erosion potential in the burn area. Surface soils are comprised of loose sands however. There is therefore considerable wind erosion potential. The fire accelerated nutrient cycling, but damage to soil fertility may have occurred through destruction of soil organisms. Important soil nutrients such as nitrogen and phosphorous were probably released into the soil as litter was consumed. These increases may be temporary as excessive amounts can be lost aerobically or leached from soil by flooding.

1. Cottonwood bottomland forest: Very little native vegetation will survive and resprout following the Unit 8 wildfire. Native woody riparian vegetation is inherently fire intolerant having evolved under a flood disturbance regime. Conversely, the non-native Russian olive and saltcedar community is fire tolerant and highly competitive. The basal regrowth rate in Russian olive and saltcedar following a fire is very high. Within a matter of weeks, two or three times the number of stems will sprout and grow rapidly. These species will further invade surviving native vegetation, reduce its vigor and result in its replacement by exotic species.

2. Riparian Wetland: The effects of fire on riparian wetland communities is mixed. Periodic burning of marsh areas releases accumulated rank emergent growth allowing for larger open areas if water levels remain high after burning. The removal of this vegetation will provide substrate for the reestablishment of vegetation including wetland plants and woody native and non-native seedlings upon wetland drawdown. The timing of receding water levels will dictate the degree to which non-native species dominate. Water control is therefore a critical requisite for determining vegetative makeup. Similar to the effects outlined above, very little native forest vegetation along the wetland periphery will survive the fire. This vegetation afforded prime nesting sites for neotropical breeding passerine species.

B. Damage to Physical structures and facilities: No damage occurred to physical structures or facilities. The wildfire was in a remote portion of the refuge.

C. Off-site nonphysical factors: Air quality will be reduced due to blowing sand. An overburden of sandy soils predominate in the burn area. These effects will continue until the area is revegetated.

D. Effects on wildlife and wildlife habitat: Little evidence of direct wildlife loss was found during reconnaissance after the fire. It is believed that the fire was of such intensity that carcasses were burned beyond recognition. It is likely that many songbird nest sites unique to the

cottonwoodwillow forest were destroyed in the blaze. Quail and turkeys prevalent in many areas may have not been able to outrun the fire. Likewise, medium sized mammals such as porcupines and raccoons may have also been caught in the fire. Mule deer, bobcats, and coyotes were probably able to outrun the blaze. Rodents and lagamorphs may have had time to take refuge in burrows evident throughout the area.

1. Cottonwood forest: Wildfire has the most destructive effect on this habitat. As mentioned previously, this biotic community is extremely fire intolerant and can be destroyed by fire and replaced quickly by non-native Russian olive and saltcedar vegetation. In this sense, unless stabilized through revegetation, the biological integrity of this habitat will be lost. The continued loss of native riparian vegetation and replacement with invasive species along the Rio Grande will eventually result in the decline and elimination of associated high bird and InamInal species diversities and densities.

2. Riparian Wetland: The fire removed emergent vegetation and surrounding mixed cottonwood, willow and saltcedar. Wetland vegetation will return in some form, but without water control to stabilize this biotic community, the wetland risks invasion by exotic species. Waterfowl and other waterbirds will probably benefit from the new herbaceous growth within the wetland if such water control is developed.

III. Rehabilitation Needs and Objectives

A. Rehabilitation alternatives including "no action": Guidance for rehabilitation of wildfire areas, is provided by the U.S. Fish and Wildlife Service Fire Management Handbook (3/95) and more recent guidance outlined in section 095 FW 3 (2/00) of the Refuge Manual for preparation of Burned Area Fire Rehabilitation (BAER) plans. Guidance limits the use of fire rehabilitation funds to stabilize soils and biotic communities no later than 2 growing seasons, or a maximum of 3 years after initial plan approval. The stabilization of biotic communities should minimize unacceptable changes to ecosystem structure and function resulting from wildfire. Such stabilization allows for the establishment of shrubs, forbs, and grasses, and trees if demonstrated to meet project objectives. Also allowed are efforts to minimize the establishment of non-native invasive species to prevent burned area degradation. To implement immediate post-fire rehabilitation plans, the hiring of temporary personnel or the use of contract services can be authorized. The plan must also include provisions for monitoring and evaluating treatments and techniques and procedures for data gathering and information dissemination.

1. No Action: Under this alternative no funding would be provided for rehabilitation of the Unit 8 wildfire (103 acres).

-Positive Aspects

A savings of considerable rehabilitation funding would result under this alternative. These savings would include salaries for personnel or contractors involved in evaluating the wildfire and implementing post-fire rehabilitation plans. Invasive species control measures and revegetation to stabilize biotic communities would not occur. These efforts require the use of heavy equipment using fossil fuels and herbicide treatments as follow-up exotic species control

Potential temporary environmental degradation would therefore not occur.

-Negative Aspects

Under this alternative, exotic invasive species such as Russian olive and saltcedar would not be controlled. The expansion and dominance of these invasive species within the cottonwood forest and riparian wetland would be rapid leading to the ultimate demise of native riparian forests in the burn area. These invasive species will produce highly combustible fuels within 8-10 years which could endanger surrounding native habitats with wildfire once again. Soils would not be stabilized leading to excessive wind erosion and air quality reduction due to blowing sand. Without revegetation in the cottonwood forest and the development of water control for the riparian wetland, stabilization of these biotic communities will not be realized and the biological integrity of these habitats will be seriously compromised.

2. Control Russian Olive and Saltcedar in the Cottonwood Forest and Riparian Wetland: Under this alternative, invasive species including Russian olive and saltcedar would be controlled mechanically using heavy equipment over the entire burn area. Follow-up herbicide applications would be required to treat resprouting invasive vegetation after initial mechanical treatment. No revegetation would occur in the burn area and water control would not be developed for the riparian wetland.

-Positive Aspects

Russian olive and saltcedar would be controlled in cottonwood forest habitats as a first step in restoring the area to native vegetation and the spread of these invasive exotics would be halted in the area. By controlling these species which produce highly combustible fuels, future catastrophic wildfire will be averted. Revegetation in the cottonwood forest community and the development of water control in the riparian wetland is costly and considerable savings would result from suspension of these activities.

-Negative Aspects

Costs to control the invasion of Russian olive and saltcedar into cottonwood forest habitat will be high. These efforts require the use of heavy equipment using fossil fuels and herbicide treatments as follow-up exotic species control. Therefore, temporary environmental degradation resulting from these treatments would occur. The opportunity to stabilize soils will be lost leading to excessive wind erosion and air quality reduction due to blowing sand. Without revegetation in the cottonwood forest and water control development for the riparian wetland, stabilization of these biotic communities will not be realized and the biological integrity of these habitats will diminish.

3. Control Russian Olive and Saltcedar in the Burn Area. and Stabilize Biotic Communities (Preferred Alternative): Under this alternative, Russian olive and saltcedar would be controlled mechanically using heavy equipment over the entire 103 acre burn area. Follow-up herbicide applications would be required to treat resprouts after initial mechanical treatment. Revegetation

would occur on 96 acres of pre-existing cottonwood forest according to site suitability guidelines to stabilize soils and to stabilize this biotic community. Revegetation would include the use of cottonwood pole plantings and understory plantings to develop native forest canopy layering lost as a result of the fire. Water management facilities would be developed to provide controlled water manipulation potential for the riparian wetland to control invasive species establishment.

-Positive Aspects

Invasive species would be controlled halting the spread of these species in the burn area. By controlling these species, combustible fuel loading would not occur limiting the potential for future catastrophic wildfire. This alternative would stabilize soils and the cottonwood forest and riparian wetland biotic communities to pre-fire conditions and function through revegetation and the development of water control for the riparian wetland. Revegetation with shrubs and trees will stabilize soils and reverse resource degradation resulting from the loss of cottonwood forest foliage structure important to avian species. This action will assure that the ecological integrity of the area is not lost.

-Negative Aspects

Costs to control exotic invasive species and to revegetate the burn area will be high. There will also be costs associated with water control developments for the riparian wetland. These efforts require the use of heavy equipment using fossil fuels and herbicide treatments as follow-up exotic species control. Therefore, temporary environmental degradation resulting from these treatments would occur.

IV. Environmental Considerations

A. Effects on Endangered Species: No endangered or threatened species are known to occur within the proposed rehabilitation area. The control of invasive species and subsequent revegetation will enhance habitat for threatened species including the bald eagle and peregrine falcon. The development of water control capability in the riparian wetland will provide robust new riparian growth potentially suitable for the endangered Southwestern willow flycatcher.

B. Effects on Cultural Resources: No sites within the floodplain are known to exist. Nevertheless, coordination with archeological resource specialists will occur.

C. Effects on Wilderness Areas: None.

D. Relationship of Rehabilitation Plan to Fire Management Plan: The Bosque del Apache NWR Fire Management Plan was updated in 1999 and is currently under review. In this plan, fuels reduction in riparian communities is encouraged to avert catastrophic wildfire. Combustible saltcedar and Russian olive fuels are considered undesirable due to potential detrimental effects within and adjacent to remaining cottonwood-black willow forest habitat as a result of catastrophic wildfire. Cottonwood-black willow habitat has steadily declined due to the invasion of saltcedar and Russian olive due to fire. The development of adequate firebreaks to aid in combating wildfire has progressed in some areas of the refuge. Additionally, some native

communities have been protected through the construction of firebreaks isolating them from adjacent exotic communities.

E. The proposed control of Russian olive and saltcedar invasion in this cottonwood forest community compliments a master plan and water management plan advocating the enhancement of native riparian habitats through the control of exotic species and reestablishment of native species. Water control developments outlined in this plan will provide controlled water level manipulation potential for the riparian wetland.

V. Summary of Anticipated Resource Needs and Costs

A. Description of Units: Under this rehabilitation plan, Russian olive and saltcedar invasion would be controlled over 103 acres of cottonwood forest and riparian wetland habitat (Figure 3). Control will consist of using heavy equipment to clear aerial burned debris, root plow, and root rake. Bulldozers pull large plows 18" below the ground surface, sheering root crowns from the remainder of the root mass. The root crown is the underground portion of the plant from which resprouts arise. These root crowns are then pulled from the ground using large rakes and then stacked for burning with front-end loaders equipped with brush rakes. The operation leaves an even surface for revegetation. The refuge has considerable experience in the control of saltcedar and cost estimates have been gathered from previous projects. The average estimated cost for these projects is about \$490/acre using leased equipment and the refuge labor base.

Equipment hours estimated for saltcedar control under the preferred alternative total 538 hours. Two avenues exist for accomplishing the project; by contracting the job to a private firm, or by leasing equipment and hiring temporary operators. Refuge staff would provide overall supervision during the funding period. Currently contract equipment and labor is \$212/hour for a D-7 dozer and \$98/hour for a loader. For 538 total hours the estimated contracted project cost would be \$100,383. Leased equipment is \$69/hour for a D-7 dozer and \$42/hour for a loader. The cost of equipment leasing (538 hours) and hiring 2 equipment operators for 3 months would be \$50,527. Both avenues incorporate fuel and equipment maintenance costs. Due to the less expensive costs for equipment leasing and temporary hires, these costs are used rather than contracting the job.

Preliminary site suitability data to stabilize biotic communities through revegetation shows one-third of the area capable of supporting cottonwood and black willow (*Salix nigra*) trees, one-third of the area capable of supporting salt tolerant shrubs such as seepwillow, wolfberry, and screwbean mesquite (*Prosopis pubescens*), and one-third of the area capable of supporting 4-winged saltbush (*Atriplex canescens*). Trees and salt tolerant shrubs are established using pole plantings or 1 gallon container stock, and 4-wing saltbush can be seeded for establishment. Plantings are made at a rate of 40/acre at a cost of \$8/planting. Plantings can be provided and established by the NRCS Plant Materials Center. Saltbush is seeded at a rate of 12 lbs/acre at a cost of \$5/lb. Seed is available from local distributors. The total cost for revegetating 96 acres is about \$22,400.

Water control will be required to control the invasion of Russian olive and saltcedar within the riparian wetland. Water control structures will be placed to divert water from a nearby irrigation

canal. Costs for 2 water control structures total \$4,000 including labor for installation.

Monitoring and evaluation of the rehabilitation project will also occur. Survival and growth estimates of planted vegetation will be evaluated. Passerine species of concern will also be monitored. Data generated will be disseminated in reports and publications.

B. Cost Per Unit:

1. Russian Olive and Saltcedar Control

Equipment Use and Maintenance

D- 7 Caterpillar with root plow (419hours@\$69/hour) - \$ 28,911

Loader with brush rake (120hours@\$42/hour) - \$ 5,040

Labor

(2, WG-8/1 Equip. Operators for 3 months). - \$ 16,576

Subtotal - \$ 50,527

2. Revegetation to Stabilize Biotic Communities

Tree re-establishment (32 acres @ 40 trees/acre x \$8/tree - \$ 10,240

Salt tolerant shrub re-establishment (32 acres @ 40 shrubs/acre x \$8/shrub) - \$ 10,240

4-wing saltbush seeding (32 acres @ 12lbs/acre x \$5/lb) - \$ 1,920

Subtotal - \$ 22,400

3. Water Control Development

Water control structures (2 structures @ \$2,000/structure) - \$ 4,000

Subtotal - \$ 4,000

D. Total Costs:

Russian Olive and Saltcedar Control - \$ 50,527

Revegetation to Stabilize Biotic Communities - \$ 22,400

Water Control Development - \$ 4,000

Subtotal - \$ 76,927

VI. Figures

Stored in project files.