# Guidelines for Aerial Spraying Saltcedar in New Mexico

Report for New Mexico Soil and Water Conservation Commission by the NM Technical Advisory Committee

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Prepared for the NM Technical Advisory Committee
And the
New Mexico Soil and Water Conservation Commission

May 2008

## Preface

This report addresses Task 3 Item 3 in the FY 2007-2008 Program Year for the New Mexico Technical Advisory Committee Grant funded by the New Mexico State Soil and Water Conservation Board and the New Mexico Department of Agriculture. The objective of Task 3 is to determine and recommend follow-up and maintenance practices based on the existing NM Non-native Phreatophyte Control Program. The charge in Task 3 Item 3 is to provide guidelines to assure that aerial spraying of saltcedar is done according to program specifications and to improve the probability of achieving an acceptable level of saltcedar mortality.

This report supplements our earlier report on Task 3, Item 1 and Task 3, Item 2. The Task 3, Item 1 Report provides a description of GIS and other map coverage information relevant to saltcedar management under the NM Non-native Phreatophyte Control Program. The Task 3, Item 2 Report provides an evaluation of aerial spraying conducted along the Pecos River in 2002, 2003, 2004 and 2006. This Report provides guideline specifications for aerial spraying saltcedar. Information includes herbicide application rate, appropriate spray carrier and adjuvants, appropriate spray volume, weather conditions, spraying equipment, aircraft speed, soil temperature, plant growth stage as related to carbohydrate translocation, foliage damage due to insects, hail, or disease, and off-target drift of spray. Further, this report explicitly details the specifications that should be mandatory for aerial spraying of saltcedar in the NM state-funded control project. Other guidelines are suggested to help assure that aerial spraying is done according to program specifications and in a manner to improve the probability of successful saltcedar control. The guidelines are based upon our experience, the existing knowledge base, the scientific literature, specimen label and manufacturer recommendations for imazapyr herbicide. Information obtained from other publicly funded projects in which herbicides are aerially applied for brush control is also considered.

# Guidelines for Successful Aerial Spraying for Saltcedar Control

Aerial spraying with a mixture of imazapyr can be a highly effective method for controlling moderate-to-dense infestations of saltcedar on large areas if the treatment is applied properly. For this relatively expensive herbicide treatment to be cost effective, it must be properly applied and result in a very high level of saltcedar canopy reduction and whole plant mortality. While most landowners can quickly discern poor workmanship by mechanical brush control contractors, most would not be aware of inadequacies in aerial spraying of saltcedar until the next growing season or about 1 year after the work was completed. Less than acceptable results can occur when saltcedar is aerially sprayed if proper attention is not focused upon the condition of the target plant, environmental conditions, and the technical aspects of preparation and application of the herbicide spray. There has been speculation that some commercial aerial applicators are not qualified or simply do not have the time to evaluate the conditions critical for determining the proper timing of application of aerial sprays for saltcedar control. Further, some have speculated that the high costs of imazapyr may create a temptation among some applicators to actually apply a lower rate than contracted. Our evaluation of aerial spraying accomplished thus far under the NM Non-native Phreatophyte Control Program suggests that neither of these concerns have occurred. However, diligent effort should be taken to assure that taxpayers' dollars are used wisely in any State-funded brush control program. For aerial spraying with a mixture of imazapyr to successfully achieve a high level of saltcedar canopy reduction and plant mortality, and to obtain full value for each dollar of public funds spent, the following criteria must be met:

- Imazapyr herbicide must be used and properly mixed with all other spray ingredients
- The herbicide must be applied at the correct rate
- The proper total volume of spray per acre must be applied with appropriate spraying equipment
- The spray mix must include the recommended spray carrier and adjuvants
- Applications must be made when weather conditions are conducive to maximize deposition of spray droplets onto the saltcedar leaves and absorption of herbicides into saltcedar leaves
- Environmental and saltcedar growth conditions at time of application must be appropriate to facilitate the translocation of a lethal dose of herbicide to the basal meristems and roots of the saltcedar plants.

The specifications for aerial application of herbicides for saltcedar control **that should be**

**mandated** in State-funded brush control projects are presented below, along with suggested guidelines to help assure that aerial spraying of saltcedar is done according to these specifications and to improve the probability of achieving an acceptable level of saltcedar mortality. The specifications are based upon our personal knowledge and experience, the scientific literature, and the recommendations of the manufacturer of imazapyr, BASF Corporation. http://www.corporate.basf.com.

The guidelines presented below to help assure that aerial spraying of saltcedar is done according to specifications follows the policies currently adhered to by other publicly funded programs in which herbicides are aerially applied for saltcedar control. These programs include: the Pecos River Ecosystem Restoration Project (contact: Texas Cooperative Extension, Fort Stockton, TX., phone 9151336-8585; http://pecosbasin.tamu.edu/); and the U.S. Department of Interior -Bureau of Land Management's brush control program in New Mexico (contact: Bureau of Land Management, Roswell Field Office, Roswell, NM, phone (505 627-0229).

## Specifications for the Proper Rate of Application, Spray Volume, and Spray Ingredients:

The spray mixture shall include 1.0 lb acid equivalent (a.e) imazapyr per acre. This is equivalent to 2 quarts per acre Arsenal ® or Habitat ® herbicide. Total spray volume applied should be 15 gal/acre by rotor wing aircraft or 7.5 gal/acre by fixed wing aircraft. A drift control additive or spray deposition aid such as Nalco-Trol® or StaPut® shall also be added to the spray mixture at the rate of 6 fl oz/gal to increase the mean spray droplet size, which: 1) maximizes deposition of spray on the target area; 2) maximizes the time the herbicide remains on the leaf in the liquid phase; and 3) minimizes the lateral displacement (drift) of fine spray droplets off the target area by air currents. The correct amounts of Arsenal® or Habitat®, surfactant, drift control additive, and water that shall be included for various batch sizes are shown in Table 1.

Table 1. Proper amounts of Arsenal® or Habitat®, surfactant, drift control agent and water for various batch sizes.

| Batch Size (gal) | Acres to be treated | Imazapyr (gal) | Drift Control (oz) | Water (gal) |
|---|---|---|---|---|
| 100 | 6.7 | 3.35 | 6 | 96.6 |
| 200 | 13.3 | 6.7 | 12 | 93.3 |
| 300 | 20 | 10.0 | 18 | 90 |
| 400 | 26 | 13.0 | 24 | 87 |
| 500 | 33.3 | 16.7 | 30 | 83.3 |
| 600 | 40 | 20.0 | 36 | 80 |

[1] Based upon a total spray volume of 15gal/acre, but slightly fewer acres would be actually sprayed if one swath is applied for "trim" at each end of areas where the parallel swaths began and ended. Nonionic surfactant should be added at 0.25% v/v.

## Specifications for Materials:

Commercial aerial applicators shall deliver to the loading site all herbicides, surfactant and deposition aid additives in original unopened containers (with the exception of the herbicides in the event the agency provides these materials).

Active Ingredient(s):
http://tncweeds.ucdavis.edu/products/handbook/17.Imazapyr.pdf

Imazapyr ((±)-2-[dihydro-4-methyl-4-(1-methyethyl)-5-oxo-1H-imidazol-2-yl]-3-pyridinecarboxylic acid)).
Arsenal® or Habitat® or Arsenal Powerline®
Several other trade names for generic products have recently become available and should also be considered as a cost saving measure.

## Specifications for Tank Mixing Imazapyr and Other Spray Ingredients:

Read the product labels and carefully follow all applicable directions during the tank-mixing process. Tank mixes shall be prepared according to the following procedure:

- Add half the needed water to the mixing tank
- Add the required amount of imazapyr (a water-soluble herbicide) to the mixing tank
- Add the remaining water, along with a drift control and deposition aid such as Nalco-Trol® or equivalent, needed to bring the mixture to the required volume.
- Maintain agitation in the spray tank during application.

## Specifications for Application of Aerial Sprays for Saltcedar Control:

***GENERAL AIRCRAFT SPECIFICATIONS:***

- Herbicide Mixture - 64 oz Arsenal® or Habitat® + 5 oz. nonionic surfactant + 2.4 oz. drift control agent per acre
- Application Volume - 15 gallons per acre
- Pilots of spray aircraft must be New Mexico Department of Agriculture-certified commercial aerial applicators
- Aircraft used shall be capable of applying herbicide in a precise and accurate

manner to the intended target species.

- Herbicides shall not be applied when relative humidity is less than 30%; however, some exception can be made to spray in lower humidity provided air temperature remains low (<75° F).
- Herbicides shall not be applied when air temperature is greater than 90° F
- Herbicides shall not be aerially applied when wind speed is greater than 10 mph; ideal wind speed should be 3 to 10 mph where the saltcedar foliage is very dense
- Aircraft shall be equipped with an operational Differentially Corrected Global Positioning System (DGPS) and appropriate flight data logging software. Equipment should be able to log and display the date and time of the entire flight from take-off to landing and differentiate between spray-on and spray-off areas. Specific requirements related to the DGPS needs to be continually updated to keep up with changing hardware and software support systems. Flight information software provided by the applicator must have the capability to interface with latest computer versions. The aerial applicator should provide all flight information to a representative of the agency administering the cost-share brush control project each day or after each designated area is treated.
- Chemical trucks with certified and calibrated meters (chemical) with proof of New Mexico certification (pictures to be included with bid packet on each vehicle)
- Insurance Limits of Liability - provide a copy of the following:
    - Aircraft Liability: Premises and Operations - combined liability coverage for bodily injury and property damage - $5,000,000.00
    - Aircraft Liability: Comprehensive Chemical Coverage - combined liability coverage for bodily injury and property damage - $1,000,000.00
    - Workers Compensation and Employers' Liability - $1,000,000.00
    - Automobile liability - $1,000,000.00
- Capability of producing spray reports and GPS (.shp files) maps
- Company must show proof of Quality Vegetation Management (QVM) certification.

***HELICOPTER OR ROTARY WING AIRCRAFT SPECIFICATIONS:***

All *helicopters* that are to be used for the spraying activities MUST be equipped with the following minimal equipment:

- Variable rate flow control meter directly linked into GPS unit to verify and compensate for ground speed
- Spray nozzles capable of 1000 micron droplets or larger
- Spray boom minimum width of 30 feet.
- GPS guidance system linked to spray unit to turn off upon avoidance zones
- Capability of remote refueling
- GPS- Capable of uploading ArcView files (.shp) for project boundaries

***FIXED WING AIRCRAFT SPECIFICATIONS:***

Presently, fixed wing aircraft are not specified for inclusion into the NM Non-native Phreatophyte Control Program. However, they have been widely used in other programs and they should be given future consideration for lower control cost. If used in the future then fixed wing aircraft should meet the following specifications:

- Maximum aircraft speed during herbicide application shall not exceed 120 mph.
- Aircraft shall be equipped with a boom and nozzles appropriate for delivering stable herbicide droplets. Droplet size with fixed wing aircraft should be in the range 250 and 400 microns in diameter uniformly.
- Round booms shall be positioned about 4 to 6 in. behind the trailing edge of the wing, and the ports should be directly to the rear of the boom in flight
- Airfoil or streamline booms shall be positioned 4 to 10 in. below and 4 to 6 in. to the rear of the trailing edge of the wings, and ports should be tapped along the trailing edge of these booms
- Nozzles shall be attached to a 90° street "L" that attaches to 2-in. nipples or shut-off valves. These attach to the ports on the boom to remove the nozzle from the area of air turbulence immediately behind the trailing edge of the boom.
- Nozzles shall be equipped with diaphragm check valves (e.g. Spraying Systems 4664,

Delavan 34560). Optional spray tips that fit Spraying Systems 34560 nozzle bodies include the Spraying Systems Multee Jet (dial), the Smith-Faire (dial) and the Delavan Raindrop. No. 46 or No. 56 core plates should be used in Spraying Systems 4664, Delavan 34560, and Raindrop nozzles (the No. 45 core plate is not recommended)

- Nozzles shall be oriented to the rear of the boom and generally downward 10" for aircraft that travel at high speeds (120 mph) to as much as 45" downward for aircraft that travel at slower speeds

- Eight-to 12-in. long rigid drop nozzles shall be used to avoid releasing herbicide sprays in areas of air turbulence such as prop wash and wing struts

- Usable boom length shall not exceed 3/4 of the wing span of the aircraft

- If the boom extends beyond the last functioning nozzle, a bleed line should connect the last outboard port on the boom to the last functioning nozzle to prevent fluctuation in system pressure caused by air trapped in the ends of the boom

- Swath width shall not exceed 1.25 times the width of the aircraft

- Flight height shall be 20 to 30 ft above the saltcedar canopies, low enough to achieve proper distribution of herbicide across the entire swath and uniform coverage of spray onto the saltcedar foliage

- Flight passes shall be perpendicular to the wind so that there is considerable overlap of the spray pattern from adjacent swaths (this lateral displacement is not considered to be "drift" of the herbicide droplets off the target area)

## Specifications on Soil Temperatures, Saltcedar Growth Stages, and other Environmental Conditions:

The efficacy of aerially applied herbicide sprays is a function of the physiological, morphological, and phenological stage of the target plants and the environmental conditions under which the plants are growing. If all these conditions are not optimum, aerial sprays will not usually produce sufficient levels of canopy reduction and whole plant mortality to meet management objectives in State-funded brush control projects. After a herbicide like imazapyr is absorbed by the leaves of susceptible plants, the chemical is then translocated to other parts of the plant in the phloem with photosynthates (carbohydrates) that are produced in the leaves via the process of photosynthesis. Plants like saltcedar, have the ability to resprout from dormant basal buds following treatments. It is critical that aerial portions of the plant remain undisturbed for at least 2 growing seasons after spraying. The ultimate success of an aerial spray application to saltcedar is directly related to achieving high levels of

absorption of the herbicide into the leaves and downward translocation of a sufficient amount of herbicide into the saltcedar bud zone to kill the dormant basal buds. Although we have learned that saltcedar can be effectively controlled with high-volume foliar sprays of imazapyr in late summer and into the early autumn (Duncan and McDaniel 1997) no research has been conducted specifically determine the optimum environmental conditions for applying aerial sprays of imazpyr for saltcedar control. However, research at New Mexico State University has identified several conditions necessary for effective control of saltcedar with aerial sprays of imazapyr:

- Aerial sprays shall be applied for saltcedar control only after the soil temperature at a depth of 12 to 18 inches exceeds 75 and is preferably 80°F or higher

- Aerial sprays shall be applied to tree canopies that have uniform green colored foliage.

- If the two conditions above have been met, in years when the trees produce many flowers and conditions are non-droughty, then the optimal period for aerial application of herbicide sprays for saltcedar control shall be in August and September [Note: In an exceptionally dry year when few flowers are produced, the optimum spray period should be mid-August to mid-September]

- Aerial sprays shall not be applied during any period when light green or yellow leaves are present in >25% of the tree canopies. This is because herbicide translocation is poor during this growth stage.

- Aerial sprays shall not be applied to saltcedar re-growth that appears after trees have been top killed by mowing, other mechanical treatments, herbicidal treatments, or fire. New growth must be at least 6-8 feet tall so that there will be sufficient leaf surface area to assure absorption and translocation of a lethal dose of herbicide into the old, established crown and root system

- Aerial sprays shall not be applied when more than 25% of the saltcedar leaves have been lost or damaged by freeze, insects, hail or disease

- Aerial sprays shall not be applied for about 1 week after significant rainfall events (2-3 in.) that have stimulated the growth new leaves in the upper saltcedar canopies

- Aerial sprays shall not be applied to saltcedar that is obviously drought stressed, as evidenced by the presence of sparse foliage, chlorotic (yellow) leaves, or necrosis of leaves (dead or dying tissue on the leaf margins).

## Anticipated Results

Root kill of saltcedar in large-plot aerial sprays experiments near the Pecos and Rio

Grande in New Mexico averaged 82% (range 65-97%) (unpublished data of Keith Duncan and Kirk McDaniel). It is not realistic to expect to kill all saltcedar plants growing on a target area with a single broadcast application of imazapyr. A substantial amount of variability in saltcedar root kill should be expected, not only among applications on different portions of a river system, but also among different dates within a year or between years. Saltcedar mortality may even vary among sites sprayed on the same day. Saltcedar growing within a particular area are rarely fully synchronized relative to growth stage. For example, individual saltcedar plants within the Pecos Basin have been observed to produce as many as four flower crops within a growing season whereas other nearby plants have produced none or only one or two flower crops. On a given day, soil temperatures can vary substantially. On sandy soils as well as shallow, coarse soils temperatures rise faster than deep, heavy clay soils. Clay soils remain cooler than shallow, coarse soils because they often support heavier canopies of saltcedar and more herbaceous vegetative cover which act to shade and insulate the soil from the full heating impact of sunlight. Significant summer rainfall events can result in a substantial drop in soil temperature thereby lowering the opportunity for successful saltcedar control with aerial spraying.

# Suggested Guidelines to Assure that Aerial Spraying of Saltcedar is according to Program Specifications

## Pre-certification of saltcedar growth stage, foliage conditions, and soil temperatures on target areas by agency representatives:

Procedures followed by Soil Water Conservation District personnel on the Lower Rio Grande and Pecos Watersheds to pre-certify saltcedar infestations for aerial spraying is commendable, most appropriate, and should be utilized in other State-funded brush control projects (see Appendix B and C). District personnel on the Lower Rio Grande and Pecos Basin Watershed were trained for conducting these surveys by brush control experts (Dr. Keith Duncan Extension Range Specialist, New Mexico Cooperative Extension).

A "Checklist to Determine Saltcedar Conditions for Effective Herbicide Control" was prepared for use by District personnel conducting these surveys, and this checklist has been routinely used by Soil Water Conservation District personnel. A copy of the checklist is included in Appendix A. Completed checklists become a permanent record in the contracts of participating landowners to verify the rationale for decisions on aerial spraying. New Soil Water Conservation District employees who will be involved in certification of saltcedar for aerial application of imazapyr in State-funded brush control projects should be trained each spring, and other employees should receive an annual "refresher" training course in evaluating the suitability of the saltcedar conditions and soil temperatures for aerial spraying. District employees who have used the checklist should critique this document and offer suggestions for improvement.

Administrators of State-funded brush control projects should consider developing a written policy for conducting pre-certification of saltcedar targeted for aerial spraying and for informing landowners and aerial applicators of the results of these surveys.

## Establish legal contracts with aerial applicators:

"Verbal" agreements between S&WCD personnel and aerial applicators may not effectively communicate the program specifications to participating landowners. Written procedures should clearly and concisely define all the necessary specifications for aerial spraying of saltcedar. For example, specifications in a representative contract that involves aerial spraying of saltcedar should include:

Treat saltcedar by aerial application with 1 lb of imazapyr in a high volume total spray solution (7.5 gallon per acre by fixed wing; 15 gallon per acre by rotor wing aircraft). All treatments must be applied following guidelines in the Chemical Weed and Brush Control Manual provided by the New Mexico Cooperative Extension Service.

The publication mentioned above, "Chemical Weed and Brush Control for New Mexico Rangelands" (New Mexico Cooperative Extension Service Bulletin Circular 597), was not designed to provide all the technical specifications for saltcedar treatment. On pages 12-13 of the publication the following brief recommendations for herbicide control of saltcedar is 1 lb (2 qts) imazapyr per acre; spray volume: 10-15 gallons per acre in-water total solution; Time to apply: August through September**.**

The agency administering State-funded saltcedar control projects, rather than the participating landowners, should establish legal contracts with aerial applicators to assure that public funds are used judiciously and that the work is done properly. The specifications for aerial spraying saltcedar, as provided in this report, should be included in the contracts so that commercial aerial applicators will clearly understand treatment specifications. All responsibilities of the agency and the applicator, as well as performance standards should be clearly delineated in contracts. A copy of the contracts currently used by the New Mexico Soil and Water Conservation Districts offices in Socorro and Carlsbad are given in Appendix B and C.

## Use agency representatives as inspectors (Aircraft Recorders) at herbicide mixing and loading areas:

A representative of the agency administering State-funded brush control projects should be at the airport or landing area at all times during mixing and loading of herbicide sprays. This person should be designated as the "Aircraft Recorder"(AR). An example of

specific duties of a AR is outlined in the "Aircraft Recorder Instruction Manual" and "Daily Aircraft Record Form 802" used by the Texas Boll Weevil Eradication Program. This document is available through the Texas State Soil and Water Conservation Board upon request. The AR should serve under the direct supervision of the S&WCD Project Supervisor and will perform a range of delegated assignments in accordance with written instructions and established procedures. The primary function of the AR is to observe and record all activities that occur at landing areas while aerial spray operations are in progress. The AR should maintain and provide an accurate Daily Aircraft Record and furnish the aerial applicator with a copy. The AR responsibilities include overseeing operations to assure the contractor and their employees abide by the contract. The AR will check aircraft spray systems to include:

- Checking nozzles, hoses, booms, and hopper for leaks
- Checking systems for compliance with contract specifications, such as nozzle size and type, shut-off valves, by-pass lines, etc.

The AR will also supervise loading of the aircraft, to include:

- Determining the amount of herbicide to load before takeoff
- Determining the amount of herbicide remaining in hopper upon landing
- Comparing amount of herbicide used with acreage treated to assure correct sprayer calibration
- Observing actual loading and metering of all spray ingredients (does not physically assist in handling or loading of fuel herbicide into the aircraft)
- Keeping inventory of herbicide and other spray ingredients (if the agency purchases and furnishes these items)
- Documenting that the meters used to measure water, diesel fuel, and herbicides have been checked by the NM Department of Agriculture for accuracy, and confirming the accuracy of meters by taking samples (measuring) of small volumes of each liquid into containers of known capacity
- Maintaining adequate supplies of herbicides and other spray ingredients by informing the Project Supervisor when reserves get low enough to warrant additional delivery (if the agency purchases and furnishes these items).

The AR will complete the Daily Aircraft Record form by:

- Recording all requested information

- Using forms to maintain herbicide usage records

- Documenting routine daily operations, including noting delays and reasons for delays, acres treated and gallons sprayed, and times of all pertinent events start and end of daily operations, aircraft takeoffs and landings, etc.)

- Documenting problems and unusual events that occur during spray operations, including accidents, safety violations or unsafe practices of the contractor or his personnel, herbicide spills or dumps, and leaks in either the aircraft spray system or bulk tank storage systems

- Documenting complaints, and recording visits and telephone calls from the public regarding project activities.

The AR will also maintain communications with the Project employee stationed at the spray target area to:

- Monitor weather conditions, including wind, temperature, and relative humidity conditions at the spray site, watching for approaching rain and storms, monitoring fog or haze at the spray site, watching for temperature inversions, etc.

- Track progression of the spray operation, including advising Project personnel at the spray site when the aircraft leaves and returns to landing site.

- Make changes on the Application Log, such as when a particular spray sites is missed an area is not sprayed adequately.

- Notify the Project Supervisor if a herbicide spill occurs.

## Use agency representatives as inspectors at field locations during aerial herbicide applications:

An employee of the agency administering State-funded brush control projects should be present at spray sites (within the target area) at all times during spraying operations to serve as Field Inspector (FI). The duties of the FI should be to:

- Assure that the herbicide treatment is being applied to the correct area and to the entire area designated to be treated, and to report problems to the pilot and Aircraft Recorder

- Assure that buffer zones adjacent to drainages, dwellings or susceptible plants and

areas designated to be left untreated for wildlife are not sprayed

- Record air temperature, relative humidity, and wind Speed/direction and report these data to the Aircraft Recorder and to the pilot

- Advise the pilot and Aircraft Recorder when spraying should cease because of excessive air temperature or wind speed or inadequate relative humidity

- Check for ground fog (signs of a temperature inversion) and report this to the pilot and Aircraft Recorder

- Observe the aircraft for abnormalities during the spraying operation, including functioning nozzles, leaks, etc. and report these to the pilot and Aircraft Recorder.

## Require constant communications capability between field inspectors and aircraft pilots:

Aerial applicators should be required to furnish 2-way radios so that the pilot can be in constant communication with the Field Inspector and Aircraft Recorder. This allows problems to be instantly communicated. An example includes the need to terminate spraying for weather problems.

## Agency should purchase the herbicides or require commercial aerial applicator to deliver herbicides to mixing and loading site in new containers that have not been opened:

Products to be used should be delivered to the site undamaged and in original, unopened containers with the manufacturer's name and brand designation and contents legibly indicated. The Aircraft Recorder should inspect all herbicide containers. The agency administering State-funded brush control projects should investigate purchasing herbicides directly from the manufacturer as a means to reduce control costs.

# Summary

For aerial spraying with imazapyr at 1.0 lb/acre to be successful in achieving a high level of saltcedar canopy reduction, whole plant mortality, and getting full value for each dollar of public funds spent, the spray must be:

- Properly mixed
- Applied at the correct rate
- Applied in the proper total volume of spray per acre
- Applied with the spray adjuvants recommended by the herbicide manufacturer
- Applied in the proper manner with appropriate spraying equipment
- Applied when weather conditions are conducive to maximize deposition of spray droplets onto the saltcedar leaves and absorption of the herbicide into saltcedar leaves

Specifications for achieving these critical elements that should be mandated in State-funded saltcedar control projects are presented in this report. Assurance that aerial spraying operations are conducted according to these specifications and in a manner to improve the probability of achieving an acceptable level of saltcedar mortality can be achieved if the agency responsible for State-funded brush control projects will:

- Certify that saltcedar growth stage and foliage conditions and soil temperatures are acceptable prior to spraying
- Adopt strict specifications for aerial spraying
- Establish legal contracts with aerial applicators
- Place inspectors at herbicide mixing and loading areas and at sites being sprayed to reduce control costs and for eliminating the chances for product alteration.
- Require constant communications capability between inspectors and aircraft pilots
- Purchase the herbicide or require commercial aerial applicators to deliver herbicides to the mixing and loading site in new containers that have not been opened.

# Appendix A

Checklist to Determine Saltcedar Condition for Effective Herbicide Control

River or location_____ Date_____

Land owner_____ GPS#_____

**SALTCEDAR CONDITIONS**

1. Current foliage volume as a percentage of "normal"_____% <75% "**RED FLAG"**

2. Foliage has been damaged, removed, or reduced by_____%
(Circle appropriate agents that have damaged, removed, or reduced foliage volume)

a. INSECT/ANIMAL DAMAGE. Symptoms include: leaflets removed, leaves tied together by webs, insect frass on soil surface, and larvae under loose debris.

b. HAIL DAMAGE. Symptoms include: leaves on soil surface, foliage "ragged".

c. DISEASE. Symptoms include: leaf chlorosis, orange dots on lower leaf surfaces, and leaf drop.

d. DROUGHT. Symptoms include: necrosis of leaf tips and margins, chlorotic leaves, pale green or yellow leaf color, or leaf drop.

e. FREEZE. Symptoms include: yellowing of leaf and dessication.

3. General foliage color. (Circle appropriate color)
   a. Dark green
   b. Yellow or pale-green **"RED FLAG"**
   c. Intermediate green (Between dark green and yellow)

4. Is there light yellow or pale green foliage in upper tree canopies and on twig tips? (Circle appropriate response.) YES NO YES = **"RED FLAG"**

5. Flower abundance if present. (Circle appropriate answer)
   a. High
   b. Moderate
   c. None or low **"RED FLAG"**

6. Environmental conditions
   Soil temperature at 18 inches _____F°
   Estimated rainfall within previous week_____inches
   Estimated rainfall within previous month_____inches

**"RED FLAG"= CONDITION FOR POOR SUSCEPTIBILITY TO BROADCAST SPRAYS**

7. Notes: Record observations such as the percentage of the trees that appear "normal" and likely susceptible to broadcast sprays, and where these trees occurred (at the river edge, valley bottom, in draws, on playas, in low-density or high-density saltcedar areas, etc.)

# Appendix B

**Example of contract specifications prepared by the Socorro Soil & Water Conservation District**

# Request for Proposal for Lower Rio Grande Saltcedar Control Project

July 9, 2007

## 1. Introduction

**Water problems:** The Rio Grande River originates in the San Juan Mountains of southern Colorado and follows a 1,885-mile course before it flows into the Gulf of Mexico. It is the major water supply for several irrigation organizations, as well as various communities. The water of the Rio Grande River supplies thousands of acres of agriculture, recreational opportunities, livestock water, wildlife habitat, and is home to several endangered or threatened wildlife species. Division of the Rio Grande River Water supply is governed under the Rio Grande River Compact of 1938 between the states of Colorado, New Mexico and Texas and the U.S. Supreme Court Decree of 1988 regarding that compact.

Due to the great variety of terrain and climatic conditions that occur along the river systems in New Mexico, water delivery can be erratic. This water supply has been affected by watershed changes over the past 50 years to the point that the rivers no longer produce enough water.

**Saltcedar:** Saltcedar (Tamarix species) was introduced in the early 1900's as a plant to stabilize the banks of stream channels. Saltcedar is a very opportunistic and aggressive plant that crowds out native plant species. It will use any water available and tolerates both drought and very wet conditions. This plant also exudes salt from its leaves that contaminates the soil and water; thereby creating bare ground conditions around the Saltcedar.

**Project Initiation**: The Supreme Court decree of 1988 sets conditions that New Mexico must meet compact obligations with delivery of water to Texas. The Soil and Water Conservation Districts, through the New Mexico Association of Conservation Districts have worked with the New Mexico State Legislature on opportunities to enhance flows in river systems and watersheds. Our Federal and State Agency partners are also receiving funding for treatment on their lands.

## Receipt of Proposal

Three copies of proposal shall be submitted to the Socorro Soil & Water Conservation District on or before 4:00 pm local time on August 8, 2007

## Preparation of Statements

- Respondents shall comply with all instructions and provide all information requested. Failure to do so may disqualify a statement.
- A letter of transmittal must accompany the statement identifying the submitting offeror.
- Statements shall be prepared in print or pen and ink.

- Statements may be bound.
- The person signing the statement shall initial any correction in ink.

## Statement Format

To facilitate review, it is mandatory that statements be presented in the following format. Failure to do so will result in disqualification

- An introduction.
- Description of the firm proposing to contract with the Socorro Soil & Water Conservation District. Please give details about your equipment:
  a. Helicopters by N numbers and how each one is equipped (Including Spray Equipment, GPS, etc.). Pictures of helicopters showing the N numbers to be detailed to this project must also be submitted.
  b. Support Trucks (Batch Trucks, Chemical Support Trucks, etc.). Please include pictures of trucks showing a close up of 406 compliance inspection stickers.
  c. Any Additional Equipment
  d. Please give details about your personnel:
     - Pilots Qualifications (Copy of Required Licenses or Certifications – FAA & Department of Agriculture)
     - GIS Specialist qualifications regarding similar project work
     - Support Crew
     - Additional Personnel and Support
- Please provide appropriate details of similar projects completed by your company in the past 3 years. May we contact your customers for references? If yes, please provide names and phone numbers. Please include any additional references.
- Describe how you plan to complete this project including a scope of work and detailed work plan. The scope of work should be based upon the general scope of work attached to this request. If you plan to subcontract, please provide all of the above information on each subcontractor.
- Describe your company's qualification using GIS and GPS systems including capability of shape file format data transfer and capability of uploading avoidance zones.
- A budget for the project, based upon cost per acre, not a total for the entire project, as the acreage is open with this RFP. Acreage will be finalized

upon contract. Please include a cost per acre including herbicide and a cost per acre without herbicide (i.e. our project provides the herbicide).

## Project Information

### Scope of Work

The Scope of Work must include the following specifications:

Aerial application of the herbicide 2 lb. Arsenal or Habitat (in aquatic situations) at the application volume of 15 gallons per acre using a helicopter only for Saltcedar and Russian Olive. This will be addressed in contract with a specific work item. Please submit a cost per acre. Other work involving a different herbicide or noxious weeds will be negotiated with contractor prior to start of contact with amendment added to this contract detailing that specific work.

Herbicide mixture per acre (i.e. herbicide + surfactant). Please submit a copy of the label and MSDS sheet of the surfactant.

Licenses and permits-Please provide a copy of the following:

FAA Part 137 Operating Certificate

Department of Agriculture Licenses

Insurance Limits of Liability:

Aircraft Liability: Premises and Operations-Combined liability for bodily injury and property damage - $5,000,000.

Aircraft Liability: Comprehensive Chemical Coverage-Combined Liability Coverage for bodily injury and property damage - $1,000,000.

Workers Compensation and Employers' Liability - $1,000,000.

Automobile Liability - $1,000,000.

Required Reports-Spray reports that meet the Department of Agriculture requirements and GPS-generated spray maps. Also, a flight log of the Flight must be given in one-second intervals in an ESRI .shp file. And both the .shp files and the spray reports must be given in both paper and electronic format on a CD, DVD or jump drive or submitted by email.

Treated area shape files that can be downloaded for use by the Socorro SWCD (WGS 84 and NAD 83 Zone 13).

Areas to be treated: Total amount of acreage has not been finalized. Treatment areas identified are as follows: Socorro County - the Rio Salado and its tributaries, Tularosa Watershed in Otero County, and Holloman Air Force Base. The total acreage is not finalized at this particular time. If you have a minimum acreage

that we must meet to make your bid feasible, please include this in your proposal.

Aerial application along the Rio Grande cannot begin until September 1 due to presence of 4 threatened and endangered bird species. The species of primary concern is the Southwestern Willow Flycatcher. Shape files of the nesting areas, habitat areas, and areas of concern that WILL BE considered avoidance areas, will be given to the entity that is awarded this contract. These shape files must be uploaded into the GPS unit on board the helicopter so that application of herbicide will automatically cease when these areas are reached. This data WILL NOT be released by the contractor to anyone without prior written approval from the Project Manager of the Lower Rio Grande Saltcedar Control Project (Nyleen H. Troxel Stowe) and the US Fish and Wildlife Service Ecological Services Office and Regional Office. There are no exceptions to this.

Ability to have GIS/GPS Specialist on site before project begins to go over treatment area data and avoidance area data regarding Southwestern Willow Flycatcher and also to have GIS/GPS Specialist on site during project to monitor treatment area data and avoidance area data. This Specialist will work closely with the Project Manager for the duration of this contract.

For the Holloman Air Force Base acreage, your company will have to submit paperwork to clear your aircraft for flight onto and over the air force base. Holloman Air Force Base will complete background checks on all personnel. All staff and equipment will have to be present one day before treatment to clear access to base. No treatment will be done on that day. All regulations required by Holloman Air Force Base must be followed to the strictest level.

## Funding

The Lower Rio Grande Saltcedar Control Project has $25,000 encumbered at this point in time for the work on Rio Salado, $65,000 for the Chico/Torreon Arroyo (Rio Puerco area), $60,000 for the Tularosa area, and $109,600 for Holloman Air Force Base. Socorro SWCD continues to pursue other funding to complete more acreage at this point in time. If further funds become available before the start of the contract, the contract will be amended to reflect this. Acreage could also decrease due to the threat of fire-newly burned areas will be taken out of the identified treatment areas.

## Sequence of events

- A Request for Statement of Proposal may be requested July 9, 2007 through August 8, 2007. A list of those requesting packages will be maintained in the Socorro Soil & Water Conservation District office.
- Questions on the RFP may be submitted between July 8, 2007 and August 8, 2007.
- Answers to substantial questions will be provided to all entities that requested and received RFP packages by the Socorro Soil & Water Conservation District.
- Sealed Statements of Proposal shall be submitted to the Socorro Soil & Water Conservation District before 4:00 pm August 8, 2007.
- Sealed Statements of Proposal shall be opened and evaluated on August 14, 2007.
- Applicants may be short listed for interview purposes with the Socorro Soil & Water Conservation District.
- Successful Applicant will be notified by August 15, 2007.

## Taxes

Fees for contractual services performed under this proposal shall include gross receipts taxes and are the responsibility of the entity that is awarded this contract.

## Contact Person

Nyleen Troxel Stowe
Socorro Soil & Water Conservation District-
Director of Special Projects
Lower Rio Grande Saltcedar Control Project-
Project Manager
103 Neel Ave.
Socorro, NM 87801
(505) 838-0078
(505) 838-0978 (fax)
**sswcd@sdc.org**
**www.socorroswcd.com - website contains project plan and other information**

## Proposal Evaluation Criteria

Evaluation will be based on the following criteria:

1. Prior Experience – Maximum 70 points

    a. Number of years saltcedar experience – 10 points per year with a maximum of 3 years.
    b. Drainage ditch, River system, or Irrigation system Projects – 10 points total.

c. Experience with automatic shut-off in avoidance areas and non-treatment areas and flow control systems-30 points.

2. Equipment – Maximum 50 points

    a. Helicopters – 20 points per helicopter with a maximum of 40 points if equipped as follows:
        1. GPS capable of providing guidance in a curve, data transfer in a .shp file format and capable of uploading avoidance zones.
        2. Variable Rate Flow Control linked to GPS.
        3. Precision Boom and Nozzles divided into three sections for variable swath width.
    b. Batch Trucks – 5 points per truck with a maximum of 10 points
        1. All DOT spec. 406 certified
        2. All have ability to batch and triple rinse on site.

3. GIS Specialist Qualifications – 20 points maximum
    a. Experience with uploading boundary files into GPS.
    b. Ability to transfer data from one coordinate system into another.
    c. Ability to program automatic shutoff and avoidance zones into GPS.
    d. Previous experience with work conducted in and/or near threatened and endangered species habitat.

4. Plans for Completion of Project – Maximum 30 points
    a. Excellent – 30 points
    b. Good – 20 points
    c. Fair – 10 points

5. Time required to have all equipment on project – Maximum 10 points
    a. 1 week – 10 points
    b. 2 weeks – 5 points
    c. 3 weeks – 1 point

6. Price – Maximum 10 points
    a. Low bid – 10 points
    b. 2nd - 5 points
    c. 3rd – 2 points

7. BASF Quality Vegetation Management Certification – Maximum 10 points
    a. If certified, please submit documentation. This will be verified with BASF. – 10 points

8. Deduction of Points
    a. Use of subcontractor – Minus 50 points
    b. Over 3 weeks before start date – Minus 20 points
    c. No experience on Saltcedar – Minus 60 points

## Evaluation and Awards

The Socorro Soil & Water Conservation District will assign a statement review team.

The Socorro Soil & Water Conservation District in accordance with the proposed Evaluation Criteria will review all statements.

Ratings for each of the Evaluation Criteria are listed above with each item. Only those with a score of 150 or greater will be eligible for further evaluation and the short list for interviews.

The Socorro Soil & Water Conservation District reserves the right to accept all or a portion of an offeror's proposal, to reject any or all proposals received as a result of this request and may negotiate in any manner necessary to serve the best interests of the State of New Mexico. The Socorro Soil & Water Conservation District reserves the right to make an award without further discussion or negotiation of proposals.

## Contracts

Final scope of work, budget and schedule of work will be negotiated with the Socorro Soil & Water Conservation District and the successful applicant prior to finalizing the contract. This contract will be valid for one year from date of last signature.

Project Manager for the Socorro Soil & Water Conservation District will require a demonstration of GPS/GIS technology and automatic shut-off on board helicopter(s) with regard to avoidance zones prior to start of treatment. This is necessary due to agreement with Federal Agencies and the Federal acreage that treatment will occur on this year. If system does not meet necessary requirement of automatic shut-off in avoidance zones, contract will be terminated prior to start of project.

# Appendix C

## Pecos River Non-Native Phreatophyte Management Program

### Sealed Request for Proposal (RFP): STATE 05-2006-02

### Aerial Treatment for non-native phreatophytes

**This Request for Proposal pursuant to Section 13-1-111 thru 13-1-119 NMSA 1978 of the Procurement Code is for restoration work in areas where Phreatophyte treatment has been accomplished. Bribes and kickbacks as pursuant to Section 13-1-191 NMSA 1978 of the Procurement Code are not allowed, and if offered, will automatically deem the proposal as invalid.**

**The Pecos River Non-Native Phreatophyte Management Program reserves the right to delete or remove items necessary to comply with the budget set for this project.**

**The Pecos River Non-Native Phreatophyte Management Program reserves the right to reject any and all proposals.**

## All proposals must be submitted no later than

## August 9, 2006, 3 p.m. MST

## Proposals will be awarded

## August 10, 2006
## Offeror need not be present.
**E-mailed or faxed proposals are not accepted.**

## Send proposals to:

## Carlsbad Soil and Water Conservation District

# 3219 S. Canal
# Carlsbad, NM 88220

**The following documents contain the necessary details for bidding on the Pecos River Non-Native Phreatophyte Management Project. The project will consist of 1,000 acres of saltcedar to be treated by helicopter. The project will be located along the Pecos River and tributaries. Remote capabilities will be required. Descriptions of the priority areas are provided in Section F.**

**Please provide documentation as requested and any other items necessary for the bid. Sections A-G of this document provide the requirements of this project and your company. This document MUST BE SIGNED AND DATED by the company president or designee at the end of Section I.**

**Please base bids on an estimated acreage of 1,000 acres total project area to be treated and place the per acre amount in the blank on Section I. Place bid documents into an envelope and seal. The bids will be opened on August 10, 2006 and applicants need not be present.**

**If there are any questions pertaining to this bid, feel free to contact the Carlsbad Soil and Water Conservation District office at (505) 628-1532 and ask for the project manager, Aaron Curbello, or assistant project manager, Judy Bock.**

All bids must be completed, sealed, and received at the address below by or on the day of August 9, 2006 no later than 3:00 p.m. Postmarked dates on bid envelope will not be accepted. Faxed or e-mailed versions of the bid will not be accepted.

**RETURN ALL BIDS TO:**

Carlsbad Soil and Water Conservation District

**Attn: Project Manager**

**3219 South Canal Street (Pecos Highway)**
**Carlsbad, NM 88220**

## BID PACKAGE CONTENTS

****SIGNATURE AND DATE REQUIRED ON SECTION I****

## Request for Proposal

Please provide the appropriate details about your company.

1. Please give details about your equipment:
    a. Helicopters by N numbers and how each one is equipped (Including Spray Equipment, GPS, etc.)
    b. Support Trucks (Batch Trucks, Chemical Support Trucks, etc.)
    c. Any Additional Equipment
2. Please give details about your personnel:
    a. Pilots (Copy of Licenses- FAA & New Mexico Department of Agriculture)
    b. Support Crew
3. Please provide appropriate details of similar projects completed by your company in the past three (3) years. May we contact your customers for references? If yes, please provide names and phone numbers. Please include any additional references.
4. After bid is awarded how long before you could start the project?
5. Please describe how you plan to complete the project? If a subcontract is used, please provide the above information on each subcontractor.
6. Please provide a breakout of the cost per acre for this project (be sure to include NM Gross Receipts Tax)**.**
7. Is your company Quality Vegetation Management (QVM) certified? If so, list projects treated through the QVM program.

## Specifications

1. Aircraft - Helicopter Only

2. Licenses and Permits - Please provide a copy of the following:

a. FAA Part 137 Operating Certificates

b. New Mexico Department of Agriculture Licenses

3. Herbicide Mixture - 64 oz Arsenal or Habitat + 5 oz. nonionic surfactant + 2.4 oz. drift control agent per acre

4. Application Volume - 15 gallons per acre

5. Variable flow control meter directly linked into GPS unit to verify and compensate for ground speed

6. Spray nozzles capable of 1000 micron application or larger

7. Spray boom minimum width of 30 feet with variability

8. GPS guidance system linked to spray unit to turn off upon avoidance zones

9. Capability of remote refueling

10. Chemical trucks with certified and calibrated meters (chemical) with proof of DOT Spec. 406 certification (pictures to be included with bid packet of 406 plate on each vehicle)

11. Insurance Limits of Liability - Please provide a copy of the following:
    a. Aircraft Liability: Premises and Operations - combined liability coverage for bodily injury and property damage - $5,000,000.00
    b. Aircraft Liability: Comprehensive Chemical Coverage - combined liability coverage for bodily injury and property damage - $1,000,000.00
    c. Workers Compensation and Employers'Liability - $1,000,000.00
    d. Automobile liability - $1,000,000.00

12. Capability of producing spray reports and GPS (.shp files) maps

13. Company must show proof of Quality Vegetation Management (QVM) certification.

## Evaluation

If the offeror feels that there is alternative equipment that may perform a better job or is more efficient than those listed, it is important that this equipment be listed in the requested attachment as noted under Specifications, Item 6. The equipment identified

will be evaluated the same as the listed equipment. If equipment for removal of the phreatophytes is not listed and specified by the offeror, it will not be considered for use in the job. Read each section carefully. When answering the information requested, please do so on separate sheets of paper. Only Section I of this proposal needs to be sent back to the office. The other pages are for reference and guidance to the RFP only and do not need to be submitted. Any of the requested information not submitted will result in the proposal becoming void and the proposal will not be accepted.

**Proposals will be evaluated based off the following information:**

1) The RFP Section I "Proposal Summary/Signature" will be submitted as a cover page for the submitted offer. Failure to submit this as the cover page will void the proposal.

2) Request for Proposal attachments as specified

3) Equipment specifications and/or alternative equipment specified

4) Price per acre

5) QVM certification

6) Ability to complete work within the specified timeframe

The requested work will be time sensitive. Work for this proposal will be completed within a one month time period (excepting weather conditions) and final spray reports and spray files (.shp format) within a two week time period. Failure of meeting the deadline(s) as negotiated and agreed upon will result in renegotiation of contract.

# SECTION A- Contractual Agreement

The Carlsbad Soil and Water Conservation District as lead sponsor for the Pecos River Non-Native Phreatophyte Management Program, along with _____(contractor) entered into agreement on _____ day of _____, 200_ to carry out aerial treatment of non-native phreatophytes on lands within the project boundaries of the Pecos River Non-Native Phreatophyte Management Program. Both parties agree upon obligations set forth in this contractual agreement and it is further stated that both the project manager and contractor's superintendent will review any addenda to this contract prior to beginning work. The contractor and its constituents shall hold harmless the Program and District for liabilities incurred within the project. Work for this contract is time sensitive and will commence on _____(Date)_____ and end on _____(Date)_____. Final spray reports and spray files (.shp format) will be given to the project management within two weeks on_____(Date)_____. As this contract is carried out, work will only be done as specified by project manager and/or designee. Work on the project will stop when weather prohibits forward progress and or work on project is completed.

_____ _____

Representative for CSWCD President of Contractor Company

State of New Mexico

County of _____
Subscribed and sworn to (or affirmed)before me this_____dayof_____
200__by_____ representing CSWCD and_____ for contracting agency.

_____

Notary Public

My commission expires_____

## SECTION B - Summary/Timeframe

SUMMARY

The project sites are located within the boundaries of the Carlsbad, Central Valley, and Peñasco Soil and Water Conservation Districts. A portion of the project will be conducted on Federal lands. All Federal laws pertaining to chemical application will be adhered to. Pre-job conferences will be scheduled to go over maps, acreage to be treated, set up or staging sites, and overall project. All personnel working within the project must attend the conference.

TIMEFRAME

Work for the project is time sensitive. A specified time for beginning and completion of the project will be discussed in a pre-job conference with awarded contractor. The time frame in which work will be completed will be one (1) month in duration after work for the contract is started. After treatment has ended there will be a two (2) week timeframe for all spray reports, and final project maps and files to be given to project management. If weather prohibits the completion, a scheduled meeting with contractor and project manager will occur to discuss alternative deadlines. If the contractor fails to meet the deadline as agreed upon in the pre-job conference (excepting weather conditions), the project will be reduced by 1% of the awarded bid in price each day for the first five (5) days after the deadline. If the project is not completed more than five (5) consecutive days (excepting weather conditions) from the specified date of completion, the project manager and contractor will meet to renegotiate an adjusted price of the contract and overall project.

## SECTION C - Work Conditions/Limitations

GENERAL REQUIREMENTS

Labor - Project labor for the aerial application of this project will be provided through contractor's company. Project ground support and technical staff will be assisting on the ground with contractor's staff, ensuring public safety, questions about land ownership, and documenting project's progress. This will be discussed in a pre-job briefing prior to any spraying activities.

Location - All work will be accomplished using specified boundaries, predetermined on maps by project manager. Areas to be treated will be designated on project maps and will be strictly adhered to.

PROJECT CONDITIONS

A. General conditions - During the spraying, technical and project ground support will be checking wind speed, temperature, relative humidity, and any other conditions that are major stipulations of work done in this nature. This will be documented in logbooks to insure quality assurance.
B. Documentation - Logbooks will be used by the project ground support and technical support noting conditions, recommendations, and any other specifics given throughout the project. This will assist in quality assurance of the project.
C. Access to work - All work that requires ground accessibility will be done in a manner as to keep disturbance of the natural vegetation at a minimum. Access points into specific areas for chemical trucks, refueling trucks and crewmembers must be discussed with the project manager or his designee and have landowner approval before commencing.

ENVIRONMENTAL CONDITIONS

All ground activities done by the contractor's company will be done in a manner with minimal disturbance of the natural vegetation and will be restricted to existing roads and sites unless approved by the landowner. These will be discussed in a pre-job conference.

WORK

A. Notification to New Mexico Department of Agriculture (NMDA) Pesticide Division (Division Director or designee) shall be done each day spraying activities are started. Failure of the contractor to contact NMDA will result in work being stopped and a direct discussion with NMDA, contractor, and project support.
B. All herbicide application will be completed under the project's technical support's recommendations regarding the following:
    1. Weather conditions
    2. Environmental conditions
    3. Handling and mixing herbicides
    4. Other conditions deemed necessary by technical support

    These conditions will be discussed regularly between pilots, crewmembers, and technical support.
C. Hours - All federal and New Mexico labor laws will be followed. Holidays and weekends may be worked following project manager's approval.

LIMITATIONS

A. The project limitation will be set at the acreage determined in the signed contractual agreement.
B. If weather or environmental conditions limit spraying, untreated acreage will be rescheduled.
C. If conditions permit, resumption of spraying will be allowed with approval obtained from project manager and sponsors.

# SECTION D - Materials and Equipment

GENERAL

All helicopters that are to be used for the spraying activities MUST be equipped with the following minimal equipment:

1. Licenses and Permits - FAA Part 137 Operating Certificates and NMDA Licenses
2. Variable flow control meter directly linked into GPS unit to verify and compensate for ground speed
3. Spray nozzles capable of 1000 micron application or larger
4. Spray boom minimum width of 30 feet with variability
5. GPS guidance system linked to spray unit to turn off upon avoidance zones
6. Capability of remote refueling
7. GPS- Capable of uploading ArcView 3.0 files (.shp) for project boundaries

If aircraft is flying the project without appurtenant equipment listed, the project will be stopped and the contractor shall reimburse the project for all acreage flown without the equipment listed.

MATERIALS

A. Herbicide - To be furnished and stored by contractor in accordance with EPA guidelines. This includes herbicide, surfactant, and drift agent.
B. Mixing Sites - All mixing sites will be discussed prior to commencement of spraying.
C. Mixtures - Herbicide mixtures have been pre-determined by technical support before bidding of contract. Any deviation will have prior approval of the technical support staff and may result in contract renegotiations. (see Specifications Item 3)

EQUIPMENT

A. The contractor will provide all equipment. Any deviation of this will be discussed with project manager prior to activity. Failure to comply with this statement will result in all work being stopped until both parties agree upon a renegotiation of contract.
B. Equipment Storage - Equipment storage will be the responsibility of the contractor and will be in accordance with EPA regulations.
C. All equipment will meet or exceed the specifications included in the bid request.

## SECTION E – Reports and Conferences

A. Pre-job conference - A pre-job conference will be held prior to the commencement of work to discuss herbicide applications. Those expected in the conference will be the contractor, project manager, and all ground support. The date and time of the conference will be determined at the awarding of the contract.
B. Spray maps - All ground support, pilots, and crew members of the helicopter company shall have in hand a copy of maps generated by the project manager. These maps will indicate the areas where spraying is to take place. A master copy of the map with boundaries and land status will be at the site with ground support while spraying is done. The project manager will retrieve these maps at the end of the project and use them as archived documentation.
C. Notification - Notification of spraying activities to NMDA shall be done every day prior to spraying. This is to be done by the Helicopter Company.
D. Progress reporting- All reporting of work progress will be in paper copy and will include GIS/GPS generated maps showing areas of completion. Project manager will review reports.
E. Final reports - Final documentation of work completed will show weather conditions, maps, spray reports, and details of problems or concerns.
F. Post-job conference- Upon completion of work, there will be a post-job conference with contractor, ground support, and project manager, to discuss all items of the project. Project maps and notebooks used as documentation for the project will be returned to the project manager at this time. A signed post-job conference sheet will be done with questions/comments about project success.

## SECTION F - Maps/Priority Area Descriptions/ Project Boundaries

MAPS

A. The aerial spraying will be conducted using GIS mapping, loaded into aircraft's GPS, and will be pre-determined before work commences. All files will be reviewed prior to work and any discrepancies will be discussed with project manager and company's ground leader. If, for any reason, work is conducted outside specified area without permission, work will stop and consultation along with signed documentation will be done with project management and company designee before work resumes.
B. Any of the sprayed or treated areas will be loaded on GIS files. Physical maps will be given to all ground crews, project management, technical support, and pilots. The maps will be discussed each morning or day work starts (morning meetings, etc.). Maps of this nature are necessary and critical to the project. Work will not be done until maps are in hand of everyone that is operating as ground support.

PRIORITY AREA DESCRIPTIONS

Priority Area – Northern Eddy County

Approximately 1000 acres north of Brantley Reservoir and south of Artesia. Landscape of the area to be treated is a monotypic stand of saltcedar with kochia adjacent to the saltcedar canopy. Alkali saccaton and a few other forbs may be present in pocketed areas. (For exact locations, contact the Carlsbad SWCD office)

PROJECT BOUNDARIES

A. Project boundaries will be determined by GIS shapefiles. These files will be preloaded onto aircraft prior to any aerial applications.
B. Predetermined locations shall dictate where work is to be accomplished. Additional acreage or land to be treated will NOT be loaded onto the aircraft during fly time in the field. Furthermore, any additional acreage will not be loaded into helicopters without prior discussion and approval of project manager and contractor.

## SECTION G - Basis of Payment

Payment will be based on a per-acre sprayed cost and will be made after a performance certification and receipt of invoices by the project manager.

## SECTION H- Insurance/Liability/Certification

LIABILITY

All insurance liability of work will be the responsibility of the contractor. At no time will the project be liable for workers injured or equipment damaged during this project. Basic coverage of contractor's liability should include:

1. Workers Compensation
2. Insurance of equipment
3. Liability for property damage
4. $1,000,000.00 in liability coverage

CERTIFICATION

Assurance of work performed on the project will be guided as follows:

1. Copy of certification stating the company has successfully completed the Quality Vegetation Management (QVM) training.
2. Listing of all employees that were certified.

## SECTION I- Proposal Summary/Signature

Please attach a proposed budget for this scope of work based on the information listed in sections Request for Proposal and Specifications and also sign and date this page indicating acknowledgement of this proposal, and its contents. This price reflects the attached budget information.

**PRICE PER ACRE :_____**

**Please sign and date below:**

**I certify that I have the authority for allowing this proposal to be submitted.**

**Signed:_____ Date:_____**

**Print:**

**Name:_____**

**Company:_____**

**Address:_____**

**Phone:_____**