

VASCULAR PLANT INVENTORIES

at

HUBBELL TRADING POST NATIONAL HISTORIC SITE



2004

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ABSTRACT

The focus of the study at Hubbell Trading Post (HUTR) was to provide park managers with a complete baseline inventory of vascular plants. Complete area searches were conducted within all habitats over a 2-year period from May 2001 to September 2002. A total of 98 vouchers were collected during the two years of inventory. Previous collections and a previous inventory in 1987 resulted in the collection of 128 specimens. Total number of plant taxa present at Hubbell Trading Post is now 184 representing 48 plant families. Fifty-three previously undocumented species were collected during the inventory period. Many of the additional species found during the 2001-2002 inventory were exotic or weedy species, including 13 SWEMP (Southwest Exotic Plant Mapping Project) listed species, bringing the total number of SWEMP listed species to 28 (ca. 15 % of flora). Sixty-one (33%) of the total number of taxa were exotic species, including 11 cultivars. No special status plants were found. Hubbell Trading Post contains one sensitive habitat, the riparian habitat of Pueblo Colorado Wash. The Park Service has been actively restoring the wash since 1998.

Keywords: Hubbell Trading Post National Historic Site, northern Arizona, vascular plant inventory, NPS I & M Program, rare plants, exotic plants, SWEMP.

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INTRODUCTION

The National Park Omnibus Management Act, passed by the U.S. Congress in 1998, provided federal support for a “program of inventory and monitoring of National Park Service (NPS) resources to establish baseline information and to provide information on the long-term trends in the condition of National Park Service resources.” This Act also provided the basis for Congressional funding for the NPS-Servicewide Inventory and Monitoring Program (I&M). This nationwide I&M program is currently compiling and organizing existing resource data for 265 NPS units, and completing inventory and monitoring data to fill data gaps in existing information. The I&M program will provide NPS land managers with comprehensive, scientifically-based information about the nature and status of natural resources within their jurisdictions for the purposes of management decision-making, scientific research, and public education.

Under a cooperative agreement established through the Colorado Plateau Cooperative Ecosystem Studies Unit, the Navajo Natural Heritage Program (NNHP) of the Navajo Nation Department of Fish and Wildlife agreed to conduct vascular plant inventories for the NPS at two of the national parks that are contained within Navajo Nation lands in Arizona. These parks are Hubbell Trading Post National Historic Site in Apache County (HUTR), and Navajo National Monument (NAVA) in Navajo and Coconino counties (see separate report on NAVA).

The Navajo Nation is situated within the south-central part of the Colorado Plateau and encompasses portions of Arizona, New Mexico, and Utah, covering over 25,000 square miles of land. Most of the land is semi-arid high plateau country but vegetation communities range from salt-desert scrub at the lower elevations to mixed

conifer communities in the mountains. Elevation ranges between 853 m (2,800 ft) at the mouth of the Little Colorado River, to 3,175 m (10,416 ft) at the summit of Navajo Mountain.

Hubbell Trading Post National Historic Site

Hubbell Trading Post National Historic Site is located along Pueblo Colorado Wash within the town of Ganado in northern Apache County, AZ. This National Historic Landmark is a culturally significant feature in that it is a continuously-operated Native American trading post. The unit encompasses 64.8 ha (160 acres), including the structural components of the Trading Post, NPS buildings and staff housing, plus an 880 m (2887ft) section of Pueblo Colorado Wash. The portion of Pueblo Colorado Wash within the HUTR boundaries is currently being restored with the goal of a total replacement of non-native to native riparian vegetation. The elevation within the unit boundaries ranges from approximately 1920 to 1940 m (6300 to 6365ft). The wash and its alluvial banks compose approximately 6.4 ha (16 acres) of the trading post. Because of the cultural preservation focus of the park in the past, very little attention has been directed towards natural resources. Previous floristic work is limited to a vascular plant inventory from 1987 (Gandhi and Hatch 1987)

METHODS

Baseline inventories were accomplished by performing complete area searches within the park boundaries. Existing information was used and included whenever possible (Gandhi and Hatch 1987). A special focus during the baseline inventories was on sensitive habitats (hanging gardens, seeps and springs, and relic stands of vegetation),

because they often contain a significant number of species not found elsewhere. Potential rare or sensitive species were obtained from the Navajo Endangered Species List (NESL) which includes federally listed species with the potential to occur within the boundaries of the Navajo Nation (Appendix 3). To further expand the possibility of rare or sensitive species at Hubbell Trading the Navajo Natural Heritage Element Tracking List for plants was also utilized (Appendix 4). For sensitive species encountered the standard protocol used by the Natural Heritage Program (Element Occurrence Form) was utilized to record pertinent information. A field report on sensitive species included a map, habitat description, elevation, site condition, and associated species. Noxious weeds were recorded according to the protocol of the Southwest Exotic Plant Mapping Program (SWEMP 2000), which included estimated area, cover percentage, density, and additional site-specific information. Exotic species were defined as plants that are not native to the United States. Voucher specimens were collected for each new species encountered and the location of the collection was recorded using a Garmin Global Positioning System with an approximate accuracy of less than 15m.

Identifications were checked against descriptions in Cronquist et al. (1977, 1984, 1989, 1994, 1997), Kearney et al. (1960), and McDougall (1973), or other recent treatments. Current taxonomy and exotic species status were determined from the USDA Plants Database (2004). All voucher specimens were deposited at the local park herbaria in Ganado and duplicate specimens were deposited at the NAU Deaver Herbarium (ASC) in Flagstaff and the Navajo Nation Herbarium (NAVA) at the Department of Fish & Wildlife in Window Rock, AZ. Detailed information on plant specimens and their

locations will be available at the NPS Inventory and Monitoring website at:

<http://www.nature.nps.gov/im>

Field surveys were conducted as follows: 2001: 5/22, 5/23, 8/20, 8/21 2002:
5/16, 6/11, 9/18, 9/19

INVENTORY OBJECTIVES

Inventory objectives described in Stuart (2000) were:

1. To document the occurrence of at least 90% of vascular plant species estimated to occur in the parks and monuments.
2. To describe the distribution and relative abundance of species of special concern with emphasis on special habitats, rare and endangered species, and exotic species.
3. To provide a baseline of information to develop a monitoring strategy for special emphasis species and habitats identified in the inventory.
4. To develop a data management system accessible to park managers, scientists, and the public.

RESULTS

The total number of voucher specimens collected during the two years of inventory is 98 (Appendix 1). Previous collections and a previous inventory resulted in the collection of an additional 128 specimens (Gandhi and Hatch 1987). The total number of plant species, subspecies and varieties present at Hubbell Trading Post now totals 184, representing 48 plant families (Appendix 2). Fifty-three previously

undocumented species were collected during the inventory period (Table 1). Many of the additional species found during the 2001-2002 inventories were exotic or weedy species, including 13 SWEMP listed species, bringing the total number of SWEMP listed species to 28 or ca. 15 % of flora (Table 2). All SWEMP listed species recorded in 1986 were still present on site in 2001 & 2002. In 2001, two of the dominant weedy species in the pastures were blue mustard (*Chorispora tenella*) and flixweed (*Descurainia sophia*). Neither one of these two species were recorded during the 1986 inventory. Sixty-one species (33% of the total flora) were exotic species, including 11 cultivars and 5 species considered both native and exotic. No special status plants were found.

The drought of 2002 reduced the abundance of plant species substantially, which was especially evident in the abundance of annual exotic species. Annual exotics were found only along the riparian zone and other small areas where water was available such as underneath the gutters along the walls of structures. In 2001, the old agricultural fields were dominated by flixweed, bindweed (*Convolvulus arvensis*), blue mustard, and tumbleweed (*Salsola kali*), which are all listed under the SWEMP Noxious Weed and Special Concern Species List of 2000. The dominant weedy species during the drought of 2002 was the perennial *Convolvulus arvensis*, especially in the old agricultural fields. The 3 remaining species are annual in habit and were almost completely missing from this site. Species diversity remained low during 2002 until the third survey period on September 19th after the rains had finally returned. Restoration work along Pueblo Colorado Wash continues to remove Russian olives, Chinese elms, and tamarisk from within the boundaries of the floodplain. Small native cottonwoods and willows have been planted along the wash.

Detailed information on plant species collected and their location can be found on the NPS Inventory & Monitoring Program website at <http://www.nature.nps.gov/im>.

DISCUSSION

The National Park Service estimated that 90% of expected species are detected once 186 species have been documented to occur at Hubbell Trading Post. This inventory identified 184 species. Considering the small size of the park, amount of time spend in the field during different seasons, and previously documented species, we feel that the 90% goal has been achieved. Even just 2 years of study have shown that species distribution and abundance is directly correlated to season and weather. Hubbell Trading Post has a large component of annual species and especially annual exotics whose abundance in any given year is directly related to rainfall and season. Due to its proximity to a main highway, high tourist visitation rates and the high degree of land disturbance at Hubbell Trading Post, future expansion and increase of weedy species can be expected.

Since it's founding over 100 years ago Hubbell Trading Post has been a culturally significant site with numerous human caused impacts, including irrigation and agriculture and livestock grazing until the early 1960's. Hubbell Trading Post has a highly disturbed natural environment that will likely continue. Hubbell Hill represents the only relatively undisturbed area within Park boundaries.

The Pueblo Colorado Wash riparian area is actively being restored. Noxious woody species are being removed and native woody species are being planted.

Continued monitoring of native vegetation establishment, increased planting of native vegetation and continued removal of exotics is already in progress at the Trading Post

Hubbell Trading Post anticipates the reinstatement of agriculture in at least one of the currently abandoned fields. Fallow agricultural fields tend to invite the establishment of new exotic species or noxious weeds. It is highly recommended that the National Park Service monitor high impact areas, such as areas surrounding the parking lots, housing and freshly plowed fields for weedy species with potential to overtake the site. This includes Russian knapweed (*Acroptilon repens*) and Texas blueweed (*Helianthus ciliaris*) in particular, as both are currently present on site in relatively small amounts.

The plant species list at Hubbell Trading Post increased by almost 30% since the original inventory of 1987. The species additions are likely due to the invasion of new exotic species and the larger extent of the current inventory spanning over 2 years and two seasons each year. Despite the fact that the number of exotic species increased substantially, the percentage of exotics in the total flora remains similar (30 – 33%). This is due to an increase in the total number of species present in the flora following the inventory. Even without the cultivated exotic plants and species considered both native and introduced, the composition of exotics remains high (27% of total flora). Forty-three percent (23 taxa) of the newly documented species were exotics. Several native species found in 1987 were no longer found at the Trading Post in 2001 or 2002. It is unclear whether these species were extirpated from the site, whether they were not found during the most recent inventory, or whether they were initially misidentified. Several questionable taxa from the Hubbell Trading Post herbarium were investigated and annotated with current and correct names if necessary. No rare or sensitive species were

found at Hubbell Trading Post; in fact none were listed as potential to occur there with the Navajo Natural Heritage Program's database. This is primarily due to the extent of habitat disturbance at the Trading Post and the overall lack of habitat for sensitive species.

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Table 1. Summary of species additions to the Hubbell Trading Post National Historic Site vascular plant list with this inventory.

	1987	2002
Total No. of Species	128	184
No. of SWEMP listed Species	15	28
No. of Exotic Species	38	61
No. of Rare Species	0	0

Table 2. SWEMP listed species and their relative abundance at Hubbell Trading Post
National Historic Site in Ganado, AZ, 2001 – 2002

Species	Relative Abundance
<i>Acroptilon repens</i>	Occasional
<i>Aegilops cylindrica</i>	Rare
<i>Bromus tectorum</i>	Common
<i>Cardaria chalepensis</i>	Rare
<i>Carduus nutans</i>	Rare
<i>Chorispora tenella</i>	Ubiquitous
<i>Cichorium intybus</i>	Rare
<i>Cirsium vulgare</i>	Rare
<i>Convolvulus arvensis</i>	Ubiquitous
<i>Conyza canadensis</i>	Occasional
<i>Cuscuta umbellata</i>	Occasional
<i>Cyperus esculentus</i>	Rare
<i>Descuraina sophia</i>	Ubiquitous
<i>Elaeagnus angustifolia</i>	Occasional
<i>Erodium cicutarium</i>	Ubiquitous
<i>Helianthus ciliaris</i>	Occasional
<i>Kochia scoparia</i>	Occasional
<i>Marrubium vulgare</i>	Rare
<i>Melilotus alba</i>	Rare
<i>Melilotus officinalis</i>	Rare

Species	Relative Abundance
<i>Portulaca oleracea</i>	Ubiquitous
<i>Salsola collina</i>	Occasional
<i>Salsola tragus</i>	Ubiquitous
<i>Setaria viridis</i>	Rare
<i>Tamarix chinensis</i>	Occasional
<i>Tamarix ramosissima</i>	Occasional
<i>Tribulus terrestris</i>	Occasional
<i>Xanthium strumarium</i>	Occasional

APPENDIX 1. Voucher specimens documenting the vascular flora of Hubbell Trading Post

National Historic Site in Ganado, AZ; list includes plants collected by Gandhi and Hatch (1987) and this study (D. Roth)

Family Name	Latin Name	Collector
Agavaceae	<i>Yucca angustissima</i>	Gandhi, Kancheepuram
Agavaceae	<i>Yucca baccata</i>	Daniela Roth
Agavaceae	<i>Yucca baccata</i>	Gandhi, Kancheepuram
Amaranthaceae	<i>Amaranthus albus</i>	Gandhi, Kancheepuram
Amaranthaceae	<i>Amaranthus powellii</i>	Daniela Roth
Amaranthaceae	<i>Amaranthus wrightii</i>	Gandhi, Kancheepuram
Apiaceae	<i>Cymopterus purpureus</i>	Gandhi, Kancheepuram
Asclepiadaceae	<i>Asclepias subverticillata</i>	Daniela Roth
Asclepiadaceae	<i>Asclepias subverticillata</i>	Gandhi, Kancheepuram
Asteraceae	<i>Achillea millefolium</i>	Daniela Roth
Asteraceae	<i>Acroptilon repens</i>	Daniela Roth
Asteraceae	<i>Acroptilon repens</i>	Daniela Roth
Asteraceae	<i>Ambrosia acanthicarpa</i>	Daniela Roth
Asteraceae	<i>Ambrosia psilostachya</i>	Gandhi, Kancheepuram
Asteraceae	<i>Artemisia bigelovii</i>	Daniela Roth
Asteraceae	<i>Artemisia carruthii</i>	Daniela Roth
Asteraceae	<i>Carduus nutans</i>	Gandhi, Kancheepuram
Asteraceae	<i>Chaetopappa ericoides</i>	Daniela Roth
Asteraceae	<i>Chrysothamnus Greenei</i>	Daniela Roth
Asteraceae	<i>Cichorium intybus</i>	Daniela Roth
Asteraceae	<i>Cirsium arizonicum</i>	Gandhi, Kancheepuram
Asteraceae	<i>Cirsium ochrocentrum</i>	Gandhi, Kancheepuram
Asteraceae	<i>Cirsium vulgare</i>	Gandhi, Kancheepuram
Asteraceae	<i>Conyza canadensis</i>	Daniela Roth
Asteraceae	<i>Conyza canadensis</i>	Gandhi, Kancheepuram
Asteraceae	<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>glabrata</i>	Daniela Roth
Asteraceae	<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i>	Gandhi, Kancheepuram
Asteraceae	<i>Grindelia nuda</i> var. <i>aphanactis</i>	Gandhi, Kancheepuram
Asteraceae	<i>Gutierrezia sarothrae</i>	Daniela Roth
Asteraceae	<i>Gutierrezia sarothrae</i>	Gandhi, Kancheepuram
Asteraceae	<i>Helianthus ciliaris</i>	Daniela Roth
Asteraceae	<i>Helianthus ciliaris</i>	Gandhi, Kancheepuram
Asteraceae	<i>Helianthus petiolaris</i>	Gandhi, Kancheepuram
Asteraceae	<i>Heterotheca villosa</i> var. <i>villosa</i>	Gandhi, Kancheepuram
Asteraceae	<i>Hymenopappus filifolius</i>	Gandhi, Kancheepuram
Asteraceae	<i>Hymenopappus filifolius</i> var. <i>lugens</i>	Gandhi, Kancheepuram
Asteraceae	<i>Hymenoxys richardsonii</i> var. <i>floribunda</i>	Gandhi, Kancheepuram
Asteraceae	<i>Iva axillaris</i>	Daniela Roth

Family Name	Latin Name	Collector
Asteraceae	<i>Lactuca serriola</i>	Gandhi, Kancheepuram
Asteraceae	<i>Machaeranthera canescens var. canescens</i>	Daniela Roth
Asteraceae	<i>Malacothrix fendleri</i>	Gandhi, Kancheepuram
Asteraceae	<i>Ratibida columnifera</i>	Daniela Roth
Asteraceae	<i>Senecio flaccidus var. flaccidus</i>	Gandhi, Kancheepuram
Asteraceae	<i>Taraxacum officinale</i>	Daniela Roth
Asteraceae	<i>Taraxacum officinale</i>	Gandhi, Kancheepuram
Asteraceae	<i>Thelesperma megapotamicum</i>	Gandhi, Kancheepuram
Asteraceae	<i>Tragopogon dubius</i>	Daniela Roth
Asteraceae	<i>Tragopogon dubius</i>	Gandhi, Kancheepuram
Asteraceae	<i>Verbesina encelioides</i>	Daniela Roth
Asteraceae	<i>Xanthium strumarium</i>	Gandhi, Kancheepuram
Boraginaceae	<i>Cryptantha barbiger</i>	Gandhi, Kancheepuram
Boraginaceae	<i>Cryptantha cinerea var. jamesii</i>	Gandhi, Kancheepuram
Boraginaceae	<i>Lappula occidentalis var. cupulata</i>	Gandhi, Kancheepuram
Boraginaceae	<i>Lappula occidentalis var. occidentalis</i>	Daniela Roth
Brassicaceae	<i>Alyssum minus</i>	Daniela Roth
Brassicaceae	<i>Alyssum minus</i>	Gandhi, Kancheepuram
Brassicaceae	<i>Alyssum minus var. micranthum</i>	Daniela Roth
Brassicaceae	<i>Capsella bursa-pastoris</i>	Gandhi, Kancheepuram
Brassicaceae	<i>Cardaria chalepensis</i>	Daniela Roth
Brassicaceae	<i>Chorispora tenella</i>	Daniela Roth
Brassicaceae	<i>Descurainia sophia</i>	Daniela Roth
Brassicaceae	<i>Dimorphocarpa wislizeni</i>	Gandhi, Kancheepuram
Brassicaceae	<i>Erysimum repandum</i>	Daniela Roth
Brassicaceae	<i>Erysimum repandum</i>	Daniela Roth
Brassicaceae	<i>Lepidium perfoliatum</i>	Daniela Roth
Brassicaceae	<i>Lepidium perfoliatum</i>	Gandhi, Kancheepuram
Brassicaceae	<i>Lesquerella intermedia</i>	Gandhi, Kancheepuram
Brassicaceae	<i>Physaria newberryi</i>	Daniela Roth
Brassicaceae	<i>Sisymbrium altissimum</i>	Gandhi, Kancheepuram
Brassicaceae	<i>Stanleya pinnata</i>	Gandhi, Kancheepuram
Cactaceae	<i>Cylindropuntia whipplei</i>	Gandhi, Kancheepuram
Cactaceae	<i>Opuntia polyacantha</i>	Gandhi, Kancheepuram
Capparaceae	<i>Cleome serrulata</i>	Gandhi, Kancheepuram
Chenopodiaceae	<i>Atriplex canescens</i>	Gandhi, Kancheepuram
Chenopodiaceae	<i>Bassia hyssopifolia</i>	Gandhi, Kancheepuram
Chenopodiaceae	<i>Chenopodium album</i>	Gandhi, Kancheepuram
Chenopodiaceae	<i>Chenopodium graveolens</i>	Daniela Roth
Chenopodiaceae	<i>Kochia scoparia</i>	Daniela Roth
Chenopodiaceae	<i>Kochia scoparia</i>	Daniela Roth
Chenopodiaceae	<i>Krascheninnikovia lanata</i>	Daniela Roth
Chenopodiaceae	<i>Krascheninnikovia lanata</i>	Daniela Roth
Chenopodiaceae	<i>Salsola collina</i>	Daniela Roth
Chenopodiaceae	<i>Salsola tragus</i>	Gandhi, Kancheepuram

Family Name	Latin Name	Collector
Convolvulaceae	<i>Convolvulus arvensis</i>	Gandhi, Kancheepuram
Cupressaceae	<i>Juniperus osteosperma</i>	Gandhi, Kancheepuram
Cupressaceae	<i>Juniperus osteosperma</i>	Gandhi, Kancheepuram
Cuscutaceae	<i>Cuscuta umbellata</i>	Daniela Roth
Cyperaceae	<i>Cyperus esculentus</i>	Daniela Roth
Cyperaceae	<i>Schoenoplectus americanus</i>	Daniela Roth
Cyperaceae	<i>Schoenoplectus americanus</i>	Gandhi, Kancheepuram
Elaeagnaceae	<i>Elaeagnus angustifolia</i>	Daniela Roth
Elaeagnaceae	<i>Elaeagnus angustifolia</i>	Gandhi, Kancheepuram
Ephedraceae	<i>Ephedra torreyana</i>	Gandhi, Kancheepuram
Equisetaceae	<i>Equisetum arvense</i>	Gandhi, Kancheepuram
Euphorbiaceae	<i>Chamaesyce fendleri</i>	Daniela Roth
Euphorbiaceae	<i>Chamaesyce fendleri</i>	Gandhi, Kancheepuram
Euphorbiaceae	<i>Chamaesyce glyptosperma</i>	Gandhi, Kancheepuram
Euphorbiaceae	<i>Chamaesyce nutans</i>	Gandhi, Kancheepuram
Euphorbiaceae	<i>Croton texensis</i>	Gandhi, Kancheepuram
Fabaceae	<i>Astragalus amphioxys</i>	Gandhi, Kancheepuram
Fabaceae	<i>Lupinus kingii</i>	Gandhi, Kancheepuram
Fabaceae	<i>Medicago lupulina</i>	Gandhi, Kancheepuram
Fabaceae	<i>Medicago sativa</i>	Gandhi, Kancheepuram
Fabaceae	<i>Melilotus alba</i>	Gandhi, Kancheepuram
Fabaceae	<i>Melilotus officinalis</i>	Daniela Roth
Fabaceae	<i>Melilotus officinalis</i>	Gandhi, Kancheepuram
Fabaceae	<i>Oxytropis lambertii</i>	Gandhi, Kancheepuram
Fabaceae	<i>Parryella filifolia</i>	Daniela Roth
Fabaceae	<i>Trifolium repens</i>	Gandhi, Kancheepuram
Geraniaceae	<i>Erodium cicutarium</i>	Gandhi, Kancheepuram
Grossulariaceae	<i>Ribes aureum</i>	Daniela Roth
Grossulariaceae	<i>Ribes aureum</i>	Gandhi, Kancheepuram
Hydrophyllaceae	<i>Nama retrorsum</i>	Gandhi, Kancheepuram
Iridaceae	<i>Iris germanica</i>	Gandhi, Kancheepuram
Juglandaceae	<i>Juglans cinerea</i>	Daniela Roth
Juglandaceae	<i>Juglans cinerea</i>	Gandhi, Kancheepuram
Lamiaceae	<i>Dracocephalum parviflorum</i>	Daniela Roth
Lamiaceae	<i>Marrubium vulgare</i>	Daniela Roth
Lamiaceae	<i>Marrubium vulgare</i>	Gandhi, Kancheepuram
Lamiaceae	<i>Mentha arvensis</i>	Gandhi, Kancheepuram
Lamiaceae	<i>Salvia reflexa</i>	Daniela Roth
Liliaceae	<i>Calochortus nuttallii</i>	Gandhi, Kancheepuram
Linaceae	<i>Linum aristatum</i>	Gandhi, Kancheepuram
Loasaceae	<i>Mentzelia pumila</i>	Daniela Roth
Loasaceae	<i>Mentzelia pumila</i>	Gandhi, Kancheepuram
Loasaceae	<i>Mentzelia pumila</i>	Gandhi, Kancheepuram
Malvaceae	<i>Malva neglecta</i>	Daniela Roth
Malvaceae	<i>Malva neglecta</i>	Gandhi, Kancheepuram

Family Name	Latin Name	Collector
Malvaceae	<i>Sphaeralcea coccinea</i>	Gandhi, Kancheepuram
Malvaceae	<i>Sphaeralcea parvifolia</i>	Daniela Roth
Malvaceae	<i>Sphaeralcea parvifolia</i>	Gandhi, Kancheepuram
Moraceae	<i>Morus alba</i>	Daniela Roth
Moraceae	<i>Morus alba</i>	Gandhi, Kancheepuram
Nyctaginaceae	<i>Mirabilis linearis</i>	Gandhi, Kancheepuram
Nyctaginaceae	<i>Mirabilis multiflora</i>	Gandhi, Kancheepuram
Nyctaginaceae	<i>Tripterocalyx carnea var. wootonii</i>	Gandhi, Kancheepuram
Oleaceae	<i>Syringa vulgaris</i>	Gandhi, Kancheepuram
Onagraceae	<i>Gaura mollis</i>	Daniela Roth
Onagraceae	<i>Gaura mollis</i>	Gandhi, Kancheepuram
Onagraceae	<i>Oenothera albicaulis</i>	Daniela Roth
Onagraceae	<i>Oenothera flava</i>	Daniela Roth
Onagraceae	<i>Oenothera pallida var. runcinata</i>	Gandhi, Kancheepuram
Papaveraceae	<i>Argemone munita</i>	Gandhi, Kancheepuram
Plantaginaceae	<i>Plantago major</i>	Gandhi, Kancheepuram
Plantaginaceae	<i>Plantago patagonica</i>	Gandhi, Kancheepuram
Poaceae	<i>Achnatherum hymenoides</i>	Daniela Roth
Poaceae	<i>Achnatherum hymenoides</i>	Gandhi, Kancheepuram
Poaceae	<i>Achnatherum nelsonii ssp. dorei</i>	Gandhi, Kancheepuram
Poaceae	<i>Aegilops cylindrica</i>	Daniela Roth
Poaceae	<i>Aegilops cylindrica</i>	Gandhi, Kancheepuram
Poaceae	<i>Agropyron desertorum</i>	Daniela Roth
Poaceae	<i>Agrostis stolonifera</i>	Gandhi, Kancheepuram
Poaceae	<i>Aristida purpurea</i>	Daniela Roth
Poaceae	<i>Aristida purpurea</i>	Gandhi, Kancheepuram
Poaceae	<i>Bouteloua curtipendula</i>	Daniela Roth
Poaceae	<i>Bouteloua gracilis</i>	Daniela Roth
Poaceae	<i>Bromus inermis</i>	Daniela Roth
Poaceae	<i>Bromus inermis</i>	Daniela Roth
Poaceae	<i>Bromus japonicus</i>	Gandhi, Kancheepuram
Poaceae	<i>Bromus tectorum</i>	Gandhi, Kancheepuram
Poaceae	<i>Chloris virgata</i>	Daniela Roth
Poaceae	<i>Dactylis glomerata</i>	Gandhi, Kancheepuram
Poaceae	<i>Echinochloa crus-galli</i>	Daniela Roth
Poaceae	<i>Elymus canadensis</i>	Daniela Roth
Poaceae	<i>Elymus elymoides ssp. elymoides</i>	Daniela Roth
Poaceae	<i>Elymus trachycaulus</i>	Gandhi, Kancheepuram
Poaceae	<i>Elymus trachycaulus</i>	Daniela Roth
Poaceae	<i>Elymus trachycaulus</i>	Daniela Roth
Poaceae	<i>Eremopyrum triticeum</i>	Daniela Roth
Poaceae	<i>Hordeum jubatum</i>	Gandhi, Kancheepuram
Poaceae	<i>Hordeum murinum ssp. glaucum</i>	Daniela Roth
Poaceae	<i>Hordeum murinum ssp. leporinum</i>	Gandhi, Kancheepuram
Poaceae	<i>Muhlenbergia asperifolia</i>	Daniela Roth

Family Name	Latin Name	Collector
Poaceae	<i>Muhlenbergia wrightii</i>	Daniela Roth
Poaceae	<i>Monroa squarrosa</i>	Daniela Roth
Poaceae	<i>Monroa squarrosa</i>	Daniela Roth
Poaceae	<i>Panicum capillare</i>	Daniela Roth
Poaceae	<i>Pascopyrum smithii</i>	Gandhi, Kancheepuram
Poaceae	<i>Pleuraphis jamesii</i>	Daniela Roth
Poaceae	<i>Poa fendleriana</i>	Gandhi, Kancheepuram
Poaceae	<i>Poa pratensis</i>	Daniela Roth
Poaceae	<i>Poa pratensis</i>	Daniela Roth
Poaceae	<i>Polypogon monspeliensis</i>	Gandhi, Kancheepuram
Poaceae	<i>Puccinellia distans</i>	Daniela Roth
Poaceae	<i>Puccinellia distans</i>	Gandhi, Kancheepuram
Poaceae	<i>Setaria viridis</i>	Daniela Roth
Poaceae	<i>Sporobolus airoides</i>	Daniela Roth
Polemoniaceae	<i>Gilia subnuda</i>	Gandhi, Kancheepuram
Polygonaceae	<i>Eriogonum cernuum</i>	Gandhi, Kancheepuram
Polygonaceae	<i>Polygonum aviculare</i>	Daniela Roth
Polygonaceae	<i>Polygonum aviculare</i>	Gandhi, Kancheepuram
Polygonaceae	<i>Polygonum lapathifolium</i>	Gandhi, Kancheepuram
Polygonaceae	<i>Polygonum ramosissimum</i>	Daniela Roth
Polygonaceae	<i>Rumex salicifolius var. mexicanus</i>	Gandhi, Kancheepuram
Polygonaceae	<i>Rumex stenophyllus</i>	Daniela Roth
Portulacaceae	<i>Portulaca oleracea</i>	Daniela Roth
Ranunculaceae	<i>Ranunculus cymbalaria</i>	Gandhi, Kancheepuram
Rosaceae	<i>Malus baccata</i>	Daniela Roth
Rosaceae	<i>Malus sylvestris</i>	Gandhi, Kancheepuram
Rosaceae	<i>Malus X soulardii</i>	Gandhi, Kancheepuram
Rosaceae	<i>Prunus gracilis</i>	Gandhi, Kancheepuram
Rosaceae	<i>Prunus rivularis</i>	Gandhi, Kancheepuram
Rosaceae	<i>Rosa woodsii var. woodsii</i>	Gandhi, Kancheepuram
Salicaceae	<i>Populus alba</i>	Gandhi, Kancheepuram
Salicaceae	<i>Populus deltoides</i>	Daniela Roth
Salicaceae	<i>Populus deltoides</i>	Gandhi, Kancheepuram
Salicaceae	<i>Salix exigua</i>	Daniela Roth
Salicaceae	<i>Salix exigua</i>	Daniela Roth
Salicaceae	<i>Salix irrorata</i>	Daniela Roth
Scrophulariaceae	<i>Castilleja linariifolia</i>	Gandhi, Kancheepuram
Scrophulariaceae	<i>Veronica americana</i>	Gandhi, Kancheepuram
Solanaceae	<i>Chamaesaracha coronopus</i>	Gandhi, Kancheepuram
Solanaceae	<i>Lycium pallidum</i>	Daniela Roth
Solanaceae	<i>Physalis virginiana</i>	Gandhi, Kancheepuram
Solanaceae	<i>Solanum rostratum</i>	Daniela Roth
Solanaceae	<i>Solanum rostratum</i>	Gandhi, Kancheepuram
Solanaceae	<i>Solanum triflorum</i>	Daniela Roth
Tamaricaceae	<i>Tamarix chinensis</i>	Gandhi, Kancheepuram

Family Name	Latin Name	Collector
Tamaricaceae	<i>Tamarix ramosissima</i>	Daniela Roth
Ulmaceae	<i>Ulmus pumila</i>	Gandhi, Kancheepuram
Verbenaceae	<i>Verbena bracteata</i>	Daniela Roth
Verbenaceae	<i>Verbena bracteata</i>	Gandhi, Kancheepuram
Vitaceae	<i>Parthenocissus quinquefolia</i>	Gandhi, Kancheepuram
Zygophyllaceae	<i>Tribulus terrestris</i>	Daniela Roth
Zygophyllaceae	<i>Tribulus terrestris</i>	Gandhi, Kancheepuram

APPENDIX 2. Vascular plant species list for Hubbell Trading Post National Historic Site in
Ganado, AZ. N= Native, I = Introduced, C = Cultivated, SWEMP = Southwest Exotic
Plant Mapping Program

Family	Latin Name	Status
Agavaceae	<i>Yucca angustissima</i>	N
Agavaceae	<i>Yucca baccata</i>	N
Amaranthaceae	<i>Amaranthus albus</i>	N
Amaranthaceae	<i>Amaranthus powellii</i>	N
Amaranthaceae	<i>Amaranthus wrightii</i>	N
Apiaceae	<i>Cymopterus purpureus</i>	N
Asclepiadaceae	<i>Asclepias subverticillata</i>	N
Asteraceae	<i>Achillea millefolium</i>	N
Asteraceae	<i>Ambrosia acanthicarpa</i>	N
Asteraceae	<i>Ambrosia psilostachya</i>	N
Asteraceae	<i>Artemisia bigelovii</i>	N
Asteraceae	<i>Artemisia carruthii</i>	N
Asteraceae	<i>Carduus nutans</i>	I, SWEMP
Asteraceae	<i>Centaurea repens</i>	I, SWEMP
Asteraceae	<i>Chaetopappa ericoides</i>	N
Asteraceae	<i>Chrysothamnus greenei</i>	N
Asteraceae	<i>Chrysothamnus nauseosus ssp. graveolens</i>	N
Asteraceae	<i>Cichorium intybus</i>	I, SWEMP
Asteraceae	<i>Cirsium arizonicum</i>	N
Asteraceae	<i>Cirsium ochrocentrum</i>	N
Asteraceae	<i>Cirsium vulgare</i>	I, SWEMP
Asteraceae	<i>Conyza canadensis</i>	N, SWEMP
Asteraceae	<i>Ericameria nauseosa var. nauseosa</i>	N
Asteraceae	<i>Grindelia nuda var. aphanactis</i>	N
Asteraceae	<i>Gutierrezia sarothrae</i>	N
Asteraceae	<i>Helianthus ciliaris</i>	N, SWEMP
Asteraceae	<i>Helianthus petiolaris</i>	N
Asteraceae	<i>Heterotheca villosa var. villosa</i>	N
Asteraceae	<i>Hymenopappus filifolius</i>	N
Asteraceae	<i>Hymenopappus filifolius var. lugens</i>	N
Asteraceae	<i>Hymenoxys richardsonii var. floribunda</i>	N
Asteraceae	<i>Iva axillaris</i>	N
Asteraceae	<i>Lactuca serriola</i>	I
Asteraceae	<i>Machaeranthera canescens var. canescens</i>	N
Asteraceae	<i>Malacothrix fendleri</i>	N
Asteraceae	<i>Ratibida columnifera</i>	N
Asteraceae	<i>Senecio flaccidus var. flaccidus</i>	N
Asteraceae	<i>Taraxacum officinale</i>	N/I
Asteraceae	<i>Thelesperma megapotamicum</i>	N
Asteraceae	<i>Tragopogon dubius</i>	I

Family	Latin Name	Status
Asteraceae	<i>Verbesina encelioides</i>	N
Asteraceae	<i>Xanthium strumarium</i>	N, SWEMP
Boraginaceae	<i>Cryptantha barbigera</i>	N
Boraginaceae	<i>Cryptantha cinerea</i> var. <i>jamesii</i>	N
Boraginaceae	<i>Lappula occidentalis</i> var. <i>cupulata</i>	N
Boraginaceae	<i>Lappula occidentalis</i> var. <i>occidentalis</i>	N
Brassicaceae	<i>Alyssum minus</i>	I
Brassicaceae	<i>Alyssum minus</i> var. <i>micranthum</i>	I
Brassicaceae	<i>Capsella bursa-pastoris</i>	I
Brassicaceae	<i>Cardaria chalepensis</i>	I, SWEMP
Brassicaceae	<i>Chorispota tenella</i>	I, SWEMP
Brassicaceae	<i>Descurainia sophia</i>	I, SWEMP
Brassicaceae	<i>Dimorphocarpa wislizeni</i>	N
Brassicaceae	<i>Erysimum repandum</i>	I
Brassicaceae	<i>Lepidium perfoliatum</i>	I
Brassicaceae	<i>Lesquerella intermedia</i>	N
Brassicaceae	<i>Physaria newberryi</i>	N
Brassicaceae	<i>Sisymbrium altissimum</i>	I
Brassicaceae	<i>Stanleya pinnata</i>	N
Cactaceae	<i>Cylindropuntia whipplei</i>	N
Cactaceae	<i>Opuntia polyacantha</i>	N
Capparaceae	<i>Cleome serrulata</i>	N
Chenopodiaceae	<i>Atriplex canescens</i>	N
Chenopodiaceae	<i>Bassia hyssopifolia</i>	I
Chenopodiaceae	<i>Chenopodium album</i>	N/I
Chenopodiaceae	<i>Chenopodium graveolens</i>	N
Chenopodiaceae	<i>Kochia scoparia</i>	I, SWEMP
Chenopodiaceae	<i>Krascheninnikovia lanata</i>	N
Chenopodiaceae	<i>Salsola collina</i>	I, SWEMP
Chenopodiaceae	<i>Salsola tragus</i>	I, SWEMP
Convolvulaceae	<i>Convolvulus arvensis</i>	I, SWEMP
Cupressaceae	<i>Juniperus osteosperma</i>	N
Cuscutaceae	<i>Cuscuta umbellata</i>	N, SWEMP
Cyperaceae	<i>Cyperus esculentus</i>	N/I, SWEMP
Cyperaceae	<i>Schoenoplectus americanus</i>	N
Elaeagnaceae	<i>Elaeagnus angustifolia</i>	I, SWEMP
Ephedraceae	<i>Ephedra torreyana</i>	N
Equisetaceae	<i>Equisetum arvense</i>	N
Euphorbiaceae	<i>Chamaesyce fendleri</i>	N
Euphorbiaceae	<i>Chamaesyce glyptosperma</i>	N
Euphorbiaceae	<i>Chamaesyce nutans</i>	N
Euphorbiaceae	<i>Croton texensis</i>	N
Fabaceae	<i>Astragalus amphioxys</i>	N
Fabaceae	<i>Lupinus kingii</i>	N
Fabaceae	<i>Medicago lupulina</i>	I

Family	Latin Name	Status
Fabaceae	<i>Medicago sativa</i>	I
Fabaceae	<i>Melilotus alba</i>	I, SWEMP
Fabaceae	<i>Melilotus officinalis</i>	I, SWEMP
Fabaceae	<i>Oxytropis lambertii</i>	N
Fabaceae	<i>Parryella filifolia</i>	N
Fabaceae	<i>Trifolium repens</i>	I
Geraniaceae	<i>Erodium cicutarium</i>	I, SWEMP
Grossulariaceae	<i>Ribes aureum</i>	N
Hydrophyllaceae	<i>Nama retrorsum</i>	N
Iridaceae	<i>Iris germanica</i>	IC
Juglandaceae	<i>Juglans cinerea</i>	IC
Lamiaceae	<i>Dracocephalum parviflorum</i>	N
Lamiaceae	<i>Marrubium vulgare</i>	I, SWEMP
Lamiaceae	<i>Mentha arvensis</i>	N
Lamiaceae	<i>Salvia reflexa</i>	N
Liliaceae	<i>Calochortus nuttallii</i>	N
Linaceae	<i>Linum aristatum</i>	N
Loasaceae	<i>Mentzelia pumila</i>	N
Malvaceae	<i>Malva neglecta</i>	I
Malvaceae	<i>Sphaeralcea coccinea</i>	N
Malvaceae	<i>Sphaeralcea parvifolia</i>	N
Moraceae	<i>Morus alba</i>	IC
Nyctaginaceae	<i>Mirabilis linearis</i>	N
Nyctaginaceae	<i>Mirabilis multiflora</i>	N
Nyctaginaceae	<i>Tripteryocalyx carnea</i> var. <i>wootonii</i>	N
Oleaceae	<i>Syringa vulgaris</i>	IC
Onagraceae	<i>Gaura mollis</i>	N
Onagraceae	<i>Oenothera albicaulis</i>	N
Onagraceae	<i>Oenothera flava</i>	N
Onagraceae	<i>Oenothera pallida</i> var. <i>runcinata</i>	N
Papaveraceae	<i>Argemone munita</i>	N
Plantaginaceae	<i>Plantago major</i>	N
Plantaginaceae	<i>Plantago patagonica</i>	N
Poaceae	<i>Achnatherum hymenoides</i>	N
Poaceae	<i>Achnatherum nelsonii</i> ssp. <i>dorei</i>	N
Poaceae	<i>Aegilops cylindrica</i>	I, SWEMP
Poaceae	<i>Agropyron desertorum</i>	I
Poaceae	<i>Agrostis stolonifera</i>	N
Poaceae	<i>Aristida purpurea</i>	N
Poaceae	<i>Bouteloua curtipendula</i>	N
Poaceae	<i>Bouteloua gracilis</i>	N
Poaceae	<i>Bromus inermis</i>	N/I
Poaceae	<i>Bromus japonicus</i>	I
Poaceae	<i>Bromus tectorum</i>	I, SWEMP
Poaceae	<i>Chloris virgata</i>	N

Family	Latin Name	Status
Poaceae	<i>Dactylis glomerata</i>	I
Poaceae	<i>Echinochloa crus-galli</i>	I
Poaceae	<i>Elymus canadensis</i>	N
Poaceae	<i>Elymus elymoides ssp. elymoides</i>	N
Poaceae	<i>Elymus trachycaulus</i>	N
Poaceae	<i>Eremopyrum triticeum</i>	I
Poaceae	<i>Hordeum jubatum</i>	N
Poaceae	<i>Hordeum murinum ssp. glaucum</i>	I
Poaceae	<i>Hordeum murinum ssp. leporinum</i>	I
Poaceae	<i>Muhlenbergia asperifolia</i>	N
Poaceae	<i>Muhlenbergia wrightii</i>	N
Poaceae	<i>Monroa squarrosa</i>	N
Poaceae	<i>Panicum capillare</i>	N
Poaceae	<i>Pascopyrum smithii</i>	N
Poaceae	<i>Pleuraphis jamesii</i>	N
Poaceae	<i>Poa fendleriana</i>	N
Poaceae	<i>Poa pratensis</i>	N/I
Poaceae	<i>Polypogon monspeliensis</i>	I
Poaceae	<i>Puccinellia distans</i>	N
Poaceae	<i>Setaria viridis</i>	I, SWEMP
Poaceae	<i>Sporobolus airoides</i>	N
Polemoniaceae	<i>Gilia subnuda</i>	N
Polygonaceae	<i>Eriogonum cernuum</i>	N
Polygonaceae	<i>Polygonum aviculare</i>	I
Polygonaceae	<i>Polygonum lapathifolium</i>	N
Polygonaceae	<i>Polygonum ramosissimum</i>	N
Polygonaceae	<i>Rumex salicifolius var. mexicanus</i>	N
Polygonaceae	<i>Rumex stenophyllus</i>	I
Portulacaceae	<i>Portulaca oleracea</i>	N, SWEMP
Ranunculaceae	<i>Ranunculus cymbalaria</i>	N
Rosaceae	<i>Malus baccata</i>	IC
Rosaceae	<i>Malus sylvestris</i>	IC
Rosaceae	<i>Malus X soulardii</i>	IC
Rosaceae	<i>Prunus gracilis</i>	IC
Rosaceae	<i>Prunus rivularis</i>	IC
Rosaceae	<i>Rosa woodsii var. woodsii</i>	N
Salicaceae	<i>Populus alba</i>	IC
Salicaceae	<i>Populus deltoides</i>	N
Salicaceae	<i>Salix exigua</i>	N
Salicaceae	<i>Salix irrorata</i>	N
Scrophulariaceae	<i>Castilleja linariifolia</i>	N
Scrophulariaceae	<i>Veronica americana</i>	N
Solanaceae	<i>Chamaesaracha coronopus</i>	N
Solanaceae	<i>Lycium pallidum</i>	N
Solanaceae	<i>Physalis virginiana</i>	N

Family	Latin Name	Status
Solanaceae	<i>Solanum rostratum</i>	N
Solanaceae	<i>Solanum triflorum</i>	N
Tamaricaceae	<i>Tamarix chinensis</i>	I, SWEMP
Tamaricaceae	<i>Tamarix ramosissima</i>	I, SWEMP
Ulmaceae	<i>Ulmus pumila</i>	IC
Verbenaceae	<i>Verbena bracteata</i>	N
Vitaceae	<i>Parthenocissus quinquefolia</i>	N
Zygophyllaceae	<i>Tribulus terrestris</i>	I, SWEMP

APPENDIX 3. Navajo Endangered Species List

NAVAJO NATION
DIVISION OF NATURAL RESOURCES
DEPARTMENT OF FISH AND WILDLIFE

NAVAJO ENDANGERED SPECIES LIST

Resources Committee Resolution No.

RCMA-31-01

March 2001

GROUP 1: Those species or subspecies that no longer occur on the Navajo Nation.

GROUP 2 (G2) & GROUP 3 (G3): “Endangered” -- Any species or subspecies whose prospects of survival or recruitment within the Navajo Nation are in jeopardy or are likely within the foreseeable future to become so.

G2: A species or subspecies whose prospects of survival or recruitment are in jeopardy.

G3: A species or subspecies whose prospects of survival or recruitment are likely to be in jeopardy in the foreseeable future.

GROUP 4: Any species or subspecies for which the Navajo Nation Department of Fish and Wildlife (NNDFWL) does not currently have sufficient information to support their being listed in G2 or G3 but has reason to consider them. The NNDFWL will actively seek information on these species to determine if they warrant inclusion in a different group or removal from the list.

The NNDFWL shall determine the appropriate group for listing a species or subspecies due to any of the following factors:

1. The present or threatened destruction, modification, or curtailment of its habitat;
2. Over-utilization for commercial, sporting or scientific purposes;
3. The effect of disease or predation;
4. Other natural or man-made factors affecting its prospects of survival or recruitment within the Navajo Nation; or
5. Any combinations of the forgoing factors

NAVAJO ENDANGERED SPECIES LIST – March 2001

	<i>Scientific name</i>	(Common name)
GROUP 1:		
MAMMALS	<i>Canis lupus</i>	(Gray Wolf)
	<i>Lontra canadensis</i>	(Northern River Otter)
	<i>Ursus arctos</i>	(Grizzly or Brown Bear)
BIRDS	<i>Centrocercus minimus</i>	(Gunnison Sage-Grouse)
FISHES	<i>Gila elegans</i>	(Bonytail)
GROUP 2:		
MAMMALS	<i>Mustela nigripes</i>	(Black-footed Ferret)
BIRDS	<i>Empidonax traillii extimus</i>	(Southwestern Willow Flycatcher)
AMPHIBIANS	<i>Rana pipiens</i>	(Northern Leopard Frog)
FISHES	<i>Gila cypha</i>	(Humpback Chub)
	<i>Gila robusta</i>	(Roundtail Chub)
	<i>Ptychocheilus lucius</i>	(Colorado Pikeminnow)
	<i>Xyrauchen texanus</i>	(Razorback Sucker)
PLANTS	<i>Astragalus humillimus</i>	(Mancos Milk-vetch)
	<i>Erigeron rhizomatus</i>	(Rhizome Fleabane)
	<i>Pediocactus bradyi</i>	(Brady Pincushion Cactus)
GROUP 3:		
MAMMALS	<i>Antilocapra americana</i>	(Pronghorn)*
	<i>Ovis canadensis</i>	(Bighorn Sheep)
BIRDS	<i>Aquila chrysaetos</i>	(Golden Eagle)
	<i>Buteo regalis</i>	(Ferruginous Hawk)
	<i>Cinclus mexicanus</i>	(American Dipper)
	<i>Coccyzus americanus</i>	(Yellow-billed Cuckoo)
	<i>Strix occidentalis lucida</i>	(Mexican Spotted Owl)
INVERTEBRATES	<i>Speyeria nokomis</i>	(Western Seep Fritillary)

NAVAJO ENDANGERED SPECIES LIST – March 2001

Scientific name (Common name)

PLANTS

Allium gooddingii (Gooding's Onion)
Astragalus cremnophylax var. *hevroni* (Marble Canyon Milk-vetch)
Astragalus cutleri (Cutler's Milk-vetch)
Carex specuicola (Navajo Sedge)
Erigeron acomanus (Acoma Fleabane)
Pediocactus peeblesianus var. *fickeiseniae* (Fickeisen Plains Cactus)
Penstemon navajoa (Navajo Penstemon)
Platanthera zothecina (Alcove Bog-orchid)
Sclerocactus mesae-verdae (Mesa Verde Cactus)

*G3 designation **excludes** NNDFWL Management Unit 16 ('New Lands'), the boundaries of which are: From Sanders, AZ east along Unit 4 boundary to the Zuni boundary; south along the boundary past AZ Hwy 61 to the Navajo Nation/state boundary; west along the boundary past US Hwy 666 to the Navajo Nation/state boundary; north along Rd 2007 to Navajo, AZ; west (to the north and south of Interstate 40) to the state/Petrified Forest National Park boundary; north along the boundary to the Unit 8 boundary; east along the boundary to US Hwy 191; south to Chambers and east to Sanders. For a Unit 16 map, contact NNDFWL, P.O. Box 1480, Window Rock, AZ, 86515, (520) 871-6451.

GROUP 4:

MAMMALS

Dipodomys microps (Chisel-toothed Kangaroo Rat)
Microtus mexicanus (= *mogollonensis*) (Navajo Mountain Vole)
Plecotus townsendii (Townsend's Big-eared Bat)
Vulpes macrotis (Kit Fox)

BIRDS

Accipiter gentilis (Northern Goshawk)
Aechmophorus clarkii (Clark's Grebe)
Aegolius acadicus (Northern Saw-whet Owl)
Ceryle alcyon (Belted Kingfisher)
Charadrius montanus (Mountain Plover)
Columba fasciata (Band-tailed Pigeon)
Dendragapus obscurus (Blue Grouse)
Dendroica petechia (Yellow Warbler)
Empidonax hammondii (Hammond's Flycatcher)
Falco peregrinus (Peregrine Falcon)
Glaucidium gnoma (Northern Pygmy-Owl)
Otus flammeolus (Flammulated Owl)
Picoides tridactylus (Three-toed Woodpecker)
Porzana carolina (Sora)
Tachycineta bicolor (Tree Swallow)

REPTILES

Lampropeltis triangulum (Milk Snake)

- Sauromalus ater* (Chuckwalla)
- FISHES
- Catostomus discobolus* (Bluehead Sucker)
- Cottus bairdi* (Mottled Sculpin)
- INVERTEBRATES
- Oxyloma kanabense* (Kanab Ambersnail)
- PLANTS
- Amsonia peeblesii* (Peebles Blue-star)
- Asclepias sanjuanensis* (San Juan Milkweed)
- Asclepias welshii* (Welsh's Milkweed)
- Astragalus cronquistii* (Cronquist Milk-vetch)
- Astragalus naturitensis* (Naturita Milk-vetch)
- Astragalus sophoroides* (Painted Desert Milk-vetch)
- Astragalus tortipes* (Sleeping Ute Milk-vetch)
- Camissonia atwoodii* (Atwood's Camissonia)
- Clematis hirsutissima* var. *arizonica* (Arizona Leather flower)
- Cryptantha atwoodii* (Atwood's Catseye)
- Cymopterus acaulis* var. *higginsii* (Higgins Biscuitroot)
- Cystopteris utahensis* (Utah Bladder-fern)
- Erigeron sivinskii* (Sivinski's Fleabane)
- Errazurizia rotundata* (Round Dunebroom)
- Lesquerella navajoensis* (Navajo Bladderpod)
- Perityle specuicola* (Alcove Rock Daisy)
- Phacelia indecora* (Bluff Phacelia)
- Phacelia welshii* (Welsh Phacelia)
- Puccinella parishii* (Parish's Alkali Grass)

APPENDIX 4. Navajo Natural Heritage Program Element Tracking List – Plants. July 2001.

Scientific Name	Common Name
<i>Agave utahensis</i> var. <i>kaibabensis</i>	Utah Century Plant
<i>Aletes macdougallii</i>	Macdougall's Aletes
<i>Aletes sessiliflorus</i>	Sessile-Flower Aletes
<i>Amsonia tomentosa</i> var. <i>stenophylla</i>	Narrowleaf Blue Star
<i>Angelica pinnata</i>	Small-Leaf Angelica
<i>Aquilegia desertorum</i>	Desert Columbine
<i>Artemisia pygmaea</i>	Pigmy Sagebrush
<i>Asclepias cutleri</i>	Cutler Milkweed
<i>Astragalus accumbens</i>	Zuni Milk-vetch
<i>Astragalus beathii</i>	Beath Milk-vetch
<i>Astragalus chuskanus</i>	Chuska Milk-vetch
<i>Astragalus cremnophylax</i> var. <i>myriorrhaphis</i>	Sentry Milk-vetch
<i>Astragalus knightii</i>	Knight Milk-vetch
<i>Astragalus micromerius</i>	Chaco Milk-vetch
<i>Astragalus monumentalis</i> var. <i>cottamii</i>	Cottam Milk-vetch
<i>Astragalus monumentalis</i> var. <i>monumentalis</i>	A Milk-vetch
<i>Astragalus xiphoides</i>	Gladiator Milk-vetch
<i>Besseyia arizonica</i>	Arizona Coral-Drops
<i>Calypso bulbosa</i>	Fairy Slipper
<i>Camissonia specuicola</i> ssp. <i>specuicola</i>	
<i>Chrysothamnus molestus</i>	Disturbed Rabbitbrush
<i>Cirsium rydbergii</i>	Rydberg's Thistle
<i>Cymopterus megacephalus</i>	Bighead Spring-Parsley
<i>Cypripedium parviflorum</i>	Yellow Lady's Slipper
<i>Dalea scariosa</i>	A Prairie-Clover
<i>Dalea scoparia</i>	Broom Pea
<i>Eremocrinum albomarginatum</i>	Sand Lily
<i>Erigeron bistiensis</i>	Bisti Fleabane
<i>Eriogonum clavellatum</i>	Comb Wash Wild Buckwheat
<i>Eriogonum heermannii</i> var. <i>subracemosum</i>	A wild buckwheat
<i>Eriogonum ripleyi</i>	Ripley's Wild Buckwheat
<i>Euphorbia aaron-rossii</i>	
<i>Gilia formosa</i>	Aztec Gilia
<i>Haplopappus salicinus</i>	
<i>Haplopappus scopulorum</i>	
<i>Hedeoma diffusum</i>	Flagstaff Pennyroyal
<i>Hymenoxys helenioides</i>	Intermountain Bitterweed

Scientific Name	Common Name
<i>Isoetes bolanderi</i>	Bolander Quillwort
<i>Mammillaria wrightii</i> var. <i>wrightii</i>	Wright Fishhook Cactus
<i>Oenothera cavernae</i>	Cave Evening-Primrose
<i>Ostrya knowltonii</i>	Knowlton Hop-Hornbeam
<i>Parthenium alpinum</i> var. <i>alpinum</i>	Alpine fever-few
<i>Pediocactus paradinei</i>	Park Pincushion-Cactus
<i>Pediocactus peeblesianus</i> var. <i>peeblesianus</i>	Peebles Navajo Cactus
<i>Phacelia howelliana</i>	Howell Phacelia
<i>Phacelia mammillarensis</i>	Nipple Phacelia
<i>Phacelia splendens</i>	Splendid Scorpion Weed
<i>Phlox cluteana</i>	Navajo Mountain Phlox
<i>Platanthera stricta</i>	Slender Bog-orchid
<i>Polygala acanthoclada</i>	Thorn Milkwort
<i>Primula specuicola</i>	Cave Primrose
<i>Proatriplex pleiantha</i>	Mancos Saltbrush
<i>Psoralidium junceum</i>	Western Scurf Pea
<i>Psorothamnus arborescens</i> var. <i>pubescens</i>	Marble Canyon Dalea
<i>Psorothamnus thompsoniae</i> var. <i>whitingii</i>	Whiting Indigo Bush
<i>Rosa stellata</i> ssp. <i>abyssa</i>	Grand Canyon Rose
<i>Salvia pachyphylla</i>	Hopi Sage
<i>Sclerocactus cloveriae</i> ssp. <i>brackii</i>	Brack's Cactus
<i>Tetradymia filifolia</i>	Thread-Leaf Horsebrush
<i>Toumeyia papyracantha</i>	Gramma Grass Cactus
<i>Zigadenus vaginatus</i>	Alcove Death Camass