White Pine Power Project

BIOLOGICAL ASSESSMENT

TECHNICAL REPORT

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Technical Report

For The

WHITE PINE POWER PROJECT

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October 1983

SUMMARY

The White Pine Power Project is a proposed 1500 megawatt coal-fueled steam-electric generating facility to be located in White Pine County, Nevada which may affect threatened and endangered species in the project area. The Pahrump killifish (*Empetrichthys latos*), bald eagle (*Haliaeetus leucocephalus*), and peregrine falcon (*Falco peregrinus anatum*) are the only listed species that occur in the WPPP area. However, numerous candidate animal and plant species occur within the area proposed for development. In partial fulfillment of Section 7 of the Endangered Species Act of 1973, the following biological assessment evaluates the extent to which the WPPP may affect threatened or endangered species identified by the U.S. Fish & Wildlife Service and species which are being reviewed for consideration to propose and list as threatened or endangered. Major potential impacts include the potential reduction of Pahrump killifish habitat in the Shoshone Ponds of Spring Valley. Other potential impacts include sedimentation due to accelerated erosion of disturbed soils which may affect aquatic habitats and resident fish species in areas adjacent to proposed rail and transmission corridors while the same soil disturbance would temporarily reduce preferred habitat for the terrestrial wildlife and plant species.

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1.0 INTRODUCTION

The White Pine Power Project (WPPP) is a proposed 1500 megawatt coal-fueled steam-electric generating facility to be located in White Pine County, Nevada. WPPP facilities consist of a power generation station, coal transportation system, power transmission system, and water supply system. Three alternative sites located in Spring Valley, North Steptoe Valley, and Butte Valley, are currently being evaluated for development of the power generation station. Additionally, coal transportation and power transmission corridors have been selected which extend southerly through Nye County, Lincoln County, and Clark County, and an additional coal transportation corridor north through Elko County.

The Endangered Species Act of 1973 (the Act) requires federal agencies to "insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat of such species." This legislation was conceived when regulatory agencies realized the existing precautionary measures for protecting various sensitive species of wildlife, fish, and plants were inadequate. The lack of awareness and conservation had previously led to the extinction of various fish, wildlife, and plant species within the United States and additional species were depleted to levels jeopardizing their existence. The purpose of the Act is "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved" and "to provide a program for the conservation of such endangered species and threatened species. . . ."

Section 4 of the Act (Determination of Endangered Species or Threatened Species) grants the Secretary of the

Interior power to determine whether any species is considered threatened or endangered based on the present status of the species such as population numbers, limited habitat, disease or predation, over-utilization of the species, inadequacy of existing regulatory mechanisms, or any man-made influences jeopardizing the species' continuing existence.

Section 7 of the Act (Interagency Cooperation) specifies that, to more effectively carry out the purposes of the Act, all other federal departments and agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities by "taking such action necessary to insure that actions authorized, funded, or carried out by them (federal departments and agencies) do not jeopardize the continued existence of any listed species (pursuant to Section 4) or result in the destruction or modification of critical habitat of such species."

The consultation process is designed to assist federal agencies when complying with the Act, and authority of consultation has been delegated by the Secretary of the Interior to the Director of the U.S. Fish & Wildlife Service (USFWS). The consultation process involves several phases. First, a species list is submitted to the USFWS by the affected agency. USFWS responds with a list of candidate, proposed, and listed species within the proposed project area. When the project is a construction project, the agency (e.g., BLM for WPPP) then prepares a Biological Assessment which identifies the project, details the biology of the species on the list submitted by USFWS, analyzes the cumulative effects of the project, and determines if there is likely to be an effect (either beneficial or adverse) on any listed or proposed species. If a "may affect" determination is made, the agency must request formal consultation with USFWS. Formal consultation involves USFWS consideration of

the proposed project and how it may affect the biology of any listed species, incuding the magnitude of such effects and potential cumulative effects. Based on this information, a Biological Opinion is issued by USFWS which states one of three possible conclusions: The proposed action: 1) may promote the continued existence of the species; 2) is not likely to jeopardize the continued existence of the species; or (3) is likely to jeopardize the continued existence of the species. Reasonable and prudent alternatives must be addressed by USFWS as part of the Biological Opinion when a determination is made that the proposed project is likely to jeopardize the continued existence of the species.

Species addressed in this biological assessment include those the USFWS has identified as threatened or endangered and those being reviewed by the USFWS for consideration to propose and list as threatened or endangered. Species descriptions will be presented in greater detail for listed species as opposed to the descriptions for species under review. Two species listed as endangered have been identified by the USFWS and the Nevada Department of Wildlife (NDOW) to be potentially affected by the WPPP and include the bald eagle (Haliaeetus leucocephalus) peregrine falcon (Falco peregrinus anatum), and Pahrump killifish (Empetrichthyes latos), while numerous candidates for review have been identified. Discussions of each listed species will include present status, potential project impacts, cumulative impacts where necessary, and possible mitigation recommendations if warranted. Candidate species that occur adjacent to, or on WPPP alternative sites will be identified and habitat requirements briefly described.

2.0 METHODOLOGY

2.1 AQUATIC SPECIES

Published and unpublished literature was reviewed and state and federal regulatory agency, and university personnel were contacted to obtain information on the threatened and endangered fish species of the WPPP area. After species were identified, a site reconnaissance and qualitative field sampling program was initiated to field-truth potential habitats of important or threatened and endangered fish species. BLM or NDOW personnel were in attendance during the site reconnaissance and field sampling. Field sampling was performed on springs in the vicinity of the Cardano Ranch in northern Steptoe Valley, along the base of the Cherry Creek Range. Specific locations potentially inhabited by sensitive species and visited during the site reconnaissance included the Shoshone Ponds in Spring Valley, Lookout Springs in Antelope Valley, and Becky Springs and Cardano Ranch Springs in Steptoe Valley.

2.2 WILDLIFE SPECIES

Information regarding threatened or endangered wildlife species and their distribution in the WPPP area was obtained by reviewing published and unpublished literature, discussions with the BLM and NDOW personnel and field reconnaissance of the three alternative sites, well fields, water pipeline corridors, transmission line corridors, and railroad corridors within White Pine County. Field reconnaissance was performed during early summer (1981) and early spring (1982), and included both aerial and ground reconnaissance. The purpose of the field reconnaissance was to field-truth information obtained from other sources.

2.3 PLANT SPECIES

Plant species of special concern include candidates for federal listing as threatened or endangered, and species listed by the State of Nevada as threatened or endangered, rare, or on watch lists. Such species that occur, or have potential to occur, near proposed WPPP facilities were identified primarily by literature review. However, field searches were conducted on the North Steptoe Valley Site, Butte Valley Site, and Spring Valley Site several times during the growing seasons in 1981 and 1982. Pertinent literature and information sources on rare, threatened and endangered plant species in eastern Nevada include:

- Distribution maps compiled by the Nevada State Museum (1983) and Harrison (1980).
- Habitat and location information from Mozingo and Williams (1980).
- Sensitive plant lists for Nevada, Nevada Threatened and Endangered Plant Workshops, November 14, 1981 and February 11, 1983.
- Critically endangered plant species lists, Nevada State Forester Firewarden, as authorized under NRS 527.270.
- Personal communication with R. Valdez and R. Parenti of the USFWS - Reno, Nevada and Boise, Idaho respectively, February 17, 1983; March 17, 1983; and March 25, 1983.

- Personal communications, R.V. Hardy, BLM - Ely, Nevada, June 1, 1982; and A. Pinzl, Curator of Natural History - Nevada State Museum, Carson City, Nevada, December 1, 1982, and August 12, 1983.

3.0 RESULTS

Figure 3-1 shows the distribution of candidate, threatened, or endangered species in the WPPP study area.

3.1 THREATENED OR ENDANGERED AQUATIC SPECIES

3.1.1 Pahrump Killifish

3.1.1.1 Present Status

The Pahrump killifish or poolfish (*Empetrichthys latos*) as described by La Rivers (1962), hereafter referred to as the Pahrump killifish, was originally confined to three separate spring areas in the Pahrump Valley of Nye County, Nevada. Each spring complex was a type locality of a different Pahrump killifish subspecies. The type locality and respective subspecies included: 1) Pahrump Ranch Pahrump killifish (*E.l. pahrump*); 2) Raycraft Ranch Pahrump killifish (*E.l. concavus*); and 3) Manse Ranch, Pahrump killifish (*E.l. latos*) (La Rivers, 1962). The Pahrump Ranch springs failed in 1958, probably due to groundwater pumping (Minckley and Deacon, 1968). During the mid-1950s, the Raycraft Ranch spring also became dry as a result of continuous groundwater pumping (U.S. Department of the Interior, 1980b). The complete dewatering of the Pahrump Ranch Springs and the Raycraft Ranch Springs resulted in the elimination of the respective Pahrump killifish subspecies, leaving only the Manse Ranch killifish subspecies.

The Manse Ranch population was favorably maintaining itself prior to the introduction of goldfish (*Carassius auratus*) (Deacon et al., 1964). In 1967, killifish were removed from the Manse Ranch spring in an attempt to determine the Pahrump killifish population size and irradicate the

goldfish. A majority of the goldfish were eliminated and the Manse Ranch Pahrump killifish population was estimated at 1300 (Minckley and Deacon, 1968). Minckley and Deacon (1968) postulated that Pahrump killifish "appears capable of maintaining its population in the face of some competition, but obviously cannot withstand the virtual total destruction of its habitat." Additionally, this research predicted, based on decreasing spring discharge from 1958 to 1966, that Manse Ranch Spring would fail in 10 or 11 years (by 1976 or 1977). The last remaining Pahrump killifish natural habitat was eliminated in 1975 when Manse Ranch spring ceased discharging due to excessive groundwater pumping for agricultural irrigation (U.S. Department of the Interior, 1980b).

The decreasing annual discharge from 1958 to 1966 in Manse Ranch spring was significant enough to threaten the last known population of Pahrump killifish. Acting in response to this threat, the BLM implemented precautionary procedures to preserve this species. In 1970, the Manse Ranch spring Pahrump killifish population was transplanted to Corn Creek Springs on the Desert National Wildlife Refuge in Clark County, approximately 25 miles northwest of Las Vegas (Sada, 1982; U.S. Department of the Interior, 1980b). Increasing growth in the Las Vegas Valley and its accompanying demand for water however, became a threat to the Corn Creek Springs water source (U.S. Department of the Interior, 1980).

Recognizing the potential impacts to the only Pahrump killifish habitat known to exist, the BLM pursued a transplant program which eventually led to the establishment of a second self-sustaining Pahrump killifish population. The habitat selected for this transplant was to be contained within the Shoshone Ponds in southern Spring Valley. The Shoshone Ponds, consisting of a north, south, and middle pond, were constructed by the BLM in early 1972. These three ponds

are fenced to prevent habitat degradation due to livestock grazing. An additional pond, constructed by the Civilian Conservation Corps (CCC) in 1937, is located northeast of the fenced ponds. In March, 1972, 16 Pahrump killifish were introduced to the Shoshone middle pond from the diminishing Manse Ranch spring (Barber, 1979). By September, 1972, eight of these transplants had survived the cooler-than-preferred water temperatures in the middle pond. The survivors were transplanted to the warmer south pond but by August, 1974, all killifish in the pond had perished (Barber, 1979). Attempts to reestablish a Pahrump killifish population in the Shoshone Ponds were again made when, during August, 1976, 50 fish were transported from the University of Nevada, Las Vegas and introduced to the north Shoshone Pond. Within one year (October of 1977), the north pond population experienced successful reproduction and increased to about 800 fish (Barber, 1979) compared to an estimated world population of 3100 fish in April 1977 (Barber, no date). In addition to inhabiting the fenced ponds, Pahrump killifish have been observed in the adjacent CCC pond.

The Pahrump killifish habitat consists primarily of alkaline warm springs (74°F to 77°F) (LaRivers, 1962 and U.S. Department of the Interior, 1980b). Spawning will normally peak during March or April (Deacon et al., 1980), however, the Pahrump killifish will spawn at anytime if habitat is suitable. The Pahrump killifish feeds omnivorously on a mixture of snails, insects, plant matter, and zooplankton (Deacon et al., 1980). Deacon et al. (1980) found the north Shoshone Pond to be structurally composed of the filamentous green algae (Spirogyra crassa) which provides a "three dimensional curtain" that enhances the productivity of various forage organisms for the killifish.

On March 17, 1980, the Pahrump Killifish Recovery Plan was approved. The prime objective of the plan was "to restore the Pahrump killifish to a non-endangered status; by establishing at least three viable, reproducing populations" (U.S. Department of the Interior, 1980b). Each of the three populations must maintain 500 adults on a yearly basis for at least three years, at which time the Pahrump killifish may be reclassified to a threatened status. If, after an additional three-year evaluation period, the populations maintain 500 adults yearly, consideration should be given to de-listing the species (U.S. Department of the Interior, 1980b).

3.1.1.2 Potential WPPP Impacts

Although groundwater modeling results indicate WPPP groundwater withdrawals may potentially lower existing water levels near the Shoshone Ponds by two to three feet, actual water level fluctuations within the ponds should not deviate appreciably from normal seasonal fluctuations. The surrounding natural subirrigated substrate and the water source contribute to maintaining the presently favorable conditions for Pahrump killifish within the Shoshone Ponds.

The Shoshone Ponds water source consists of a flowing artesian well originating approximately 400 feet below the ground surface. A relatively impermeable layer of clay beneath the Shoshone Ponds, in combination with the upward hydraulic gradient within the groundwater system, supports the zone of natural subirrigated substrate and inhibits downward movement of surface water (Dames & Moore, 1983). A majority of the subirrigated water loss is attributed to evapotranspiration which will occur regardless of WPPP development.

The potential also exists for reducing groundwater pressure within zones which are hydrologically connected with

and overlie the deep aquifer. The anticipated two to three foot drawdown could, however, potentially lower the hydrostatic pressure in the deep aquifer. Reducing the hydrostatic pressure in the deep aquifer or within any interconnecting zones by withdrawing groundwater will reduce the artesian pressure and, in response, the discharge into the Shoshone Ponds. The predicted magnitude of drawdown is small compared to existing pressure levels and, therefore, the associated impact to the Shoshone Ponds is also expected to be minimal. However, any alteration in waters inhabited by the Pahrump killifish should be regarded as undesirable.

Corresponding to the potential for a minor decrease in flow and the resulting lower water volume within the Shoshone Ponds, water temperatures may also decrease slightly during winter months thereby creating a potentially less than optimal environment (76°F) for the Pahrump killifish. The Pahrump killifish has been known to survive in southern Nevada for limited periods in waters considerably lower than 76°F (U.S. Department of the Interior, 1980b). However, the long-term effects on viability in waters below 76°F are not known. Because winters are likely to be more severe near the Shoshone Ponds than in southern Nevada, the cooling influence on the Shoshone Ponds is expected to be greater and temperatures within the ponds may decrease for extended periods should the existing thermal influence be altered.

Additionally, the potential for vandalism of the Shoshone Ponds increases with the increase in human activities associated with development of the Spring Valley Site.

3.1.1.3 Mitigation Recommendations

Three courses of action may be taken to minimize or mitigate the potentially adverse impacts to the Shoshone

Ponds and the Pahrump killifish: 1) selecting either the Butte Valley Site or North Steptoe Valley Site; 2) insuring maintenance of the existing conditions in the Shoshone Ponds; and 3) identifying additional suitable habitat outside the WPPP area for establishing Pahrump killifish populations as a precautionary measure should the Shoshone Ponds be rendered uninhabitable.

Development of either the Butte Valley Site or North Steptoe Valley Site would preclude any adverse impacts to the Pahrump killifish. The remaining two mitigation recommendations should be considered only if the Spring Valley Site is developed. Cooperative efforts between responsible agencies and WPPP in identifying additional suitable habitat would probably have greater merits than attempting to maintain the existing conditions of the Shoshone Ponds throughout the life of the project. The Pahrump killifish Recovery Plan's prime objective is to establish "at least three viable reproducing populations" and identification of additional suitable habitat would satisfy the preliminary requirements of this objective.

3.2 THREATENED OR ENDANGERED WILDLIFE SPECIES

3.2.1 Bald Eagle

3.2.1.1 Present Status

Although no bald eagles are known to nest in White Pine County, several overwinter in the area (Perkins, 1981). Overwintering bald eagles will normally seek roosts near water bodies such as streams, lakes, or reservoirs where fish are available for food. However, in east-central Nevada, where water bodies are not abundant, bald eagles will roost in trees and feed primarily on jackrabbits and carrion (Snow, 1973).

3.2.1.2 Potential WPPP Impacts

Major potential WPPP-related impacts to the bald eagle include unlawful shooting, electrocution on low voltage water supply system transmission lines, and collision with power transmission lines. Although the bald eagle is federally protected, shooting remains the "greatest direct mortality factor" (Snow, 1973). Increased human activities in White Pine County resulting from the influx of the construction and operation work force may increase the unlawful shootings of bald eagles in the area. Construction of transmission lines and towers for the water supply transmission system will increase the potential for bald eagle electrocution. However, with proper tower design, electrocutions can be minimized. Transmission lines sited in the treeless valley bottoms would benefit bald eagles by providing perches, which allow for observing prey species over a wide radius and more efficient use of air currents for flight. An additional impact, associated with the power transmission system, includes the potential for collisions with wires and towers, especially during periods of poor visibility.

3.2.1.3 Mitigation Recommendations

The irresponsible use of firearms is difficult to prevent, and unavoidable or undetected losses of bald eagles will occur as they do throughout the bald eagle range. However, increased enforcement of laws protecting this species may eventually reduce bald eagle losses. By employing adequate engineering design practices throughout the water supply system, electrocutions of bald eagles and other raptors can be minimized. Additionally, final transmission route selections should accommodate areas with existing natural perches, such as trees along the valley edges, to minimize the utilization of transmission structures for perches.

3.2.2 Peregrine Falcon

3.2.2.1 Present Status

Several peregrine falcon (Falco peregrinus anatum) have been known to frequent the WPPP area. Documentations of peregrine falcon sightings indicate occurrences in Goshute Canyon and White River Valley, near Ely and Comins Lake, and east of Wheeler Peak (Barber, 1983b). Peregrine falcons will usually nest on mountainous cliffs and river gorges and will travel up to 17 miles from nesting cliffs to hunting areas (Porter and White, 1973). Flight speeds in excess of 60 miles per hour allow this falcon to hunt a large area with ease. Wintering areas are usually associated with large rivers or waterfowl refuges (Enderson, 1965).

3.2.2.2 Potential WPPP Impacts

The potential WPPP-related impacts to the peregrine falcon are essentially identical to those of the bald eagle since both species are raptors with similar behavior and habitat requirements. The potential impacts include unlawful shooting and transmission line collisions. The increase in regional human population increases the potential for unlawful shooting of peregrine falcons. Peregrine falcons will normally dive in flight with great speeds to strike ground-dwelling prey. Therefore, the establishment of transmission lines will increase the potential for transmission line collisions. However, the remoteness of the transmission lines and the infrequent occurrences of falcons will limit this adverse impact.

3.2.2.3 Mitigation Recommendations

The irresponsible use of firearms is difficult to prevent and unavoidable or undetected losses of peregrine

falcons may occur. However, enforcement of laws protecting these species will curtail the losses. The selection of transmission routes accommodating valley edges or areas adjacent to trees as opposed to routes selected in open or treeless areas of the valleys should reduce the frequency of peregrine falcons colliding with transmission lines or towers.

3.3 CANDIDATE AQUATIC SPECIES

Eleven fish species within the WPPP study area are being reviewed by USFWS for consideration to propose and list as threatened or endangered (U.S. Department of the Interior, 1982a). These fish species have been placed in two review categories: 1) adequate biological information is available to appropriately propose listing of species as endangered or threatened; or 2) biological information is available which possibly justifies the proposing of such species, but additional biological research and field study may be necessary for such action. It is likely that some of the species in the latter category will not warrant listing based on biological support (U.S. Department of the Interior, 1982a). The fish species in Category 1 include the White River spinedace (Lepidomeda albivallis) and the Big Springs spinedace (L. mollispinnis pratensis). Category 2 includes relict dace (Relictus solitarius), Bonneville (Utah) cutthroat trout (Salmo clarki utah), Clover Valley speckled dace (Rhinichthys osculus oligoporus), Independence Valley speckled dace (R.o. lethoporus), Independence Valley tui chub (Gila bicolor isolata), White River speckled dace (R.o. velifer), Preston White River springfish, (Crenichthys baileyi albival lis), White River desert sucker (Catostomus clarki intermedius), and Meadow Valley Wash speckled dace (R.o. spp.).

3.3.1 Relict Dace

The relict dace or Steptoe dace originally inhabited the Pleistocene lakes of the Great Basin approximately 10,000 years ago. As these lakes evaporated and receded, this small minnow became isolated in: 1) warm thermal springs; 2) non-thermal springs and creeks; and 3) ponds and intermittent lakes in Ruby Valley, Butte Valley, Goshute Valley, and Steptoe Valley in northeastern Nevada (Vigg, 1982). The relict dace also occurs in Lookout Springs in Antelope Valley and has been introduced in the Shoshone Ponds in Spring Valley. The relict dace is not recreationally or commercially harvested or considered to provide substantial forage for game fish and therefore, is considered of minimal economic value. However, this desert fish is endemic to the region and is found in relatively rare habitats, many of which have been eliminated through the development of water resources. The intrinsic importance of this unique species lies in its contribution to the diversity of life.

Potential impacts to the relict dace may include reductions of habitat within the springs, ponds, and intermittent lakes resulting from reduced groundwater supplies and possible competition resulting from introduced species. Limited relict dace populations occur throughout Ruby Valley, Butte Valley, Goshute Valley, Spring Valley, and Steptoe Valley and the minor disturbance of isolated habitats in one valley would probably not jeopardize the continued existence of the species. This, however, does not preclude the implementation of measures designed to preserve existing habitat potentially affected by groundwater withdrawal in Butte Valley, Steptoe Valley, or Spring Valley. Any reduction of population or habitat may justify listing the relict dace as threatened or endangered. Additionally, the potential exists for introducing exotic fish species to relict dace

habitats in response to increases in human activities associated with WPPP. Competition resulting from these introductions could reduce relict dace populations. Alternative courses of action which may minimize adverse impacts to the relict dace would include the selection of groundwater sources not associated with relict dace habitat or possibly enhancing existing habitat.

3.3.2 Bonneville (Utah) Cutthroat Trout

The Bonneville (Utah) cutthroat trout, like many other subspecies of cutthroat trout, was geographically isolated in headwater streams when large pluvial lakes began receding approximately 25,000 years ago. During the late 1800s, these previously undisturbed pure strain populations began to decrease in response to increasing competition and cross-breeding with introduced non-native species. This decline continued to a point where the only pure strain population believed to exist in the western Lake Bonneville Basin occurred in Pine Creek (now commonly referred to as Pine Ridge Creek) near Mount Wheeler in eastern Nevada (Dodge and Cain, 1972). Pine Ridge Creek originates at 8600 feet and flows for approximately six miles toward Spring Valley. In 1960, Pine Ridge Creek Bonneville (Utah) cutthroat trout were introduced by the NDOW into Goshute Creek, a five-mile-long stream on the eastern side of the Cherry Creek Range in northen Steptoe Valley. The intent of this transplant was to "assure the perpetuation" of this relatively pure strain of Pine Ridge Creek population. By 1970, the Goshute Creek population had increased sufficiently to be self-supporting (Dodge and Cain, 1972). However, during the spring of 1983 severe flooding and sedimentation of Goshute Creek reduced this Bonneville (Utah) cutthroat trout population (Barber, 1983a).

Goshute Creek, located southwest of the North Steptoe Valley Site, and Pine Ridge Creek, located east of the Spring Valley Site, are not directly supported by local groundwater sources. Therefore, direct WPPP-related impacts to these populations are anticipated to be negligible. However, possible indirect impacts, such as increased angling pressure created by the construction and operation work force, could adversely affect both populations. Stream-dwelling cutthroat trout are vulnerable to angling pressure and unregulated or unrestrained exploitation could suppress the reproducing sector of the populations to an unrecoverable level. Should the North Steptoe Valley Site or Spring Valley Site be developed, closure of Goshute Creek and Pine Ridge Creek, to fishing during construction and enforcement of special regulations by the NDOW during operation could minimize this adverse impact. Complete enforcement of stream closure or special regulations is frequently unfeasible and exploitation of the Bonneville (Utah) cutthroat trout in Goshute Creek and Pine Ridge Creek can be expected. Therefore, further mitigative procedures may be recommended such as assisting in the establishment of additional Bonneville (Utah) cutthroat trout populations in streams targeted by the NDOW for population expansion.

3.3.3 Clover Valley Speckled Dace

The Clover Valley speckled dace inhabits a spring-fed pond and outflow 9.5 miles south of Wells, and Warm Springs at Warm Creek (formerly Clover) Ranch (Hubbs et al., 1974). Both habitats lie remotely adjacent to an alternative railroad corridor. These springs were, at one time, connected by pluvial Lake Clover which also broadly connected Clover Valley and Independence Valley. Clover Valley speckled dace populations became slightly differentiated during a period when Lake Clover receded and the two habitats became isolated

(Hubbs et al., 1974). The population inhabiting the spring and pond south of Wells apparently declined during the early 1930s due to the introduction of rainbow trout (Salmo gairdneri) and diversions of spring water for irrigation. However, by 1965 increased numbers of adult dace indicated the population had recovered (Hubbs et al., 1974). Collections of Clover Valley speckled dace in Warm Springs in 1964 and 1965 revealed a suppressed population (Hubbs et al., 1974). As was the case in the previously described habitat, rainbow trout had been introduced in Warm Springs and "apparently was forcing the localized form of speckled dace definitely into the seriously endangered category" (Hubbs et al., 1974). Bullfrogs were probably also contributing to the decline in the dace population (Hubbs et al., 1974).

Potential WPPP-related impacts to the Clover Valley speckled dace habitat would be short-term and restricted to activities associated with the rail construction involving possible sedimentation in the springs resulting from the erosion of disturbed soils. Avoidance of these habitats during railroad route selection would minimize these impacts.

3.3.4 Independence Valley Speckled Dace

The Independence Valley speckled dace inhabits Warm Springs, the only known spring complex in Independence Valley. Warm Springs is approximately ten miles north of the existing Western Pacific Railroad and a proposed railroad corridor. Population numbers of speckled dace in this spring have been supressed by the introduction of predators, such as largemouth bass (Hubbs et al., 1974). Bullfrogs and carp also compete with the speckled dace in Warm Springs (Hubbs et al., 1974). The bullfrogs were probably introduced in the mid-1950s by the Nevada Department of Fish and Game; however, exact dates of introduction for largemouth bass and carp are not available, but probably occurred after 1960 (Hubbs et al., 1974).

The remoteness of this habitat to the existing Western Pacific Railroad and a proposed railroad corridor precludes major WPPP-related impacts to this Independence Valley speckled dace population.

3.3.5 Independence Valley Tui Chub

The Independence Valley tui chub is confined to the same spring complex as the Independence Valley speckled dace previously described (Hubbs et al., 1974). This subspecies appears to greatly outnumber its endemic companion. The speckled dace readily seeks refuge amongst the aquatic vegetation while the tui chub can be found in more open waters of the spring (Hubbs et al., 1974). The Independence Valley tui chub has encountered the same competition problem from introduced species as the Independence Valley speckled dace.

The remoteness of this habitat to the existing Western Pacific Railroad and a proposed railroad corridor precludes major WPPP-related impacts to this Independence Valley tui chub population.

3.3.6 White River Speckled Dace

The White River speckled dace inhabits springs within two valleys of the pluvial White River system: the Pahranagat Valley and northern White River Valley. The northern White River Valley population is within the WPPP area and inhabits Lund Town Springs and Preston Big Springs, which are adjacent to two transmission corridors and a proposed railroad corridor. The population within these two springs has been reduced in numbers due to habitat modification and introduction of exotic species (Hardy, 1979).

Potential WPPP-related impacts to the White River speckled dace habitat would be restricted to activities

associated with railroad corridor and transmission line system construction. Construction impacts would involve possible sedimentation in the springs due to accelerated erosion of disturbed soils. Avoidance of these habitats during railroad and transmission route selection would minimize adverse impacts.

3.3.7 Preston White River Springfish

The Preston White River springfish is a localized subspecies of the White River springfish and inhabits warm springs in northern White River Valley near Preston and Lund. Known habitat includes Arnoldsen Spring, Cold Spring, Indian Spring, Lund Town Spring, Preston Big Spring, and Preston Town Spring (Williams and Wilde, 1981). The Preston White River springfish, like other relict fish species inhabiting these warm springs, has been reduced in numbers due to exotic or non-native species introduction (Hardy, 1979). Additional White River springfish populations inhabit Moorman Springs and springs adjacent to the Moon Ranch in southern White River Valley.

Potential WPPP-related impacts to the Preston White River springfish habitat would be restricted to activities associated with construction of the transmission lines and railroad. Construction impacts would consist of possible sedimentation in the springs created by accelerated erosion of disturbed soils. Avoidance of these habitats during railroad and transmission route selection would minimize adverse impacts.

3.3.8 White River Spinedace

The White River spinedace inhabits cool (65°F to 71°F) clear springs in the upper, ancient White River system

of eastern Nevada (LaRivers, 1962). Known habitats of the White River spinedace are primarily confined to springs in the vicinity of Preston and Lund and include Arnoldsen Spring, Cold Spring, Lund Town Spring, and Nicholas Spring. Due to the introduction of exotic species, populations of the White River spinedace have been considerably reduced (Hardy, 1979).

Potential WPPP-related impacts to the White River spinedace habitat would be restricted to activities associated with construction of the transmission lines and railroad. Construction impacts would include possible sedimentation, created by the transport of disturbed soils which may drain into White River spinedace habitat. Avoidance of these habitats during railroad and transmission route selection will minimize adverse impacts.

3.3.9 White River Desert Sucker

The White River desert sucker is known to inhabit Arnoldsen Spring, Lund Town Spring, and Preston Big Spring in the northern White River system near Preston and Lund, Nevada (LaRivers, 1962). The Meadow Valley Wash desert sucker, which may be an additional population of the White River desert sucker occurs in the Condor Canyon area through which the existing Union Pacific Railroad passes. The White River Valley population is currently rare in all habitats due to the introduction of exotic species and loss of habitat (Hardy, 1979). Data on the Meadow Valley Wash population are lacking.

Potential WPPP-related impacts to the White River desert sucker habitat would be restricted to activities associated with construction of the transmission lines and railroad White River Valley. Construction impacts would include possible sedimentation through the transport of disturbed soils within an area draining into the White River

Springs. Avoidance of the White River Valley habitats during railroad and transmission route selection would minimize impacts to this population. Furthermore, the selection of an alternative railroad route would also preclude any WPPP-related impacts to the Meadow Valley Wash population.

3.3.10 Meadow Valley Wash Speckled Dace

The Meadow Valley Wash speckled dace is confined to the Meadow Valley Wash through which the existing Union Pacific Railroad passes in north-central Lincoln County, Nevada. Although population numbers and exact distribution are not known, suitable habitat, which is considered to be any perennial water body, occurs throughout Meadow Valley Wash (Allen, 1983).

No major WPPP-related impacts to the Meadow Valley Wash habitat are anticipated. Furthermore, the selection of an alternative railroad route would preclude any WPPP-related impacts to the Meadow Valley Wash speckled dace population.

3.3.11 Big Springs Spinedace

Exploration of relict fish populations, conducted by Miller and Hubbs (1960) in 1938 and 1959, indicated that a population of Big Springs spinedace once inhabiting a spring-fed marsh approximately one mile east of Panaca in Lincoln County was extinct. This population, at the time it was ruled extinct, was presumed to be the sole representative of spinedace in the remaining waters of pluvial Carpenter River (Miller and Hubbs, 1960). The demise of this population was considered a result of "water diversion and the occasional stoppage of flow in the ditch" connecting the marsh with the spring (Miller and Hubbs, 1960). In 1977 and 1978, NDOW personnel discovered a population of Big Spring spinedace

in perennial waters of Condor Canyon through which the existing Union Pacific Railroad passes (Allen, 1983; Hardy, 1979). Status of this population is unknown at this time.

No major WPPP-related impacts to the Big Springs spinedace habitat are anticipated and, furthermore, selection of an alternative railroad route would preclude any impacts to Big Springs spinedace habitat.

3.4 CANDIDATE WILDLIFE SPECIES

The distributional ranges of six wildlife species being reviewed by the USFWS for consideration to propose and list as threatened or endangered (U.S. Department of the Interior, 1982a), occur within the WPPP area. These species, which include desert tortoise (Gopherus [Scaptochelys] agassizi), ferruginous hawk (Buteo regalis), spotted bat (Euderma maculatum), white-faced ibis (Plegadis chihi), Swainson's hawk (Buteo swainsoni), and long-billed curlew (Numenius americanus) have been placed in a review category which identifies those species having "biological information available which possibly justifies the proposing of such species as threatened or endangered." It is likely that some of the species in this category will not warrant listing based on biological support (U.S. Department of the Interior, 1982a). However, a population of desert tortoise in Beaver Dam, Utah is currently listed as threatened (U.S. Department of the Interior, 1982a).

3.4.1 Desert Tortoise

The desert tortoise is found in desert shrub in Lincoln County, Nye County, and Clark County below 4000 feet (Schneider and Turner, 1980) where it burrows in firm, but not compacted ground. This species requires some ground moisture

for survival of eggs, and is frequently found near water (Stebbins, 1966). The substratum in many areas is quite rocky and apparently poor for burrow construction and may be a limiting factor for tortoise populations. In these areas, caliche caves provide permanent tortoise cover sites and tortoise abundance appears to be directly related to the availability of such habitat (Schneider and Turner, 1980). Areas that have been identified as having the highest abundance of desert tortoise occur south of the project area remotely adjacent to a proposed transmission line (Schneider and Turner, 1980).

Impacts resulting from the establishment of proposed transmission lines would be short-term and include minor disturbances associated with the construction and installation of the transmission system. Other impacts may include occasional mortalities on the service roads associated with the transmission system.

Areas populated by the desert tortoise, if encountered, should be avoided during final transmission route selection and, should it become necessary to transect known desert tortoise habitat, mitigative action to reduce roadkills should be implemented (e.g. maximum vehicle speed limits).

3.4.2 Ferruginous Hawk

Of the raptors that occur in the WPPP area, the ferruginous hawk is the most sensitive to human encroachment. The southern boundary of the ferruginous hawk extends only a short distance into Lincoln County (Herron, 1983). Most ferruginous hawks nest in juniper trees on the edge of sagebrush communities within the WPPP area and the nests are reused each year (Perkins, 1981). Ferruginous hawks will

readily abandon nests if disturbed. Known ferruginous hawk nesting sites occur within the Butte Valley Site, North Steptoe Valley well field, and Butte Valley well field, as well as in corridors associated with the power transmission and railroad systems.

Potential impacts to ferruginous hawks from WPPP development include increased nest disturbance by curious observers, increases in shootings and in transmission line electrocutions and inflight collisions. Increased harassment of the ferruginous hawk can only be curtailed by enforcement of existing programs intended to protect raptors from human encroachment. By employing adequate engineering design practices, mortalities resulting from electrocution can be minimized. Also, final transmission line route selection should accommodate areas with natural perches, such as along the valley edges. The ferruginous hawk will then have the opportunity to utilize natural perches as an alternative to transmission towers.

3.4.3 Spotted Bat

The spotted bat is likely to inhabit caves throughout the WPPP area. Additional characteristics of habitats where spotted bat specimens have been collected in New Mexico (Findley et al., 1975) include pinyon-juniper woodlands and ponderosa mixed coniferous forest habitats adjacent to rock cliffs. Preference for this relatively remote habitat precludes any major impacts to the spotted bat resulting from construction and/or operation of WPPP.

3.4.4 Swainson's Hawk

Populations of Swainson's hawks have been greatly reduced in Nevada (Herron et al., 1980) possibly in response

to juniper invasion of grasslands due to overgrazing (U.S. Department of the Interior, 1982b). The Swainson's hawk is a very conspicuous bird and consequently, during their southward migration in the fall, many are killed by hunters. Additional hawk mortalities may occur in response to the work force influx associated with the WPPP construction and operation. Relatively minor impacts would result from the loss of grasslands (seeded and saline meadows) due to construction of WPPP facilities.

3.4.5 White-Faced Ibis

A majority of the white-faced ibis colonies within the western United States occur on national wildlife refuges in the Great Basin (U.S. Department of the Interior, 1982b) with the largest colony existing at Carson Lake in northwestern Nevada. The white-faced ibis nests in marshy or wetland areas and when water sources for these marshes are diverted, nesting activities are reduced. During certain "drought years", the white-faced ibis will forego nesting. Groundwater withdrawal for WPPP use may affect local marshes or wetlands suitable for white-faced ibis nesting habitat. Such areas occur in the vicinity of the North Steptoe Valley Site and Spring Valley Site.

3.4.6 Long-Billed Curlew

Populations of long-billed curlews appear stable in Nevada (U.S. Department of the Interior, 1982b). However, in other areas of the United States, annual grasslands, the preferred habitat of the long-billed curlew, have been reduced due to irrigation and cultivation. Potential WPPP-related impacts to the long-billed curlew include relatively insignificant reductions of breeding habitat associated with WPPP construction.

3.5 CANDIDATE PLANT SPECIES

Numerous plant species in eastern Nevada are currently being reviewed by the USFWS for listing as threatened or endangered (Table 3-1). Although none of the plant species currently under review for federal listing are protected by the Act, many are protected by Nevada Revised Statutes 527.270, as administered by the Nevada Division of Forestry. A collection permit is required from the Division of Forestry prior to disturbing or taking protected species.

According to distribution maps of the Nevada State Museum (1983) and Harrison (1980), and habitat information of Mozingo and Williams (1980), three candidate species may potentially occur in the WPPP study area. These species are the Great Basin fishhook cactus (Sclerocactus pubispinus), lepidium (Lepidium nanum) and Clokey pincushion cactus (Coryphantha vivipara var. rosea). These species are also recognized as rare by the State of Nevada and are on a state watch list. No populations were located on the three alternative sites during the 1981 and 1982 field surveys.

Additional candidate plant species occur within or adjacent to proposed railroad and transmission line corridors in White Pine County. Camus (Zigadenus vaginatus), lesquerella (Lesquerella hitchcockii), Parish phacelia (Phacelia parishii), and Darrow buckwheat (Eriogonum darrovii) occur in southern White Pine County. Monte Neva paintbrush (Castilleja salsuginosa) occurs within a proposed railroad corridor and well field, but should not be affected by WPPP unless facility locations and plans change whereby intensive construction activities are implemented. Information regarding the Monte Neva paintbrush and Great Basin fishhook cactus is currently sufficient to support threatened or endangered

listing (U.S. Department of the Interior, 1980a, Nevada Threatened and Endangered Plant Workshop, November 14, 1983, Reno).

The Monte Neva paintbrush in addition to being considered for federal listing as endangered, is listed as threatened with extinction by the Nevada Division of Forestry (Mozingo and Williams, 1980). This species is restricted to damp, saline clay soils on hummocks and sides of shallow washes draining mineral springs. Although other localities are expected, it is only known from the Monte Neva Hot Springs area. The USFWS will initiate proceedings for a conservation agreement with the land owner that would define and implement protective measures for the Monte Neva paintbrush (Parenti, 1983).

Known locations of candidate plant species also occur within railroad and transmission line corridors in Lincoln County and Nye County. Parish phacelia occurs within corridors south of the Geyser Maintenance Station. Known lepidium populations occur near a proposed transmission line corridor and railroad corridor. Two known locations of oneleaf Torrey milkvetch (Astragalus calycosus var. monophyllidius) occur in corridors in Nye County. Additional candidate plant species occur in Nye County between the proposed corridors and the Wildlife Management Area, including Darrow buckwheat, Clokey pincushion cactus and oval leaf thelypody (Thelypodium sagittatum var. ovalifolium).

Proposed transmission corridors in Clark County traverse populations of the Nye milkvetch (Astragalus nyensis) and bicolored penstemon (Penstemon bicolor ssp. roseus). This latter species currently has sufficient information to support a listing as threatened or endangered (U.S. Department of the Interior, 1980a).

Known locations of lepidium (Lepidium nanum) occur about five miles south of the junction of State Highway 11 and U.S. Highway 93 in Elko County.

Potential impacts to candidate plant species by proposed WPPP activities primarily would occur during railroad and transmission line tower construction. Locating railroad rights-of-way and transmission towers outside known distributions of candidate plant species would minimize construction impacts. In addition, avoidance of specific habitats and awareness of the potential for these species to occur in other localities within the proposed corridors during final facility siting could help inadvertent disturbance to other populations.

4.0 CONCLUSIONS

Construction and operation of WPPP could impact species currently listed as threatened or endangered or are review candidates for threatened or endangered listing. The major impact includes the potential reduction in Pahrump killifish (a federally listed endangered species) habitat in the Shoshone Ponds, should the Spring Valley Site be selected for development. Groundwater withdrawals in Spring Valley could affect Pahrump killifish habitat in the Shoshone Ponds. Identification of Pahrump killifish habitat and attempts toward establishing additional viable and reproducing populations are recommended for impact mitigation. Other potential impacts include those affecting aquatic species, wildlife species, and plant species which are candidates for review for threatened or endangered listing. Impacts to these species would be primarily related to WPPP construction activities and as such are considered to be short-term. Sedimentation due to accelerated erosion of disturbed soils would affect aquatic habitats and resident aquatic species in areas adjacent to the proposed railroad and transmission line corridors, while the same soil disturbance would temporarily reduce preferred habitat for the wildlife and plant species which are candidates for review or protected by the State of Nevada. Reduction in area and other changes to wetlands in North Steptoe Valley and Spring Valley could affect species that are being considered for threatened or endangered listing.

5.0 REFERENCES

Allen, R., 1983, Telephone conversation between Mr. R.E. Quinlan, aquatic biologist, Dames & Moore; and Mr. R. Allen, biologist, NDOW, Las Vegas, Nevada, March 25, 1983.

Barber, M., No date, Unpublished report. Shoshone Ponds, 1126 (N-041).

_____, 1979, Unpublished report 6600 (N-043) - Shoshone Ponds HMP file, July 18.

_____, 1983a, Telephone conversation between Mr. R.E. Quinlan, aquatic biologist, Dames & Moore; and Mr. M. Barber, biologist, BLM, Ely, Nevada, July 12, 1983.

_____, 1983b, Correspondence from Mr. M. Barber, biologist, BLM, Ely, Nevada; to Mr. R.E. Quinlan, aquatic biologist, Dames & Moore; July 14, 1983.

Dames & Moore, 1983, Water Resources Baseline Technical Report for the White Pine Power Project, pp. 4-14 to 4-17.

Deacon, J.E., C. Hubbs, and B.J. Zahuranec, 1964, Some effects of introduced fishes on the native fish fauna of southern Nevada. Copeia: 2, 384-388.

Deacon, J.E., T.B. Hardy, J. Pollard, W. Taylor, J. Landye, J. Williams, C. Williams, P. Greger, and M. Conrad, 1980, Environmental analysis of four aquatic habitats in east central Nevada June-September, 1980, Interim Final Summary Report to HDR Sciences.

Dodge, F.H. and D.R. Cain, 1972, Our public lands - More than just a fish. U.S. Department of the Interior, BLM, Ely, Nevada.

Enderson, J. H., 1965, A breeding and migration survey of the peregrine falcon. Wilson Bull., 77:327-339.

Findley, J.S., A.H. Harris, D.E. Wilson and C. Jones, 1975, Mammals of New Mexico. University of New Mexico Press, Albuquerque, New Mexico, 360 pp.

Hardy, R.V., 1982, Personal communication between Dr. L.R. Heffinger, Plant Ecologist, Dames & Moore, and R.V. Hardy, Botanist, BLM, Ely, Nevada, June 1, 1982.

Hardy, T., 1979, The Inter-Basin area report, 1979. U.S. Department of the Interior and the State of Nevada, Reno, Nevada.

Harrison, B.F., 1980, Botanical survey threatened, endangered and other rare plants of the Schell Resource Area Ely District, Nevada. Prepared by Inter-Mountain Research Corporation for BLM, Ely, Nevada.

Herron, G., S. Stiver, and R. Turner. 1980, Population surveys, species distribution and key habitats of selected nongame species. NDOW, Job Performance Report, Federal Aid in Wildlife Restoration, Project W-53-R.

Herron, G., 1983, Conversation between Mr. G. Herron, Nongame Biologist, NDOW, Reno, Nevada and Mr. Q. Bliss, Biologist, Dames & Moore, April 7, 1983.

Hubbs, C.L., R.R. Miller, and L.C. Hubbs, 1974, Hydrological history and relict fishes of the north-central Great Basin. Memoirs of the California Academy of Sciences, Vol VII, 259 pp.

La Rivers, 1962, Fishes and fisheries of Nevada, State Printing Office, Carson City, Nevada, 782 pp.

Miller, D. 1975, Suggested practices for raptor protection on power lines, USFWS.

Miller, R.R., and C.L. Hubbs, 1960, The spiny-rayed cyprinid fishes (Plagopterini) of the Colorado River System. University of Michigan Museum Zoology Miscellaneous Publication 115:1-39, Ann Arbor, Michigan.

Minckley, W.L., and J.E. Deacon, 1968, Southwestern fishes and the enigma of "endangered fishes". Science Vol. 159, pp. 1424-1432.

Mozingo, N.H. and M. Williams, 1980, Threatened and endangered plants of Nevada; an illustrated manual. BLM, Reno, Nevada and USFWS, Portland, Oregon.

Nevada State Museum, 1983, Nevada threatened and endangered plant workshop proceedings. Carson City, Nevada.

Parenti, R., 1983, Personal communication between Dr. L.R. Hettinger, plant ecologist, Dames & Moore; and Dr. R. Parenti, USFWS, Reno, Nevada, March 25, 1983.

Perkins, M., 1981, Personal interview between Dr. P.R. Davis, wildlife biologist, Dames & Moore; and Mr. M. Perkins, wildlife biologist, BLM, Ely, Nevada, June 23, 1981.

Pinzl, A., 1982, Telephone communication between Dr. L. R. Hettinger, plant ecologist, Dames & Moore; and Ms. A. Pinzl, curator of natural history, Nevada State Museum, Carson City, Nevada, December 1, 1982.

Pinzl, A., 1983, Correspondence from A. Pinzl, curator of natural history, Nevada State Museum, Carson City, Nevada; to Dr. L.R. Hettinger, plant ecologist, Dames & Moore, August 12, 1983.

Porter, R.D., and C.M. White, 1973, The peregrine falcon in Utah, emphasizing ecology and competition with the prairie falcon. B.Y.U. Science Bull., Biol. Ser., 18:1-74.

Sada, D.W., 1982, Letter from Mr. D.W. Sada, staff ichthyologist, USFWS, Reno, Nevada to Mr. R.E. Quinlan, aquatic biologist, Dames & Moore, August 2, 1982.

Schneider, P.B., and R. Turner, 1980, A survey of desert tortoise on selected areas in southern Nevada. NDOW, Reno, Nevada.

Snow, C., 1973, Habitat management series of endangered species. Southern bald eagle Haliaeetus leucocephalus leucocephalus and northern bald eagle Haliaeetus leucocephalus alascanus. BLM, Techn. Rep. No. 5, T-N-171, Denver, Colorado.

Stebbins, R.C., 1966, A field guide to western reptiles and amphibians. Houghton Mifflin Company, Boston, Massachusetts.

U.S. Department of the Interior, 1980a, Threatened and endangered wildlife and plants, review of plant taxa for listing and endangered or threatened species. USFWS, Federal Register, 45 (242):82479-82509, December 15, U.S. Government Printing Office, Washington, D.C.

_____, 1980b, Recovery plan - Pahrump killifish, USFWS, March 17, 30 pp.

_____, 1982a, Endangered and threatened wildlife and plants; Review of vertebrate wildlife for listing as endangered or threatened species. USFWS, Federal Register, December 30, 1982, U.S. Government Office, Washington, D.C.

_____, 1982b, Sensitive bird species, Region One, USFWS, Portland, Oregon.

Vigg, S., 1982, Ecology of the Nevadan relict dace, (Relictus solitarius) (Hubbs and Miller) with a selected bibliography on Great Basin desert fishes. Bioresources Center Desert Research Institutes, Reno, Nevada, 110 pp.

Williams, J.E. and G.R. Wilde, 1981, Taxonomic status and morphology of isolated populations of the White River springfish, Crenichthys baileyi (Cyprinodontidae). The Southwest Naturalist 25 (4); 485-503.

Table 3-1

Candidate Threatened, Endangered, and Rare Plant Species

Scientific Name	Common Name	Status[a]	County	Habitat
A. calycocus var. monophyllidius	Oneleaf Torrey milkvetch	2, 3a (T)	Nye, Lincoln	Open gravelly, limestone hillsides. Pinyon-juniper, big sagebrush. Elevation 5600 to 7000 feet.
A. nyensis	Nye milkvetch	2, 3b	Clark, Lincoln	Outwash fans and gravelly flats, sometimes in sandy soil. Associated with creosote bush, black brush, bursage, range ratany. Elevation 1700 to 5600 feet.
Castilleja salsuginosa	Monte Neva paintbrush	3a (E), 4	White Pine	Occurs only at Monte Neva Hot Springs; wet saline clay soil, on hummocks and sides of shallow washes draining mineral springs.
Coryphantha vivipara var. rosea	Clokey pincushion cactus	1, 3b (T)	White Pine, Lincoln, Nye	Gravelly limestone or volcanic slopes and brushy hillsides. Pinyon-juniper, black sagebrush communities. Elevation 3800 to 9000 feet.
Draba sphaeroides var. cusickii	Draba	2, 3c	White Pine, Nye	Rocky outcrops, pinyon-juniper, Great Basin coniferous forest.
Eriogonum darrovii	Darrow buckwheat	2, 3c	Elko, White Pine	Very hard, dry, fine soil with limestone, in washes and flats. Associated plants: Utah juniper, low rabbitbrush, big sagebrush, tufted rockmat, Stansbury cliffrose. Elevation 6100 to 6500 feet.
Frasera gypsicola	Sunnyside green gentran	3 (E), 4	Nye	Fine self-rising soil, encrusted with salts. Associated plants: gentian, big sagebrush, desert plume, whitemargin frasera, pepperweed. Elevation 4950 to 5200 feet.
Lepidium nanuum	Lepidium	2, 3b	White Pine, Elko, Lincoln	Barren knolls, low sagebrush.
Lesquerella hitchcockii	Hitchcock bladderpod	2, 3b-3c(?)	White Pine, Nye	Loose limestone, rocky, gravelly soils, talus slopes. With singleleaf pinyon, ponderosa pine, bristlecone pine, white fir, black sagebrush. Elevation 7000 to 11,500 feet.
Mirabilus pudica	--	2, 3c	Clark, Lincoln	Shadscale, creosote bush, disturbed sites.
Penstemon bicolor ssp. bicolor	Bicolored penstemon	1, 3a (T)	Clark	On slight elevations in shallow, gravelly washes and on roadsides. Associated with creosote bush and yucca. Elevation 1970 to 5480 feet.

Table 3-1 (continued)

Scientific Name	Common Name	Status[a]	County	Habitat
P. bicolor ssp. roseus	Bicolored penstemon	1, 3a (T)	Clark	On slight elevations in shallow, gravelly washes and on roadsides. Associated with cresotoe bush and yucca. Elevation 1970 to 5480 feet.
Perityle megalocephala var. intricata	Perityle	2, 3b	Nye, Clark	Shadscale.
Phacelia anelsonii	A. nelson phacelia	2, 3b (T)	Clark, Lincoln	Shaded places, rich soil at base of limestone cliffs, or among rocks of sandy and gravelly washes. Associated with Utah juniper, dory sage and oak brush.
P. parishii	Parish phacelia	2, 3b	Lincoln, Nye	Big sagebrush, greasewood-saltwood.
Sclerocactus pubispinus	Great Basin fishhook cactus	1, 3a (T)	White Pine, Elko, Lincoln	Rocky dolomite or quartzite soil. Associated plants: sagebrush, pinyon-juniper, and Atriplex spp. Elevation 5000 to 6000 feet.
Thelypodium laxiflorum	Thelypody	1, 3c	Lincoln	Big sagebrush, pinyon-juniper.
T. sagittatum var. ovalifolium	Oval leaf thelypody	1, 3b (T)	Elko, White Pine, Nye	Clay soils, by springs, streams or lakes endemic to White Pine County. With basin wildrye, California slim nettle, Nevada goldenrod, burdock, willow. Elevation 6000 to 8400 feet.
Zigadenus vaginatus	Camus	1, 3b	White Pine	Geothermal areas. With greasewood-saltbrush.

[a] Status:
1 = Nevada "watch list," Nevada Rare, Threatened, and Endangered Workshop, February, 1983, or Mozingo and Williams, 1980.
2 = Nevada Rare, Threatened, and Endangered Workshop, February 1983.
3 = Candidate taxa under review by USFWS.
a = Taxa with sufficient information to support their being listed as threatened/endangered.
b = Taxa with information indicating probable appropriateness for listing as threatened/endangered, but where additional data are needed to support such listing.
c = Taxa no longer being considered for listing.
T = Threatened.
E = Endangered.
4 = Recognized as threatened or endangered by Nevada Division of Forestry, protected by NRS 527.270.

Sources: Mozingo, H. N., and Margaret Williams. Threatened and Endangered Plants of Nevada; An Illustrated Manual. U.S. Fish & Wildlife Service, Portland, Oregon, and U.S. Bureau of Land Management, Reno, Nevada, 1980.

Sensitive Plant List for Nevada. Threatened and Endangered Workshop, November, 1981.

Department of the Interior. U.S. Fish & Wildlife Service. Endangered and Threatened Wildlife and Plants; Review of Plant Taxa for Listing as Endangered or Threatened Species. Federal Reg. 45:242, pp. 82480-82569, 1980.

Nevada State Museum, Carson City, NV, Nevada Threatened and Endangered Plant Workshop, February 1983.

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Castilleja salsuginosa	Monte Neva paintbrush	3a (E), 4	White Pine	Occurs only at Monte Neva Hot Springs; wet saline clay soil, on hummocks and sides of shallow washes draining mineral springs.
Coryphantha vivipara var. rosea	Clokey pincushion cactus	1, 3b (T)	White Pine, Lincoln, Nye	Gravelly limestone or volcanic slopes and brushy hillsides. Pinyon-juniper, black sagebrush communities. Elevation 3800 to 9000 feet.
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