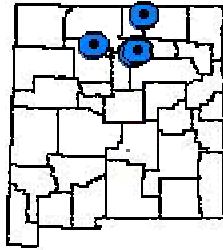


STATUS REPORT

FOR

Arizona Willow
(*Salix arizonica*; Salicaceae)



Submitted to
U.S. Fish and Wildlife Service
Region 2
Albuquerque Field Office

Prepared by
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NMNHP Report : 02 – GTR-224

for:

NM Forestry and Resources Conservation Division
P.O. Box 1948
Santa Fe, New Mexico 87504

September 2002

Status Report Summary Sheet

Taxon Name	<i>Salix arizonica</i> Dorn
Family	Salicaceae
Popular Name	Arizona Willow
Range of Occurrence	Eastern Arizona, Northern New Mexico (Mora, Rio Arriba, and Taos Counties), southern Utah, and southern Colorado.
Habitat Ownership	New Mexico: Forest Service (Carson and Santa Fe National Forests), and potentially on Private (e.g. Tierra Amarilla Land Grant).
Current Federal Status	Species of Concern
Lead Region	U.S. Fish & Wildlife Service, Region 2, Albuquerque Field Office
Current State Status	Species of Concern
Trend	This species is threatened by livestock and elk consumption and use of its habitat. It appears to be heavily impacted by such and decreasing throughout its range in New Mexico. Overuse of habitat for this species has degraded occupied and potential sites for this willow.
Knowledgeable Individuals	Robert Dorn Mountain West Environmental Services PO Box 1471 Cheyenne, WY 82003
	Duane Atwood 388 MLBM Provo, UT 84602
	George Argus R.R.3-310 Haskins Rd. Merrickville, Ontario Canada K0G 1N0
	Joyce Maschinski The Arboretum at Flagstaff P.O. Box 670 Flagstaff, AZ 86002
Report Author	Phil Tonne
Report Date	September 2002

Species Information

Nomenclature and Systematics

A. Taxon	<i>Salix arizonica</i> Dorn
B. Popular Names	Arizona Willow
C. Synonyms	None
D. Family	Salicaceae
E. Original Publication	Canadian Journal of Botany 53: 1499-1501. 1975. {Canad. J. Bot. ; BPH 296.13}

F. Illustration This species is characterized by subtle morphological characters. For this reason, a full page illustration and photographs have been included on pages 3 – 7 of this report.

G. Taxon History A previously undescribed high altitude riparian species of willow was noted as distinct in 1969 by Granfelt (Phillips et. al. 1982). This species was described by Dorn in 1975. Thought to be endemic to Arizona until a specimen, collected in Utah in 1913 (Sevier National Forest), was identified in the Rocky Mountain Herbarium by R. Dorn. *Salix arizonica* has since been found in three counties in Utah: Garfield, Sevier, and Iron. Robert Dorn, Duane Atwood, and Roger Mongold documented occurrences in New Mexico in the 1990s.

PRESENT LEGAL STATUS

A. Federal	Species of Concern
B. State	Species of Concern
C. Other	Forest Service Sensitive New Mexico Natural Heritage Program: G2 S1



Photo 1. Photograph taken in cattle and elk enclosure erected in 1958 (site D7-7 in appendix 1), showing plant habit and habitat protection. *Salix arizonica*, (bright green; second row of shrubs), growing with shrubby cinquefoil (*Dasiphora floribunda*; foreground), and diamondleaf willow (*Salix planifolia*; pale green; third row of shrubs). Enclosure fence is ca. three meters tall.



Photo 2. Arizona willow (*Salix arizonica*) branch with pistillate catkins (female flower spikes). 18 June 2001 in 1958 enclosure.



Photo 3. Arizona willow (*Salix arizonica*) with staminate catkins (male flower spikes). 18 June 2001, in 1958 exclosure.



Photo 4. Arizona willow habitat along Sawmill Creek (Wheeler Peak Wilderness; site D7-12 in appendix 1). Area released from grazing for three years (George Long, Questa RD, pers. comm.). 23 June 2001.

DESCRIPTION

A. Non-technical

Shrubs to 3 m tall (plants may be only a few centimeters tall when stunted from grazing); **stem** branches red- to yellow brown, becoming hair-free in their second year (except at the nodes, where the leaves originate, there may be soft hairs) ; current-year twigs greenish and hairy; **leaves** alternate on stem, simple (of one piece, not divided into lobes), with stipules that fall off; 1.0 – 4.5 cm long, 0.5 –2.2 cm. wide, elliptic (when mature), 1.6 – 3.6 times as long as wide, the lower surface green, without hairs or with soft hairs (not glaucous; waxy blue); the upper leaf surface shiny green without hairs or with a few soft hairs, the leaf base heart-shaped or rounded, leaf margins with serrations averaging 16 teeth per centimeter. Small glands on tips of teeth. Glands may fall off in late summer. Glands toward leaf base tend to be more conspicuous and persistent. Glands may extend onto the leaf stalk (petiole); Flower cluster (**inflorescence**) with brown, black, or bicolor bracts 1-2.5 mm long, with wavy hairs and sharply pointed tips. Staminate flowers in densely flowered catkins (short spikes of unisexual flowers) 5-15 mm long. Pistillate flowers in densely flowered catkins 11-40 mm long.

B. Technical (From Argus 1995)

SHRUBS to 2.6 (3) m. tall. Stems: branches red- to yellow-brown, becoming glabrous but remaining pilose at the nodes; branchlets yellow-green, red-brown, or brownish, villous to pilose. LEAVES: petioles villous or pubescent becoming glabrous, 3-7.5 mm long; proximal leaves on vegetative branchlets or flowering branchlets gland-dotted or serrulate; young leaves glabrous or pilose; mature blade elliptic to broadly elliptic, 20-50 mm long, 10-31 mm wide, 1.6-3.6 times as long as wide, the lower surface non-glabrous, glabrous or pilose, the upper surface shiny, glabrous or pilose, the base cordate to rounded, the margins flat, glandular-dotted to serrulate, with 7-21 teeth or glands per cm, the apex acute, abruptly short acuminate to obtuse. INFLORESCENCES: coetaneous; floral bracts brown, black, or bicolored, 1-2 mm long with wavy hairs, the apices acute to obtuse. STAMINATE FLOWERS in densely flowered catkins 5-15 mm long; flowering branchlets 1-4 mm long; filaments glabrous; nectary 1, slender or broad, 0.4-0.8 mm long. PISTILLATE FLOWERS in densely flowered catkins 11-40 mm long; flowering branchlets 2-10 mm long; ovaries glabrous; stigmas 0.14-0.36 mm long; styles 0.5-1.2 mm long; stipes 0.2-1 mm long; nectary slender or broad, 0.5-1 mm long, equal to or exceeding stipe length.

C. Identifying Characters

	<i>Salix arizonica</i>	<i>Salix boothii</i>
Leaf Blade Base	usually round or cordate	acute to rounded
Leaf Margin Teeth	7-21 (avg. 16) per cm.	2-19 (avg. 7) per cm.
Staminate Catkin	5-15 mm long	20-25 mm long
Pistillate Floral Bract Apex	acute to obtuse	rounded
Adaxial Floral Nectary – Pistillate Catkin	slender, as long as stipe	broad, shorter than stipe

SIGNIFICANCE OF TAXON

A. Natural

This plant is a useful indicator of watershed and wetland health and management.

B. Human

There is no human use that I am aware of, except as forage for livestock.

GEOGRAPHIC DISTRIBUTION

- A. Range** This taxon is known from the White Mountains of Arizona, as well as northern New Mexico, and southern Utah (Figure 2).
- B. Type Locality** White Mountains, of eastern Arizona.
- C. Known Locations** The distribution map from Maschinski (2001) is included on the next page. Detailed location descriptions of New Mexico populations are given in Appendix 1.
- D. Potential Sites** There is potential habitat on private and public land throughout its range at high elevation.
- E. Ambiguous Locations** Some of the locations reported for the San Pedro Parks Wilderness and Pecos Wilderness contain plants fitting the *Salix boothii* description better than the *Salix arizonica* parameters. There may be hybridization taking place, and identification of vegetative individuals is difficult.

HABITAT DESCRIPTION

A. Physical Habitat

- a. Physiographic Province** Southern Rocky Mountains (Dick-Peddie, 1993)
- b. Annual Precipitation** Red River – 20.52 in., Regina – 15.82 in, Eagle Nest – 14.91 in, Pecos Ranger Station – 16.10 in. There are no weather stations that I know of at high elevation, where Arizona willow occurs in New Mexico. The average annual precipitation is likely to be near the higher of these climate centers, ca. 20 in. (WRCC, 2002).
- c. Elevation** 9,560 – 11,680 ft (2,913 – 3,560 m) in New Mexico; reported at as low as 8,500 by Argus (1995).
- d. Topography** High altitude, low gradient sedge meadows and wet drainage ways; along streams and wet meadows, in cienegas, seeps and springs.
- e. Substrate** Generally on basaltic soils (AWITT 1995).

B. Biotic Characteristics

- a. Floristic Region** Southern Rocky Mountains
- b. Plant Community** Moist sedge meadows bordered by spruce forests.

c. Associated Species *Carex* spp., *Caltha leptosepala*, *Salix* spp., *Deschampsia cespitosa*, *Pedicularis groenlandica*; in meadows and wetlands bordered by *Picea engelmannii*, and *Picea pungens*

d. Other Rare Species No other rare species are known to occur in this habitat.

POPULATION BIOLOGY

A. Demography Perennial. Only young to mature plants were present during the 2001 surveys. No regeneration was noted.

B. Phenology Most plants were vegetative during the 2001 surveys, between 18 June and 18 July. Plants in exclosures were more likely to produce flowers or fruits. The 1958 exclosure on the Questa Ranger District (Carson N.F.) had a 1:1 ratio of fertile to vegetative individuals. *Salix arizonica* blooms in late May to early July, with fruit maturing through August.

C. Reproductive Biology

a. Type of Reproduction Sexual, presumably outcrossing ; *Salix arizonica* does not produce subterranean clonal rhizomes (Maschinski 2001).

b. Pollination Wind / Insect

c. Seed Dispersal Disseminated by wind and water (AWITT 1995).

d. Reproductive Success Maschinski (2001) reported a high rate of germination with ample moisture and light in greenhouse conditions. Field observations in the New Mexico populations failed to locate any seedlings during the summer of 2001.

E. Mortality A low percentage of plants observed were leafless, and appeared dead, but see habitat destruction below.

F. Hybridization Dorn's data sheets mention hybrids between *Salix monticola* and *Salix arizonica*. Field observations lead me to believe that *S. boothii* may hybridize with *S. arizonica*, making identification very tenuous in certain locations.

LAND OWNERSHIP AND MANAGEMENT

A. Ownership **New Mexico:** U.S. Forest Service, and likely on private land.

B. Management U.S. Forest Service

EVIDENCE OF THREATS TO SURVIVAL

- A. Habitat Destruction** In some areas mortality was commonplace and community-level changes were taking place due to an altered hydrology. The drying soils in previously occupied habitat has lead to the extirpation of some willow occurrences, e.g. Clear Creek (San Pedro Parks Wilderness – Santa Fe National Forest). This habitat loss appears to be due to soil compaction and major erosion problems created by overuse of the area by ungulates (currently cattle and elk).
- B. Overutilization** *Salix arizonica* is threatened by land uses and not by overutilization.
- C. Disease or Predation** This plant is subject to overbrowsing by ungulates. In areas where cattle and elk are both present in abundance this plant shows obvious and extensive decline. Repeated browsing of new willow growth produces stunted vegetative plants (AWITT 1995). This is the case in most of the *Salix arizona* occurrences in New Mexico.
- D. Adequacy of Regulatory Mechanisms** This taxon is listed by both the state and USFWS as a Species of Concern, and is therefore afforded little or no protection by law. F.S. attempts to manage for this plant have been inadequate to protect critical habitat for this species. This species continues to be threatened throughout New Mexico.
- E. Other Natural or Manmade Threats** Snowmobile traffic is associated with snow compaction. This causes snow to lose its protective, insulative properties, and increases the likelihood that snow-blanketed willows will experience tissue damage.

ASSESSMENT AND RECOMMENDATIONS

A. General

In New Mexico, Arizona willow is almost always found to be browsed by cattle and elk. As a result, it is often stunted in stature, low in number, and fails to reproduce sexually (Maschinski 2001). That is the case in most of the willow populations visited in 2001. This elevated herbivore pressure threatens the continued existence of *Salix arizonica*. Continued overgrazing of willow habitat also leads to degraded watersheds. Grazing pressure can lead to soil compaction, and a decrease in the grass, forb, and shrub cover within Arizona willow habitat. Excessive use can lead to dramatic changes in the wetland communities in which willows occur. Once the hydrology is altered due to soil compaction, erosion, and stream channel downcutting, this species is prone to extirpation.

Protection of Arizona willows will require a move to landscape- or watershed-level management, or at least require the fencing of riparian areas. Since discovering Arizona willow on Forest Service land in New Mexico and elsewhere, there has been an effort to establish small exclosures to protect individual plants or small groups of plants. Small exclosures may help to protect individual plants but do little to slow the loss of habitat critical to this species' existence (Maschinski, 2001). There is a need to protect the drainages and wetland systems on which *Salix arizonica* depends. Restoration of drainages and wetlands will likely be a controversial and costly endeavor. Maschinski (2001) found that mortality in Arizona willow populations was greatly reduced when cattle were absent. There is an urgent need to examine stocking rates and elk herd sizes and assess the impacts of these species to riparian areas within

areas where Arizona willow occurs. All areas visited this year showed the need for release from grazing. Fortunately, some areas are no longer being utilized by cattle (George Long, pers. comm.). This is a good trend and a good start for this species, but it will take many years for riparian willow populations to recover from overuse in the past. Stocking rates may appear to be quite reasonable in some areas based on the number of cow units for an overall allotment, but the moist meadows in which Arizona willow occurs is often the preferred grazing area for livestock and elk, within such an allotment.

Cattle's preference for the palatable herbs and grasses associated with meadows and riparian corridors is especially clear in the Pecos and San Pedro Parks Wilderness Areas. These are huge expanses of land with no fenced pastures. The cattle are free to congregate in large numbers in the fragile and productive wetlands and riparian habitats where willows occur. Range rider programs intended to keep cattle out of riparian areas are not sufficient to keep damage from occurring within these areas. Riparian damage is also evident and extensive along the Pecos River and its tributaries in the Pecos Wilderness. If fencing of riparian areas within our wilderness areas is not an option, then some action must be taken to rest these areas from livestock grazing.

B. Recommendations

a. Fish and Wildlife Service

This is a widespread species that is declining throughout much, if not all of its range. Its current status as a species of concern does little to protect it. The USFWS should continue to monitor this species, and consider elevating its listing to threatened if management practices are not altered sufficiently on public lands to protect this species.

b. Other Federal Agencies

The U.S. Forest Service should resurvey its known and potential habitat for this species. It should rest areas from grazing where this species occurs, and consider reducing elk populations in areas where constructing large elk exclosures around riparian areas is not feasible.

c. Other Status Recommendations

The state of New Mexico should monitor this species, and consider elevating its listing to Endangered if habitat loss continues.

C. CONSERVATION/RECOVERY RECOMENDATIONS

a. General Conservation

This species requires a move to more aggressive attempts to protect the landscapes and watersheds in which it occurs. There is an urgent need to rest riparian areas from cattle and elk in habitat for this species. In all of the areas visited in 2001 the wetlands in which Arizona willow occurs need to be rested from ungulate pressure for many years before healthy populations can be re-established. Excluding cattle and elk can have a dramatic effect on the shrub component of Arizona willow habitat. This is clear from examining the 1958 exclosure in Photo 1. Erecting exclosures like this, but larger, in all areas where Arizona willow occurs is not practical. For this reason, it is imperative that current land uses, including livestock grazing, and possibly snowmobile recreation, be reduced, curtailed, or redirected to areas that aren't as fragile. In addition, large exclosures should be put in place wherever possible. These actions should be

taken in such a way to protect not only the Arizona willow, but the health of the watershed and water quality for other natural systems occurring downstream.

b. Monitoring Activities Occupied and potential Arizona willow habitat needs to be closely monitored to see that riparian health is being restored over time. It will be important to see that erosion problems are addressed and that wetland areas are expanding, rather than contracting. Engaging in riparian habitat monitoring while tracking Arizona willow numbers, reproductive success, and occurrence sizes, will allow for the long term protection of this species and the high elevation portions of our watersheds.

INFORMATION SOURCES

A. Publications

Argus, G.W. 1995. Salicaceae Willow Family. Part Two: *Salix* L. Willow. Arizona Nevada Academy of Science 1, 39-62.

Arizona Willow Interagency Technical Team (AWITT). 1995. Arizona willow conservation agreement and strategy. U.S. Forest Service, Intermountain Region, Ogden, Utah; U.S. Forest Service, Southwestern Region, Albuquerque, New Mexico; National Park Service, Rocky Mountain Region, Denver, Colorado; U.S. Fish and Wildlife Service, Mountain-Prairie Region, Salt Lake City, Utah; U.S. Fish and Wildlife Service, Southwest Region, Albuquerque, New Mexico.

Atwood, Duane. 1996. Final report for inventory of *Salix arizonica* on the Santa Fe National Forest. Unpublished report for U.S. Forest Service.

Dick-Peddie, William A. 1993. New Mexico Vegetation past, present, and future. University of New Mexico Press. Albuquerque, New Mexico.

Dorn, R. 1975. Systematic study of *Salix* section Cordatae in North America. Canadian Journal of Botany 53, 1491-1522.

Dorn, R. 1997. Survey of Arizona Willow on the Carson National Forest. Report to Carson National Forest, August 1997.

Maschinski, Joyce. 2001. Impacts of ungulate herbivores on a rare willow at the southern end of its range. Biological Conservation 101 (2001) 119-130.

WRCC. 2000. Western Regional Climate Center. Regional weather data available on the internet (<http://weather.nmsu.edu/nmcccooperator/index.htm>).

B. Museum Specimens

Museum specimens known to the author are listed within the data sheets in Appendix 1.

C. Field Work

The results of surveys by Dorn (1997), Atwood (1996), and Tonne (2001) are compiled in Appendix 1. These notes were compiled based on the photocopies of data sheets provided in reports available in the

USFWS office. In some instances the photocopies were barely legible, and there may be mistakes in transcribing them.

AUTHORSHIP

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B. Date of Report

September 2002

C. Maintenance of Status Report

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Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: D4 -1 **Survey Date:** 7/28/1997

2001 Field Notes: Area appears heavily grazed and watershed contains a large clear-cut; stream downcutting greatly accelerated. ATV traffic heavy in general area; off road use prevalent by ATVs and fuel wood collecting trucks. This area has been hammered by poor management and overuse. Livestock use noticeably increased over Dorn's observations. Plants lacking in areas noticeably overgrazed. Surveyed 7 July, 2002.

County: Mora **USGS 7.5' Quad Name:** Cerro Vista

Narrative Description of Location: Rito la Presa ca. 1 mile above Little Korea

Legal Description: T23N, R14E, NW4NE4 sec. 24

Latitude: 36 12' 58" **Longitude:** 105 23' 59"

Elevation : 10750 ft.

UTM coordinates (NAD27 Datum; 2001 surveys):

Start Easting: 464058E **Start Northing:** 4007898N

End Easting: 463961E **End Northing:** 4008316N

UTM notes: Habitat continues above End point, but is heavily overgrazed here. Habitat abruptly disappears below start point.

Ranger District : Camino Real

Acres of occupied habitat: 1

Number of Individuals observed: 200 estimate counted

Phenology: 90% vegetative %in flower 10% in fruit
5 % immature 95% mature % senescent

Population Vigor (1997): Good

Habitat Description (From Dorn or Atwood unless noted):

Wet sedge seep; Carex spp, Pedicularis groenlandica, Phleum alpinum, Caltha leptosepala, Rhodiola rhodantha, Deschampsia caespitosa, Oxypolis fendleri, Senecio triangularis, Epilobium ciliatum; Good condition; S ; 15 .

Land Use/Visible Disturbance/Possible Threats:

Livestock grazing, use low to moderate

Specimens, if collected:

Collection # R.D. # 7432

Herbarium where deposited: RM

Other Observations: Plants show some browsing but not excessive; generally they are 0.3 - 0.7 m high; apparent hybrids with Salix monticola are common upstream where pure S. arizonica seems to be lacking.

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: D7-2 Survey Date: 7/23/1997

2001 Field Notes: Grazing pressure moderate; 39 plants observed. Poor population vigor. Nice seep on east side of FS Rd. 134.

County: Taos USGS 7.5' Quad Name: Latir Peak

Narrative Description of Location: Along Cabresto Creek on North Side of FS road 134; additional plants on SE side of road at upper end in seep area.

Legal Description: T29N, R15E, SE4SW4 sec. 6
Latitude: 36 46' 26" Longitude: 105 22' 46"
Elevation : 10150 - 10200 ft.

UTM coordinates (NAD27 Datum; 2001 surveys):
Start Easting: 466172E Start Northing: 4069612N
End Easting: 466225E End Northing: 4069651N

UTM notes: Habitat starts at Start; survey started at 466477, 4069943.

Ranger District : Questa

Acres of occupied habitat: 0.1

Number of Individuals observed: estimate 35 counted

Phenology: 100% vegetative %in flower % in fruit
2 % immature 78% mature 20% senescent

Population Vigor (1997): Poor

Habitat Description (From Dorn or Atwood unless noted):
Wet sedge meadow; Picea engelmannii, Phleum alpinum, Taraxacum officinalis, Carex spp., Potentilla gracilis, Achillea millefolium, Geum macrophyllum, Salix planifolia, Epilobium ciliatum, Luzula parviflora, Poa pratensis; poor; SW; 10 .

Land Use/Visible Disturbance/Possible Threats:
Livestock grazing; well clipped, willow severely browsed on old growth.

Specimens, if collected:

Collection #

Herbarium where deposited:

Other Observations: Plants classed as immature may be merely sprouts; population 50 ft. or less wide, +/- 100 ft. long; Location is on NW side of road; additional plants on SE side of road.

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: D7-3 **Survey Date:** 7/23/1997

2001 Field Notes: 20 June 2001. Poor population vigor. Livestock grazing; severely browsed; area frequented by elk. Ca. 50 S. arizonica observed. Almost 100 % S. planifolia in tributary. Sparse S. arizonica.

County: Taos **USGS 7.5' Quad Name:** Commanche Point

Narrative Description of Location: Meadow along Cabresto Creek after it leaves Forest Road 134.

Legal Description: T30N, R15E, SW4SW4 sec. 32, T29N, R15E, NW4NW4 sec. 5, T29N, R15E, SE4NE4 sec. 6.

Latitude: 36 46' 45" **Longitude:** 105 22' 16"
Elevation : 10280-10480 ft.

UTM coordinates (NAD27 Datum; 2001 surveys):

Start Easting: 466815E **Start Northing:** 407147N
End Easting: 467060E **End Northing:** 4071335N

UTM notes:

Ranger District : Questa

Acres of occupied habitat: 1

Number of Individuals observed: estimate 58 counted

Phenology: 100% vegetative %in flower % in fruit
15 % immature 80% mature 5% senescent

Population Vigor (1997): Poor

Habitat Description (From Dorn or Atwood unless noted):

Wet sedge meadow; Salix planifolia, Carex spp., Geum macrophyllum, Picea engelmannii, Pentaphylloides floribunda, Dodecatheon pulchellum, Trifolium sp., Taraxacum officinale, Pedicularis groenlandica, Polemonium sp., Poa pratensis, Salix monticola, Polygonum bistertoides; habitat good, willows poor; SE; 15 .

Land Use/Visible Disturbance/Possible Threats:

Livestock grazing; old willow growth severely browsed.

Specimens, if collected:

Collection # Atwood 21,074

Herbarium where deposited: BRY

Other Observations: Plants all very short, mostly hidden in sedges; Atwoods #3 is on dry knob; perhaps it should have been mapped slightly to the west. Plants very spotty, usually several together where they occur. [Atwood estimated 100 individuals in '96 and assessed the population vigor as Fair and heavily grazed by livestock and probably some elk use.]

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: D7-4 Survey Date: 7/23/1997

2001 Field Notes: Moderate to heavy grazing. Population condition poor; dwarfed and vegetative. Some of the enclosure S. arizonica have staminate aments. Vegetative plants extend up and down creek ca. .2 - .3 miles. Not abundant - small patches here and there. S. arizonica often grasslike whereas S. planifolia forms small 10 - 30 cm. shrubs. Grazing moderate to high; 400-600 S. arizonica present.

County: Taos USGS 7.5' Quad Name: Commanche Point

Narrative Description of Location: Wet meadow along road 134 above where Cabresto Creek leaves the road, and up to road that leads to Greenie Peak.

Legal Description: T29N, R15E, NE4SE4 sec. 6, T29N, R15E, NE4NE4 sec. 7, T29N, R15E, NW4NW4 sec. 8, T29N, R15E, S2NW4 sec. 8.

Latitude: 36 46' 35" **Longitude:** 105 22' 16"
Elevation : 10280-10520 ft.

UTM coordinates (NAD27 Datum; 2001 surveys):

Start Easting: 467304E **Start Northing:** 4068933N

End Easting: 466787E **End Northing:** 4069494N

UTM notes: 466696E, 4069146N, at 10m x 20m cattle enclosure.

Ranger District : Questa

Acres of occupied habitat: 10

Number of Individuals observed: estimate 535 counted

Phenology: 100% vegetative %in flower % in fruit
70 % immature 25% mature 5% senescent

Population Vigor (1997): Poor

Habitat Description (From Dorn or Atwood unless noted):

Wet sedge meadow; Carex spp., Pentaphylloides floribunda, Picea engelmannii, Caltha leptosepala, Taraxacum officinale, Salix planifolia, Agrostis stolonifera, Phleum alpinum, Dodecatheon pulchellum; good condition except shrubs poor; S; 15 .

Land Use/Visible Disturbance/Possible Threats:

Livestock grazing, heavy use evident.

Specimens, if collected:

Collection # Atwood 21,085

Herbarium where deposited: BRY

Other Observations: Most plants hidden by sedges, very low growth; immatures may be sprouts. [D. Atwood documented presence 7/31/96, listing the population vigor as poor].

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: D7-5 Survey Date: 7/28/1997

2001 Field Notes: Plants vegetative; poor population vigor; stream deeply incised so habitat marginal. Cattle enclosure torn up and filled with cow dung - same or slightly less grazed than outside of enclosure. *S. arizonica* confined to banks of small stream - dwarfed and vegetative. Ca. 45 - 50 plants in whole enclosure (almost all plants in upper end). Small patch of willows (1m x 2m; in grass stage) on E. edge of small moss bog.

County: Taos USGS 7.5' Quad Name: Commanche Point

Narrative Description of Location: Junction Roads 134, 54B, 54C.

Legal Description: T29N, R15E, S2NE4 sec. 8.

Latitude: 36 45' 56" **Longitude:** 105 21' 26"

Elevation : 10480-10460 ft.

UTM coordinates (NAD27 Datum; 2001 surveys):

Start Easting: 468195E **Start Northing:** 4068761N

End Easting: 468935E **End Northing:** 4068785N

UTM notes: BOG is at 468970E, 4068788N. *S. arizonica* starts at 468579E, 4068815N, spotty to upstream terminus where slightly more abundant.

Ranger District : Questa

Acres of occupied habitat: 0.07

Number of Individuals observed: estimate 35 counted

Phenology: 100% vegetative %in flower % in fruit
10 % immature 40% mature 50% senescent

Population Vigor (1997): Poor

Habitat Description (From Dorn or Atwood unless noted):

Wet sedge meadow; *Carex* spp., *Pedicularis groenlandica*, *Deschampsia caespitosa*, *Salix planifolia*, *Caltha leptosepala*, *Phleum alpinum*, *Pentaphylloides floribunda*, *Epilobium ciliatum*, *Veronica* sp., *Achillea millefolium*; habitat good, shrubs fair to poor; east; 10 .

Land Use/Visible Disturbance/Possible Threats:

Livestock grazing, use moderate to heavy.

Specimens, if collected:

Collection # Atwood 21,084

Herbarium where deposited: BRY

Other Observations: Stream deeply incised below road so habitat marginal. Population extends from just above road about 200 yards. Downstream immediately adjacent to stream. [D. Atwood documented presence 7/31/96, listing population vigor as poor].

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: D7-6 **Survey Date:** 7/24/1997

2001 Field Notes: Poor population vigor and many of the previous reported plants likely young Salix boothii. Livestock use moderate, and apparently hydrology is drying. Snowmobile parts/pieces not infrequent. Salix boothii towards mine - starts above Anchor Mine and S. arizonica had dropped out by next large mine on W side of creek. Habitat could be improved if use was reduced. Portions of Dorn and Atwoods mapped location lacked S. arizonica.

County: Taos **USGS 7.5' Quad Name:** Commanche Point

Narrative Description of Location: Bitter Creek east of Anchor Mine and upstream and downstream.

Legal Description: T29N, R15E, W2E2, sec. 9, T29N, R15E, NW4NW4, T29N, R15E, SE4NW4, T29N, R15E, S2S2, sec. 4.

Latitude: 36 45' 43"

Longitude: 105 20' 18" SE of Anchor Mine

Elevation : 10280-10640 ft.

UTM coordinates (NAD27 Datum; 2001 surveys):

Start Easting: 469813E **Start Northing:** 4067345N

End Easting: 468863E **End Northing:** 4069301N

UTM notes: NE portion of the population could not be relocated: 469176E, 4069346N: No S. arizonica located in this area above Creek. Nor was SAAR located between bitter creek and waypoints 25 and 29. No plants observed between Wpt 22 (469230E, 4068693N) and 23 (468863E, 406931N).

Ranger District : Questa

Acres of occupied habitat: 8

Number of Individuals observed: estimate 164 counted

Phenology: 100% vegetative %in flower % in fruit
30 % immature 60% mature 10% senescent

Population Vigor (1997): Poor

Habitat Description (From Dorn or Atwood unless noted):

Sedge stream bank; Salix planifolia, Carex spp., Argentina anserina, Pentaphylloides floribunda, Achillea millefolium, Deschampsia caespitosa, Trifolium sp., Taraxacum officinale, Phleum alpinum, Dodecatheon pulchellum, Geum macrophyllum; good condition; Salix arizonica fair; S; 15 . Atwood found this population to be in poor condition, especially for S. arizonica - I could not locate Atwoods area 8 and 11 - the northern portions of D7-6.

Land Use/Visible Disturbance/Possible Threats:

Livestock grazing; use minimal.

Specimens, if collected:

Collection # Atwood 21,083

Herbarium where deposited: BRY

Other Observations: Plants extremely spotty except at lower end. Stream becomes extremely incised below. Salix brachycarpa and Salix monticola associated locally. Immatures may be sprouts. [Dorn

comments on Atwood locations - missing or missidentified - can't tell poorly copied print. SAAR could not be relocated at D. Atwood's observed plants at T29N, R15E, SE4 sec. 4.]

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: D7-7 **Survey Date:** 7/24/1997

2001 Field Notes: George Long, Questa R.D., says that the enclosure has not always been maintained; periodically the fence needs maintenance and has gone for periods where it was not an effective barrier to ungulate access. This enclosure stands in huge contrast to the surrounding landscape. This suggests that cattle and elk numbers are too high in this area. Dorn's estimate of 300 *S. arizonica* is probably ok and could be applied today; very subjective. Overall, the population looks healthy in the upper two enclosures - ca. 80% *S. planifolia* / 20% *S. arizonica* (1.3m avg. height). Lower diversity in cattle enclosure with lower barbed wire fence which allows elk in and excludes cattle. Soils are drier and no plants were observed here. It is stated in the literature that riparian restoration is unlikely to be successful if done in the presence of large numbers of large ungulates and it is therefore important that this not be interpreted as if a pristine area was fenced off; this is a degraded area that was later fenced off and never managed to recover in the presence of large numbers of elk and no real rest.

County: Taos **USGS 7.5' Quad Name:** Commanche Point

Narrative Description of Location: Cattle and Elk Enclosure erected 1958; Range study plot #4.

Legal Description: T29N, R15E, E2SE4 sec. 5.

Latitude: 36 46' 32" **Longitude:** 105 21' 20"

Elevation : 10500 ft.

UTM coordinates (NAD27 Datum; 2001 surveys):

Start Easting: 468275E **Start Northing:** 4069830N

End Easting: 468294E **End Northing:** 4069760N

UTM notes: Start is the upper of 3 enclosures, End is lowest.

Ranger District : Questa

Acres of occupied habitat: 5

Number of Individuals observed: 300 estimate counted

Phenology: 50% vegetative 10% in flower 40% in fruit
10 % immature 70% mature 20% senescent

Population Vigor (1997): Good

Habitat Description (From Dorn or Atwood unless noted):

Moist sedge meadow; *Veratrum* sp. *Caltha leptosepala*, *Salix planifolia*, *Achillea millefolium*, *Senecio* sp., *Geum macrophyllum*, *Pentaphragma floribunda*, *Allium* sp., *Delphinium* sp., *Rhodiola rhodantha*, *Castilleja* sp.; good condition; willows with tops dead on many; E; 10 .

Land Use/Visible Disturbance/Possible Threats:

Protected with ca. 8 ft. fence.

Specimens, if collected:

Collection # Tonne 01 - 29

Herbarium where deposited: UNM

Other Observations: Additional enclosure below two elk enclosures. Upper 2 enclosures ca. 8 ft. fence; lower ca. 4 ft. barbed wire (willows not evident); elk droppings in lower enclosure; suggests elk responsible for poor condition of Arizona willow. Very little cattle use of the willow observed... unreadable.

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: D7-8 Survey Date: 7/24/1997

2001 Field Notes: Heavily grazed pasture; recent use by elk and cattle, evident. No plants observed. Could not relocate Dorn's single Salix arizonica.

County: Taos USGS 7.5' Quad Name: Commanche Point

Narrative Description of Location: Above 1958 Exclosure D7-7 ca. 150 yards.

Legal Description: T29N, R15E, NE4SE4 sec. 5.
Latitude: 36 46' 34" Longitude: 105 21' 26"
Elevation : 10560 ft.

UTM coordinates (NAD27 Datum; 2001 surveys):
Start Easting: 468101E Start Northing: 4070009N
End Easting: E End Northing: N

UTM notes:

Ranger District : Questa

Acres of occupied habitat: infinitesimal

Number of Individuals observed: 1 estimate counted

Phenology: 100% vegetative %in flower % in fruit
100 % immature % mature % senescent

Population Vigor (1997): Poor

Habitat Description (From Dorn or Atwood unless noted):
Wet sedge meadow; Pentaphylloides floribunda, Carex spp., Deschampsia caespitosa, Salix planifolia, Phleum alpinum, Trifolium sp., Caltha leptosepala, Pedicularis groenlandica, Erigeron sp., Senecio sp., condition good except shrubs poor; E; 15 .

Land Use/Visible Disturbance/Possible Threats:
Livestock grazing, moderate use.

Specimens, if collected:
Collection #

Herbarium where deposited:

Other Observations: Only one plant found; probably a sprout. Atwoods area 10 appears to be mismapped [D. Atwood documented presence 7/31/96, listing population vigor as poor].

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: D7-9 **Survey Date:** 7/25/1997

2001 Field Notes: High - moderate grazing - more high than moderate. Ca. 35 S. arizonica observed. Habitat good, vigor poor (3-5" vegetative individuals) on mossy hummocks. Mostly Salix planifolia (ca. 85%). This area would make an interesting enclosure. Hydrology good, but some downcutting has started - needs rest in absence of ungulates.

County: Taos **USGS 7.5' Quad Name:** Commanche Point

Narrative Description of Location: East of Enclosure (D7-7) and along gated road ca 0.1 mi. from main forest road (54B).

Legal Description: T29N, R15E, W2SW4 sec. 4

Latitude: 36 46' 32" **Longitude:** 105 21' 01"

Elevation : 10550 ft.

UTM coordinates (NAD27 Datum; 2001 surveys):

Start Easting: 468786E **Start Northing:** 4069754N

End Easting: 468872E **End Northing:** 4069800N

UTM notes: Meadow moist and SAAR free between Start bog and end bog.

Ranger District : Questa

Acres of occupied habitat: 0.5

Number of Individuals observed: estimate 37 counted

Phenology: % vegetative % in flower % in fruit
100 % immature % mature % senescent

Population Vigor (1997): Poor

Habitat Description (From Dorn or Atwood unless noted):

Wet sedge meadow; Carex spp., Achillea millefolium, Picea engelmannii, Deschampsia caespitosa, Trifolium sp., Taraxacum officinale, Pentaphylloides floribunda, Salix planifolia, Polygonum sp.; condition good, shrubs poor; SW 15 .

Land Use/Visible Disturbance/Possible Threats:

Livestock grazing, use moderate to severe.

Specimens, if collected:

Collection # Atwood 21,086

Herbarium where deposited: BRY

Other Observations: Plants largely restricted to mossy hummocks. [D. Atwood documented presence 7/31/96 and listed population vigor as poor].

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: D7-12 Survey Date: 7/27/1997

2001 Field Notes: This is nice habitat, though the population may be hybridizing if *Salix boothii* and *Salix arizonica* are distinct. George Long, Questa R.D., says cattle have been off this area for 3 years. Smaller pieces of habitat below END coordinates. Dorn's estimate of 900 *S. arizonica* appears high, but there is a lot of good habitat. No clear *S. arizonica* observed this year. Atwood's team reported 85+ individuals.

County: Taos USGS 7.5' Quad Name: Eagle Nest

Narrative Description of Location: Sawmill Creek

Legal Description: T27N, R15E, NE4NW4 sec. 8, T27N, R15E, E2 sec. 8, T27N, R15E, E2 sec. 17

Latitude: 36 35' 32" **Longitude:** 105 21' 56"
Elevation : 10500 - 10800 ft.

UTM coordinates (NAD27 Datum; 2001 surveys):
Start Easting: 468000E **Start Northing:** 4047000N
End Easting: 467858E **End Northing:** 4049055N

UTM notes: START is the up canyon end of the population; most of the good habitat is above the END coordinates.

Ranger District : Questa

Acres of occupied habitat: 25

Number of Individuals observed: 900 estimate counted

Phenology: 100% vegetative %in flower % in fruit
5 % immature 90% mature 5% senescent

Population Vigor (1997): Poor to Fair

Habitat Description (From Dorn or Atwood unless noted):

Wet sedge meadow and streambank; *Carex* spp., *Salix planifolia*, *Salix monticola*, *Salix brachycarpa*, *Cardamine californica* var *cardiophylla*, *Pedicularis groenlandica*, *Pentaphylloides floribunda*, *Senecio triangularis*, *Caltha leptosepala*, *Phleum alpinum*, *Picea engelmannii*, *Oxypolis fendleri*; Good condition except shrubs fair; W to N; 10-15 .

Land Use/Visible Disturbance/Possible Threats:

Livestock grazing; use light to moderate.

Specimens, if collected:

Collection # Atwood 21,100A

Herbarium where deposited: BRY

Other Observations: Plants somewhat spotty but more or less continuous. Immatures may be sprouts.

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: WPT8 **Survey Date:** 6/18/2002

2001 Field Notes: Deschampsia dominated "exclosure" - single strand and down in some areas with S. planifolia and Picea engelmannii. 2 Salix arizonica in NE corner. Identification of vegetative plants based on glands and serration; shrubs ca. .4 m tall.

County:USGS 7.5' **Quad Name:** Commanche Point

Narrative Description of Location: Short-fenced exclosure near 1958 exclosures.

Legal Description: T29N, R15E, E2SE4 sec. 5.

Latitude: 36 46' 54" **Longitude:** 105 21' 24.72"
Elevation : 10560 ft.

UTM coordinates (NAD27 Datum; 2001 surveys):
Start Easting: 468203E **Start Northing:** 4069740N
End Easting: E **End Northing:** N

UTM notes:

Ranger District : Questa

Acres of occupied habitat:

Number of Individuals observed: estimate 2counted

Phenology: % vegetative %in flower % in fruit
 % immature % mature % senescent

Population Vigor (1997):

Habitat Description (From Dorn or Atwood unless noted):
Moist meadow: Deschampsia sp., Caltha leptosepala, Allium sp., Epilobium ciliatum, Senecio streptanthifolia, Pedicularis groenlandica. Good condition except shrubs (Tonne 2001).

Land Use/Visible Disturbance/Possible Threats:

Specimens, if collected:
Collection #
Herbarium where deposited:
Other Observations:

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: AT21154A **Survey Date:** 8/3/1996

2001 Field Notes: This area was not visited in 2001 due to time constraints and its small size, ca. 6 x 6 ft. with only three plants.

County:USGS 7.5' **Quad Name:** Shady Brook

Narrative Description of Location: Rio de La Olla, .5 mi. above junction of FS roads 438 and 153, along FS road 153.

Legal Description: T24N, R15E, SW4 sec. 25.

Latitude: **Longitude:**
Elevation : 9560 ft.

UTM coordinates (NAD27 Datum; 2001 surveys):

Start Easting: E **Start Northing:** N
End Easting: E **End Northing:** N

UTM notes:

Ranger District : Camino Real

Acres of occupied habitat:

Number of Individuals observed: estimate 3counted

Phenology: % vegetative %in flower % in fruit
 % immature % mature % senescent

Population Vigor (1997): Excellent (1996)

Habitat Description (From Dorn or Atwood unless noted):

Somewhat dry meadow below old beaver dam in spruce/aspens/sedge willow riparian area. Area open at 0-5% slope to south. 6 ft. x 6 ft. occurrence size.

Land Use/Visible Disturbance/Possible Threats:

Livestock grazing.

Specimens, if collected:

Collection # 21,154A

Herbarium where deposited: BRY

Other Observations: Overall site quality good.

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: WPT13 Survey Date: 6/19/2001

2001 Field Notes: ca. 10m. x 30 m. cattle enclosure with wire fence. Fencing is being replaced by Rocky Mountain Youth Corp. Grazing moderate. Salix planifolia to 3 dm., grasses to 3 dm. Only one Salix arizonica observed in enclosure, with a few more in creek ca. 30 m. below enclosure.

County:USGS 7.5' Quad Name: Commanche Point

Narrative Description of Location:

Legal Description:

Latitude: Longitude:
Elevation : _ft.

UTM coordinates (NAD27 Datum; 2001 surveys):
Start Easting: 467917E Start Northing: 4068230N
End Easting: E End Northing: N

UTM notes:

Ranger District : Questa

Acres of occupied habitat:

Number of Individuals observed: estimate counted

Phenology: % vegetative %in flower % in fruit
% immature % mature % senescent

Population Vigor (1997):

Habitat Description (From Dorn or Atwood unless noted):
Salix planifolia, Carex spp., Allium geyeri, Pedicularis groenlandica, Deschampsia sp., Senecio sp., Taraxacum officinalis, Pentaphyloides floribunda (Tonne 2001).

Land Use/Visible Disturbance/Possible Threats:

Specimens, if collected:

Collection #

Herbarium where deposited:

Other Observations:

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: WPT14 **Survey Date:** 6/19/2001

2001 Field Notes: ca. 30m. x 30m. cattle exclosure. Cow dung present. Fencing being replaced by Rocky Mountain Youth Corp. > 40 S. arizonica; mostly quite short, but at least one to 3 dm.

County: USGS 7.5' **Quad Name:** Commanche Point

Narrative Description of Location:

Legal Description:

Latitude: **Longitude:**
Elevation : _ft.

UTM coordinates (NAD27 Datum; 2001 surveys):
Start Easting: 467806E **Start Northing:** 4068148N
End Easting: E **End Northing:** N

UTM notes:

Ranger District : Questa

Acres of occupied habitat:

Number of Individuals observed: >40estimate counted

Phenology: % vegetative %in flower % in fruit
% immature % mature % senescent

Population Vigor (1997):

Habitat Description (From Dorn or Atwood unless noted):
S. planifolia, Carex spp., Veratrum californicum, Caltha leptosepala, Senecio sp., Taraxacum officinalis, Mertensia sp., Pedicularis groenlandica, Deschampsia sp.

Land Use/Visible Disturbance/Possible Threats:

Specimens, if collected:

Collection #

Herbarium where deposited:

Other Observations:

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: Los Pinos Trail/ Rio Puerco **Survey Date:** 6/27/2001

2001 Field Notes: This is a degraded willow habitat, with a few small (ca. 2m x 2m) exclosures. Most of the exclosures are wood, constructed from spruce. The willow's status here is a clear indicator that this area is in need of rest. The San Pedro Parks suffers from "The Tragedy of the Commons". There is a vast area of forest and wilderness with no fences and several brands of cattle. Salix is nowhere abundant, with small patches along streamsides. Most meadows lack marshland quality with slow meandering streams. Grazing pressure has severely changed the vegetation and hydrology of this area. The exclosures put in place are too small and infrequent to allow for any rehabilitation. I'm not suggesting that exclosures be removed. If that is all that can be done, it should, but this whole watershed is in need of a long period of rest and recovery. This can not occur with the high ungulate numbers currently using the "wilderness". No clearly identifiable specimens of S. arizonica were located at this site. The range rider program is not a reasonable solution to the poor management of this land; cattle return back to the stream as soon as the range rider moves through.

County:USGS 7.5' **Quad Name:** Nacimiento Peak

Narrative Description of Location:

Legal Description:

Latitude: **Longitude:**
Elevation : .ft.

UTM coordinates (NAD27 Datum; 2001 surveys):
Start Easting: 332405E **Start Northing:** 3996292N
End Easting: 332798E **End Northing:** 3996149N

UTM notes:

Ranger District : Cuba

Acres of occupied habitat:

Number of Individuals observed: estimate counted

Phenology: % vegetative %in flower % in fruit
% immature % mature % senescent

Population Vigor (1997):

Habitat Description (From Dorn or Atwood unless noted):
Carex spp., Juncus balticus, Picea engelmannii, Dodecatheon pulchella, Taraxacum officinale, Pentaphylloides floribunda, Ranunculus cardiophyllus.

Land Use/Visible Disturbance/Possible Threats:

Specimens, if collected:

Collection #

Herbarium where deposited:

Other Observations:

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: Rito de las Vacas **Survey Date:** 6/28/2001

2001 Field Notes: This area was heavily used and degraded. It is in critical need of rest and restoration in the absence of a significant ungulate presence. The willows in this area are infrequent and heavily browsed. There are five small (ca. 2m x 2m) exclosures, protecting small groups of willows on this short stretch of stream.

County:USGS 7.5' **Quad Name:** Nacimiento Peak

Narrative Description of Location:

Legal Description:

Latitude: **Longitude:**
Elevation : _ft.

UTM coordinates (NAD27 Datum; 2001 surveys):
Start Easting: 335718E **Start Northing:** 3994341N
End Easting: 335676E **End Northing:** 3994572N

UTM notes:

Ranger District : Cuba

Acres of occupied habitat:

Number of Individuals observed: estimate counted

Phenology: % vegetative %in flower % in fruit
% immature % mature % senescent

Population Vigor (1997):

Habitat Description (From Dorn or Atwood unless noted):
Carex spp., Caltha leptosepala, Senecio sp., Pentaphylloides floribunda, Veratrum californicum, and Picea engelmannii.

Land Use/Visible Disturbance/Possible Threats:

Specimens, if collected:

Collection #

Herbarium where deposited:

Other Observations:

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: Rito Anastacio **Survey Date:** 6/28/2001

2001 Field Notes: This area was heavily used and degraded. It is in critical need of rest and restoration in the absence of a significant ungulate presence. The willows in this area are infrequent and heavily browsed. There a few small (ca. 2m x 2m) exclosures, protecting small groups of willows on this short length of stream.

County:USGS 7.5' **Quad Name:** Nacimiento Peak

Narrative Description of Location:

Legal Description:

Latitude: **Longitude:**
Elevation : _ft.

UTM coordinates (NAD27 Datum; 2001 surveys):
Start Easting: 335306E **Start Northing:** 3995193N
End Easting: 335175E **End Northing:** 3995393N

UTM notes: Salix growing in moist mossy meadow at: 335175E, 3995393N.

Ranger District : Cuba

Acres of occupied habitat:

Number of Individuals observed: estimate counted

Phenology: % vegetative %in flower % in fruit
% immature % mature % senescent

Population Vigor (1997):

Habitat Description (From Dorn or Atwood unless noted):
Carex spp., Caltha leptosepala, Senecio sp., Pentaphylloides floribunda, Veratrum californicum, and Picea engelmannii.

Land Use/Visible Disturbance/Possible Threats:

Specimens, if collected:

Collection #

Herbarium where deposited:

Other Observations:

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: Canon Madera **Survey Date:** 7/17/2001

2001 Field Notes: The plants present are heavily browsed and few in number. Moderate- high to high grazing with considerable browsing. Slopes clipped neatly with increaser forbs present. Signs of deer, elk and cattle bedding. Carex and willow clipped. Stream headcutting starting. Downstream channelized and downcutting.

County:USGS 7.5' **Quad Name:** Nacimiento Peak

Narrative Description of Location:

Legal Description:

Latitude: **Longitude:**
Elevation : _ft.

UTM coordinates (NAD27 Datum; 2001 surveys):
Start Easting: 332812E **Start Northing:** 3998025N
End Easting: 333140E **End Northing:** 3998096N

UTM notes:

Ranger District : Cuba

Acres of occupied habitat:

Number of Individuals observed: estimate 12counted

Phenology: % vegetative %in flower % in fruit
% immature % mature % senescent

Population Vigor (1997):

Habitat Description (From Dorn or Atwood unless noted):

Land Use/Visible Disturbance/Possible Threats:

Specimens, if collected:

Collection #

Herbarium where deposited:

Other Observations:

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: Clear Creek **Survey Date:** 7/18/2001

2001 Field Notes: No Salix arizonca observed, only Salix boothii and S. planifolia. This area was likely excellent habitat in the past and is now severely degraded. You can observe the active extirpation of willows from this area. Lower clear creek suffers from serious erosion/grazing problems as evidenced by downcutting stream channels and drying wetlands. Areas dominated by wetland species are still visible in some locations where the incised channel changed the hydrology by dropping the water table. The death of wetland species is evident, with dead and dying plants nearer the stream channel and a creeping xeric edge encroaching further into the wetland. This is by far the most poorly managed wilderness I have ever visited. Cattle are everywhere and increaser species are in abundance. This is a much changed land in need of rest.

County:USGS 7.5' **Quad Name:** Nacimiento Peak

Narrative Description of Location:

Legal Description:

Latitude: **Longitude:**

Elevation : _ft.

UTM coordinates (NAD27 Datum; 2001 surveys):

Start Easting: E **Start Northing:** N

End Easting: E **End Northing:** N

UTM notes:

Ranger District : Cuba

Acres of occupied habitat:

Number of Individuals observed: estimate counted

Phenology: % vegetative %in flower % in fruit
% immature % mature % senescent

Population Vigor (1997):

Habitat Description (From Dorn or Atwood unless noted):

Land Use/Visible Disturbance/Possible Threats:

Specimens, if collected:

Collection #

Herbarium where deposited:

Other Observations:

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: Rio Puerco Tributary **Survey Date:** 7/18/2001

2001 Field Notes: Several *Salix boothii* and some diminutive salix resembling *S. arizonica* growing in moist sedge meadow. Area moderately grazed - cattle elk and deer use evident.

County: USGS 7.5' **Quad Name:** Nacimiento Peak

Narrative Description of Location:

Legal Description:

Latitude: **Longitude:**
Elevation : _ft.

UTM coordinates (NAD27 Datum; 2001 surveys):
Start Easting: 332387E **Start Northing:** 3995139N
End Easting: E **End Northing:** N

UTM notes:

Ranger District : Cuba

Acres of occupied habitat:

Number of Individuals observed: estimate counted

Phenology: % vegetative %in flower % in fruit
% immature % mature % senescent

Population Vigor (1997):

Habitat Description (From Dorn or Atwood unless noted):
Carex spp., *Caltha leptosepala*, *Pedicularis groenlandica*, *Castilleja* sp., *Picea engelmannii*, *Senecio*, and *Phleum alpinum* (Tonne 2001).

Land Use/Visible Disturbance/Possible Threats:

Specimens, if collected:

Collection #

Herbarium where deposited:

Other Observations:

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: Rito Maestas, above Rito del Padre **Survey Date:** 7/3/2001

2001 Field Notes: This area was surveyed by Duane Atwood in 1996 and he found *Salix arizonica* here. I found only *Salix boothii*. It is possible that one of us misidentified these closely related willows. The area is characterized by fast flowing water and fairly narrow canyons. The few really moist sites which might support *S. arizonica* have only *S. boothii* on them.

County:USGS 7.5' **Quad Name:** Nacimiento Peak

Narrative Description of Location:

Legal Description:

Latitude: **Longitude:**
Elevation : _ft.

UTM coordinates (NAD27 Datum; 2001 surveys):
Start Easting: 446792E **Start Northing:** 3977320N
End Easting: 446826E **End Northing:** 3977394N

UTM notes:

Ranger District : Pecos

Acres of occupied habitat:

Number of Individuals observed: estimate counted

Phenology: % vegetative %in flower % in fruit
% immature % mature % senescent

Population Vigor (1997):

Habitat Description (From Dorn or Atwood unless noted):

Land Use/Visible Disturbance/Possible Threats:

Specimens, if collected:

Collection #

Herbarium where deposited:

Other Observations:

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: Pecos Baldy Lake **Survey Date:** 7/4/2001

2001 Field Notes: 8-25 cm. vegetative population of Salix arizonica. ca. 160 plants (one 10m x 4m patch of 100 and one 30m x 30m patch of 60). Grazing pressure difficult to assess - appears low at present but may get more use at other times of year. The site has the appearance of receiving at least moderate grazing at some time - could be entirely due to harsh winter conditions. No cow or horse dung observed. Salix boothii present as well.

County:USGS 7.5' **Quad Name:** Truchas Peak

Narrative Description of Location:

Legal Description:

Latitude: **Longitude:**
Elevation : _ft.

UTM coordinates (NAD27 Datum; 2001 surveys):

Start Easting: 441516E **Start Northing:** 3974286N
End Easting: 441563E **End Northing:** 3974177N

UTM notes:

Ranger District : Pecos

Acres of occupied habitat:

Number of Individuals observed: 160estimate counted

Phenology: % vegetative %in flower % in fruit
% immature % mature % senescent

Population Vigor (1997):

Habitat Description (From Dorn or Atwood unless noted):

Moist - boggy seep with Caltha leptosepala, S. planifolia, Pedicularis groenlandica, Carex spp., Scirpus, Veronica sp., Dodecatheon pulchellum, Pedtaphylloides floribunda (Tonne 2001).

Land Use/Visible Disturbance/Possible Threats:

Specimens, if collected:

Collection #

Herbarium where deposited:

Other Observations:

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: Upper Jacks Creek **Survey Date:** 7/4/2001

2001 Field Notes: Habitat ranges from open boggy carex/moss meadow to more upland understory of *Picea engelmannii*. Noticed here that Booth - like plants retain marginal glands, an attribute of *S. arizonica*. Atwood mapped this as two separate occurrences, but the plants are more or less continuous between the two areas. This area appears to be lightly to moderately grazed at present, but may have been under higher use in the past, and then released. Again it is difficult to separate the grazing pressure and harsh winter conditions. However, it is unlikely that there would be this much die-back in the winter without serious snow compaction, and I can't imagine that significant winter travel takes place here.

County:USGS 7.5' **Quad Name:** Truchas Peak

Narrative Description of Location:

Legal Description:

Latitude: **Longitude:**
Elevation : _ft.

UTM coordinates (NAD27 Datum; 2001 surveys):
Start Easting: 442280E **Start Northing:** 3974002N
End Easting: 442293E **End Northing:** 3973770N

UTM notes: The ending position is just west of a small pond.

Ranger District : Pecos

Acres of occupied habitat:

Number of Individuals observed: 200estimate counted

Phenology: % vegetative %in flower % in fruit
% immature % mature % senescent

Population Vigor (1997):

Habitat Description (From Dorn or Atwood unless noted):
Best habitat characterized by open *Carex* spp., *Caltha leptosepala*, *Pedicularis groenlandica*, mossy meadow, with some *Pentaphylloides floribunda*, *Phleum alpinum*, *Polygonum* sp., and *Deschampsia* sp. (Tonne 2001).

Land Use/Visible Disturbance/Possible Threats:

Specimens, if collected:

Collection #

Herbarium where deposited:

Other Observations:

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: Lower Jacks **Survey Date:** 7/4/2001

2001 Field Notes: > 2 Ha. and > 1000 plants. A nice, large mossy moist meadow. Light to moderate grazing; no significant recent clipping or dung (old cow dung present). Population is a wide wedge narrowing towards its downstream edge. It widens and narrows with the forest. Willows to 4 dm., vegetative.

County:USGS 7.5' **Quad Name:** Truchas Peak

Narrative Description of Location:

Legal Description:

Latitude: **Longitude:**
Elevation : _ft.

UTM coordinates (NAD27 Datum; 2001 surveys):
Start Easting: 442713E **Start Northing:** 3972455N
End Easting: 442852E **End Northing:** 3972622N

UTM notes: Start and End = upstream limits of population; occurrence extends to wpt 41 (442933E, 3972052N).

Ranger District : Pecos

Acres of occupied habitat:

Number of Individuals observed: estimate counted

Phenology: % vegetative %in flower % in fruit
% immature % mature % senescent

Population Vigor (1997):

Habitat Description (From Dorn or Atwood unless noted):
S. arizonica with: Picea engelmannii, Carex spp., Salix planifolia, Carex spp., Salix planifolia, Pedicularis groenlandica, Caltha leptosepala, Deschampsia sp., Pentaphylloides floribunda (Tonne 2001).

Land Use/Visible Disturbance/Possible Threats:

Specimens, if collected:
Collection #
Herbarium where deposited:
Other Observations:

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: Upper Pecos River **Survey Date:** 7/5/2001

2001 Field Notes: Large seep with Salix boothii, to .5 m.; taller with reproduction next to stream. Plants resembling Salix arizonica uphill on slope. 1000s of Salix boothii, with little if any S. arizonica (vegetative plant identification questionable). Grazing moderate to heavy. Dorn maps a population just above Pecos Falls. No Salix arizonica was located here in 2001, only Salix boothii.

County:USGS 7.5' **Quad Name:** Pecos Falls

Narrative Description of Location:

Legal Description:

Latitude: **Longitude:**
Elevation : _ft.

UTM coordinates (NAD27 Datum; 2001 surveys):
Start Easting: 451260E **Start Northing:** 3978272N
End Easting: 451116E **End Northing:** 3978338N

UTM notes: Population continues upstream, though not as extensive to wpt 50 (451116E, 3978338N).

Ranger District : Pecos

Acres of occupied habitat:

Number of Individuals observed: estimate counted

Phenology: % vegetative %in flower % in fruit
 % immature % mature % senescent

Population Vigor (1997):

Habitat Description (From Dorn or Atwood unless noted):
Salix boothii w/ Carex spp., Pedicularis groenlandica, Senecio sp., Caltha leptosepala, Polygonum sp., Castilleja sp.

Land Use/Visible Disturbance/Possible Threats:

Specimens, if collected:

Collection #

Herbarium where deposited:

Other Observations:

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: Valdez **Survey Date:** 7/5/2001

2001 Field Notes: Area is predominantly S. boothii and S. planifolia with pockets of Salix arizonica - like plants in moist, boggy seeps. (Again the vegetative plants are difficult to identify here). If present, Salix arizonica is a small percentage of total valley area, ca. 1 Ha.

County: USGS 7.5' **Quad Name:** Pecos Falls

Narrative Description of Location:

Legal Description:

Latitude: **Longitude:**
Elevation : _ft.

UTM coordinates (NAD27 Datum; 2001 surveys):
Start Easting: 452445E **Start Northing:** 3978188N
End Easting: 452267E **End Northing:** 3977805N

UTM notes:

Ranger District : Pecos

Acres of occupied habitat:

Number of Individuals observed: estimate counted

Phenology: % vegetative %in flower % in fruit
 % immature % mature % senescent

Population Vigor (1997):

Habitat Description (From Dorn or Atwood unless noted):
Salix arizonica - like plants in moist boggy seeps. S. planifolia, S. boothii, Caltha leptosepala, Carex spp., Pedicularis groenlandica, and scattered Picea engelmannii.

Land Use/Visible Disturbance/Possible Threats:

Specimens, if collected:

Collection #

Herbarium where deposited:

Other Observations:

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: Jarosa Survey Date: 7/5/2001

2001 Field Notes: Moist mossy meadow at bend in creek just above trail. Mostly booth's willow. Some of the willows do have persistent glands and could be Salix arizonica. Growth to 6 inches; ca. 100 plants in 10m. x 35m area. Grazing moderate. Adjacent area, just across creek, is extremely overgrazed; this level of overuse extends over a large area.

County:USGS 7.5' Quad Name: Pecos Falls

Narrative Description of Location:

Legal Description:

Latitude: Longitude: Elevation : _ft.

UTM coordinates (NAD27 Datum; 2001 surveys): Start Easting: 449040E Start Northing: 3976996N End Easting: E End Northing: N

UTM notes:

Ranger District : Pecos

Acres of occupied habitat:

Number of Individuals observed: estimate counted

Phenology: % vegetative %in flower % in fruit % immature % mature % senescent

Population Vigor (1997):

Habitat Description (From Dorn or Atwood unless noted): Moist mossy meadow @ bend in creek just above trail. Caltha leptosepala, Pedicularis groenlandica, Pentaphragmoides floribunda, Picea engelmannii, Castilleja sp., Carex spp., and Scirpus.

Land Use/Visible Disturbance/Possible Threats:

Specimens, if collected: Collection # Herbarium where deposited: Other Observations:

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: South Fork, Rio de la Casa **Survey Date:** 7/12/1998

2001 Field Notes: This area was not visited in 2001 because it was not listed in the Atwood report; this specimen was collected after the report was completed, and I was not aware of the location at the time of the 2001 surveys.

County: USGS 7.5' **Quad Name:** Pecos Falls

Narrative Description of Location: Ca. .84 mi. S and ca. 0.3 m W. of Middle Fork Lake.

Legal Description: T20N, R13E, SE4SW4 sec. 2 [this section as shown on the forest service map is much larger than 640 acres]

Latitude: **Longitude:**
Elevation : _ft.

UTM coordinates (NAD27 Datum; 2001 surveys):

Start Easting: E **Start Northing:** N

End Easting: E **End Northing:** N

UTM notes:

Ranger District : Las Vegas

Acres of occupied habitat:

Number of Individuals observed: estimate counted

Phenology: % vegetative %in flower % in fruit
% immature % mature % senescent

Population Vigor (1997):

Habitat Description (From Dorn or Atwood unless noted):
High open semi-wet meadow near timberline.

Land Use/Visible Disturbance/Possible Threats:

Specimens, if collected:

Collection # D. Atwood, B. Furniss, M. Lujan (24048)

Herbarium where deposited: NMC Acc# 69526

Other Observations:

Arizona Willow Occurrence – New Mexico

Combined information from surveys for Arizona Willow – based on observations by Robert Dorn (1997), Duane Atwood (1996), and Phil Tonne (2001).

Site Number: East of Middle Fork Lake, at head of Middle Fork, Rio de la Casa **Survey Date:** 7/12/1998

2001 Field Notes: This area was not visited in 2001 because it was not listed in the Atwood report; this specimen was collected after the report was completed, and I was not aware of the location at the time of the 2001 surveys.

County: USGS 7.5' **Quad Name:** Pecos Falls

Narrative Description of Location: Due E of Middle Fork Lake, at head of Middle Fork Rio de la Casa.

Legal Description: T20N, R13E, SW4NE4 sec. 2 [this section as shown on the forest service map is much larger than 640 acres]

Latitude: **Longitude:**
Elevation : _ft.

UTM coordinates (NAD27 Datum; 2001 surveys):

Start Easting: E **Start Northing:** N
End Easting: E **End Northing:** N

UTM notes:

Ranger District : Las Vegas

Acres of occupied habitat:

Number of Individuals observed: estimate counted

Phenology: % vegetative %in flower % in fruit
 % immature % mature % senescent

Population Vigor (1997):

Habitat Description (From Dorn or Atwood unless noted):
Thickets of willow around lake.

Land Use/Visible Disturbance/Possible Threats:

Specimens, if collected:

Collection # D. Atwood, B. Furniss, M. Lujan (24049)

Herbarium where deposited: NMC Acc# 69535

Other Observations: