APPENDIX C

Part I
Fish and Wildlife Service Memorandum
(December 3, 2002)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Mexico Ecological Services Field Office
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December 3, 2002

Memorandum

To: Area Manager, Western Colorado Area Office, Bureau of Reclamation, Grand Junction, Colorado

From: Field Supervisor, New Mexico Ecological Services Field Office, U.S. Fish and Wildlife Service, Albuquerque, New Mexico

Subject: Planning Aid Memorandum for the Navajo - Gallup Water Supply Project Environmental Impact Statement (EIS), New Mexico

The attached Planning Aid Memorandum (PAM) identifies information needs and recommended guidance that should be addressed in the Navajo - Gallup Water Supply Project EIS to protect fish and wildlife resources. The PAM also provides planning input that can be incorporated into the National Environmental Policy Act (NEPA) activities associated with the development of the EIS. A Fish and Wildlife Coordination Act Report will also be prepared by the Service for inclusion in the EIS process.

We appreciate the opportunity to provide information and suggestions concerning fish and wildlife resources. If you have any questions, please contact John Branstetter at (505) 346-2525 ext. 4753.

Joy Nicholopoulos

Attachment

cc: (w/ atch)
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico

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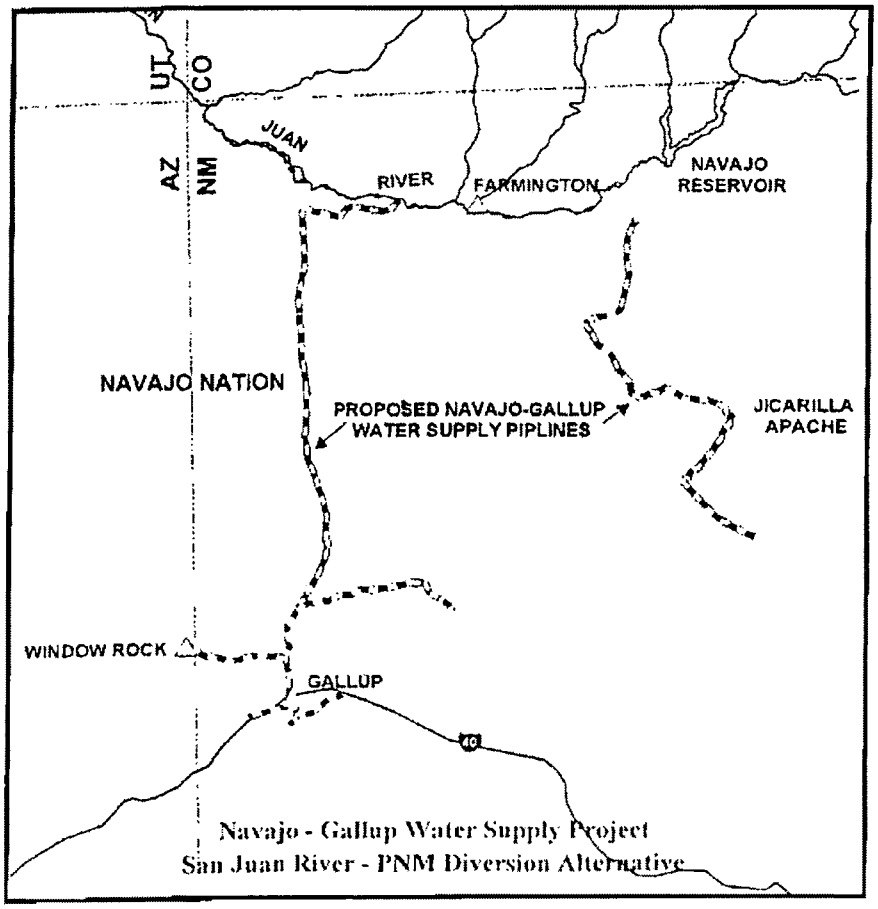

Navajo - Gallup Water Supply Project
Planning Aid Memorandum

December 2002

BACKGROUND

The Navajo Nation and the City of Gallup (Gallup), New Mexico, currently rely on a rapidly diminishing groundwater supply to meet current water needs. Groundwater depletion has been occurring for a number of years and other water sources are needed to meet future water demands. In 1971, the Bureau of Reclamation (Bureau), under Public Law 92-99, was authorized to conduct a feasibility study to provide water to the Navajo Nation and Gallup (U.S. Fish and Wildlife Service (USFWS) 1981).

In the 1970's, the Bureau, under Public Law 92-99, began development of an Environmental Impact Statement for the Gallup - Navajo Indian Water Supply Project, a precursor to the current Navajo - Gallup Water Supply Project. Feasability and appraisal reports were developed for the project in the 1970's and 1980's, but none of the reports moved forward (Bureau 2000).

Other activities and programs have developed in the San Juan Basin which have direct bearing on the Navajo - Gallup Water Supply Project. One such program is the San Juan River Basin Recovery Implementation Program (SJRBRIP). The SJRBRIP was initiated in 1992 to conserve Colorado pikeminnow (*Ptychocheilus lucius*) and razorback sucker (*Xyrauchen texanus*) populations in the basin, while proceeding with water development in compliance with Federal and State laws, interstate compacts, Supreme Court decrees, and Federal trust responsibilities to the Southern Utes, Ute Mountain Utes, Jicarillas, and Navajos (Holden 1999).

The SJRBRIP has identified factors that limit Colorado pikeminnow and razorback sucker recovery (Bureau 2002). To conserve and recover endangered fish species in the San Juan River, the SJRBRIP has recommended that water releases from Navajo Reservoir mimic the river's natural hydrograph (Holden 1999). The flow recommendations call for peak spring flows and summer, fall, and winter baseflows in the river between Farmington, New Mexico, and Lake Powell, Utah. Peak spring flows will clean existing cobble sources, build cobble bars, change channel configurations, provide channel diversity, introduce nutrients into the system, and maintain clean backwaters and low-velocity habitat for larval fish in secondary channels (Holden 1999). The recommended baseflows will ensure that backwater nursery habitats will be maintained and enhanced (Holden 1999).

To facilitate water releases from Navajo Reservoir and meet the SJRBRIP flow recommendations, the Bureau is developing an EIS for the reoperation of Navajo Dam and reservoir. Modifying the operating procedures of Navajo Dam and reservoir will allow sufficient water releases to occur at times, quantities, and durations necessary to conserve Colorado pikeminnow and razorback sucker and their designated critical habitat in the San Juan River (Bureau 2002). Operational changes will also allow water development to proceed in the basin in compliance with applicable laws, compacts, court decrees, and Indian Trust Asset responsibilities (Bureau 2002).

The Navajo - Gallup Water Supply Project will provide approximately 40,000 acre-feet of water per year (afy) to the Navajo Nation and Gallup to meet long-term, municipal and industrial needs (Bureau 2000a). Water supplied by the project will also support economic growth and improve the standard of living for current and future populations in the project area (Bureau 2000a).

The four alternatives currently being analyzed in the Navajo - Gallup Water Supply Project EIS include a no action alternative, a water conservation alternative, a Navajo Indian Irrigation Project (NIIP) alternative (structural), and a San Juan River Diversion (SJRD) alternative (structural). Two potential points of diversion have been identified for the SJRD alternative.

Under the NIIP alternative, water would be diverted from Navajo Reservoir through the NIIP Main and Burnham Lateral Canals and delivered to an 8,800 acre-foot reservoir to be constructed as part of this alternative. From the reservoir, water would be piped south to an existing natural gas line corridor. The waterline would follow the gas line corridor to the vicinity of Twin Lakes, New Mexico, where it would turn south to Yah-ta-hey, New Mexico. At Yah-ta-hey, it would connect to smaller waterlines and proceed west along Highway 64 to Window Rock, Arizona, and south along Highway 666 to Gallup. Three additional spur waterlines would connect to the mainline, including a pipeline from Naschitti, New Mexico, north along Highway 666 to Sanostee, New Mexico; a pipeline from Twin Lakes east along Indian Route 9 to Dalton Pass, New Mexico; and a pipeline along Highway 44 to Nageezi, New Mexico, then south to Torreon, New Mexico.

Under the SJRD alternative, water would be diverted from the San Juan River at the Hogback or Public Service Company (PNM) Diversion. From the diversion, water would be piped south along Highway 666 to Yah-ta-hey. At Yah-ta-hey, the main waterline would connect to spur waterlines extending to Window Rock and Gallup. An additional waterline originating at Cutter Reservoir would be constructed to provide water to the eastern portion of the Navajo Reservation. Water would be transported via pipeline to Huerfano, New Mexico, and follow Highway 44 to Nageezi. From Nageezi, water would be piped south to Torreon.

A baseline San Juan River depletion level of 845,890 afy has been established to allow sufficient flow in the river to protect fish and wildlife resources (Bleisner 2001). Bleisner (2001) estimates that current annual depletions in the San Juan River total approximately 600,590 afy. Water depletions associated with the Navajo - Gallup Water Supply Project will be covered by available unused depletions (Bleisner 2001). As a result, the baseline depletion level will not be exceeded as a result of the project (Bleisner 2001).

Although the baseline depletion level will not be exceeded, impacts to fish, wildlife, and vegetation resources could still occur as a result of the project. Impacts to aquatic organisms may include entrainment of fish or other aquatic species in diversion canals and/or impingement on screens, reduced habitat availability and quality, and reduced accessibility to important habitats. Multiple indirect impacts, some of which may develop over a long time period, could also occur. These impacts may occur as a result of long-term geomorphic and/or hydrologic changes caused by altered sediment transport in the river up- or downstream of the point-of-diversion.

Direct impacts to wildlife and vegetation in the project area may include habitat loss caused by vegetation removal, water inundation or dessication, and/or soil disturbance associated with construction activities. Indirect impacts to wildlife and vegetation, some of which may develop over a long time period, could also occur. Indirect impacts may occur as a result of hydrologic changes up- or downstream of the point of diversion which cause suitable habitat in certain areas to be lost while suitable habitat in previously unoccupied areas develops.

Ecosystems Research Institute (ERI) was contracted to develop an Environmental Assessment (EA) for the Navajo - Gallup Water Supply Project. The purpose of the EA is to identify fish, wildlife, and vegetation resources in the project area, identify potential project related impacts to those resources, and describe how impacts will be mitigated. A draft EA which contains information on fish, wildlife, and vegetation resources has been developed (ERI 2001). A final EA which identifies and evaluates direct and indirect impacts to these resources, and identifies mitigation measures to minimize impacts, will be completed.

Information on fish, wildlife, and vegetation resources in the project area is provided below. The following resource information is based on the draft EA and other published and unpublished sources. The following information should be used during the planning process to identify where impacts may occur, develop measures to avoid or minimize impacts, promote recovery of listed species, and conserve sensitive species.

Vegetation

Between the fall of 1999 and summer of 2000, ERI conducted field surveys for habitats or possible habitats of endangered, threatened, and sensitive floral and faunal species in the proposed pipeline alignments of the Navajo - Gallup Water Supply Project (ERI 2001). Sensitive vegetative species identified during the surveys are shown in Table 1.

Field surveys and Gap Analysis Project (GAP) data were used to quantitatively delineate vegetation communities along the NIIP and SJRD pipeline routes (ERI 2001). Dominant vegetative communities along the NIIP pipeline route include Great Basin lowland/swale grassland (45.7%), Great Basin foothill-Piedmont grassland (27.2%), and Great Basin microphyllous desert scrub (18.2%), respectively. Dominant vegetative communities along the San Juan Diversion pipeline route include Great Basin microphyllous desert scrub (46.3%), Great Basin lowland/swale grassland (22.0%), and Great Basin broadleaf deciduous desert scrub (13.1%), respectively (ERI 2001).

The majority of the pipeline and laterals for both the NIIP and SJRD alternatives will be located in semi-arid grassland desert scrub habitats. Project related impacts to these habitats should be identified during planning. Minimization measures should be developed to reduce impacts to vegetation, particularly native vegetation.

Table 1. Vegetative endangered, threatened, and species of concern identified during ERI surveys of the pipeline alignments for the structural alternatives (ERI 2001).

Pipeline Alignment	Species	Status
*Cutter Lateral	Beautiful (Aztec) gilia (*Gilia formosa*)	Species of Concern
*Cutter Lateral	†Brack's fishhook cactus (*Sclerocactus cloveriae var. brackii*)	Species of Concern
**NIIP	San Juan milkweed (*Asclepias sanjuanensis*)	Species of Concern
***SJRD	Mesa Verde cactus (*Sclerocactus mesae-verdae*)	Threatened

* The Cutter Lateral pipeline alignment is a common element of both structural alternatives
** The NIIP alignment does not include the Cutter Lateral in this table
*** The SJRD alignment does not include the Cutter Lateral in this table
† Only potential habitat for the Brack's cactus was identified, no plants

Riparian and wetland habitats may be impacted in the project area as well. Riparian vegetation near the project site is dominated by salt cedar (*Tamarix chinensis*), Russian olive (*Elaegnus angustifolia*), cottonwoods (*Populus fremontii and P. angustifolia*) and willows (*Salix amygdaloides and S. exiqua*) (Ryden 2000). Ecosystems Research Institute noted that additional investigative field work will need to be conducted in the riparian zone of the San Juan River corridor for threatened and endangered species and wetland identification (ERI 2001a). Wetland and riparian habitats that may be impacted by the project should be delineated as part of the proposed field work.

Terrestrial and Aquatic Wildlife

The Bureau (1983) conducted habitat investigations within a portion of the project area for the Navajo - Gallup (formerly Gallup - Navajo) Water Supply Project. Through their investigations, the Bureau identified that 150 bird and 64 mammalian species had been reported in the project area (ERI 2001). As a part of their project area investigations, the Bureau reviewed New Mexico Department of Game and Fish hunter survey reports from the late 1960's and early 1970's to evaluate wildlife density (ERI 2001). Hunter survey reports revealed low densities of game species in the project area (ERI 2001). These reports were a useful indicator of game density in the study area when quantitative data was unavailable.

A review of current literature should be conducted to determine if changes in species diversity or abundance have occurred over the last several decades. If up-to-date literature is not available,

then studies should be developed or hunter survey reports from recent years should be reviewed to determine if changes in wildlife abundance have occurred.

The proposed route was surveyed for habitats or potential habitats of raptors and threatened and endangered species during the ERI surveys (ERI 2001). Sandstone cliffs, trees, and power lines were observed for nests, eyries, perching and roosting sites within one quarter mile of the proposed pipeline routes (ERI 2001). Wildlife species observed or identified as being present are shown in Table 2.

No federally listed wildlife species were observed during the ERI surveys; however, small stands of willows were encountered along wetlands near proposed pipeline crossings (ERI 2001). These willows may provide important habitat for endangered southwestern willow flycatcher (*Empidonax traillii extimus*). Willows and other riparian vegetation which may provide habitat for southwestern willow flycatcher should be delineated, and measures should be developed during the planning process to minimize and mitigate for impacts to these habitats.

Table 2. Wildlife species observed or identified as being present during ERI surveys of the pipeline alignments for the structural alternatives (ERI 2001).

Pipeline Alignment	Species
*Cutter Lateral, **NIIP	ferruginous hawk (*Buteo regalis*)
**NIIP, ***SJRD	golden eagle (*Aquila chrysaetos*)
*Cutter Lateral, **NIIP, ***SJRD	red-tailed hawk (*Buteo jamaicensis*)
*Cutter Lateral, **NIIP	Gunnison's prairie dog (*Cynomys gunnisoni*)
*Cutter Lateral, **NIIP	kangaroo rats (*Dipodomys* spp.)
*Cutter Lateral, **NIIP	deer mice (*Peromyscus* spp.)
*Cutter Lateral	chipmunks (*Tamias* spp.)
*Cutter Lateral, **NIIP	coyote (*Canis latrans*)
*Cutter Lateral	bobcat (*Lynx rufus baileyi*)
**NIIP	fox (*Vulpes vulpes*)
**NIIP	badger (*Taxidea taxus*)

* The Cutter Lateral pipeline alignment is a common element of both structural alternatives
** The NIIP alignment does not include the Cutter Lateral in this table
*** The SJRD alignment does not include the Cutter Lateral in this table

Bald eagles (*Haliaeetus leucocephalus*), peregrine falcons (*Falco peregrinus* spp.), Swainson's hawks (*Buteo swainsoni*) and burrowing owls (*Athene cunicularia hypugaea*) were not observed during the ERI surveys; however, potential habitat for these species was identified (ERI 2001). Potential habitat observed during the surveys may be important to the long-term persistence of these species. Potential habitat should be considered during the planning process and measures developed to avoid or minimize impacts to it.

Two federally endangered fish species are found in the San Juan River within the project area (Colorado pikeminnow and razorback sucker). The roundtail chub (*Gila robusta*), also present in this reach of the San Juan River, is listed by the State of New Mexico as endangered and is classified by the Service as a species of concern. Other fish species commonly found in or near this section of the river include: red shiner (*Cyprinella lutrensis*), fathead minnow, (*Pimephales promelas*), flannelmouth sucker (*Catostomus latipinnis*), mosquitofish (*Gambusia affinis*), common carp (*Cyprinus carpio*), channel catfish (*Ictalurus punctatus*), speckled dace (*Rhinichthys osculus*), mottled sculpin (*Cottus bairdi*), plains killifish (*Fundulus zebrinus*), green sunfish (*Lepomis cyanellus*), largemouth bass (*Micropterus salmoides*), white sucker (*Catostomus commersoni*), and bluehead sucker (*Catostomus discobolus*) (Platania 1990, Keller-Bliesner Engineering and Ecosystems Research Institute 1991, Platania and Lang 1992).

Endangered Species and Species of Concern

Within the proposed project areas are several federally listed species including: Colorado pikeminnow, razorback sucker, southwestern willow flycatcher, bald eagle, Mexican spotted owl (*Strix occidentalis lucida*), Mesa Verde cactus, and mountain plover (*Charadrius montanus*) (proposed threatened).

Species of concern that may be in the project area and impacted by Bureau activities include: Townsend's big-eared bat (*Corynorhinus townsendii*), American peregrine falcon, Arctic peregrine falcon, Baird's sparrow (*Ammodramus bairdii*), black tern (*Chlidonias niger*), northern goshawk (*Accipiter gentilis*), roundtail chub, New Mexico silverspot butterfly (*Speyeria nokomis nitocris*), San Juan checkerspot butterfly (*Euphydryas anicia chuskae*), San Juan tiger beetle (*Cicindela lengi jordai*), beautiful (Aztec) gilia, Brack's fishhook cactus, and Bisti fleabane (*Erigeron bistiensis*).

Candidates and species of concern have no legal protection under the Act and are included in this document for planning purposes only. However, we monitor the status of candidate species and species of concern. If significant declines are detected, these species could potentially be listed as endangered or threatened. Therefore, these species should be considered during project planning and minimization measures should be developed to ensure that these species are not negatively impacted. Conservation actions which promote population expansion and species protection (*i.e.*, planting native vegetation or noxious weed removal) should be considered during the planning process, and, where possible, incorporated into the project.

Colorado Pikeminnow

The Colorado pikeminnow, a species endemic to the Colorado River basin, was federally listed as endangered in 1967 and given full protection under the Endangered Species Act of 1973, in 1974 (USFWS 1978). Critical habitat has been designated on 1,848 kilometers (km) of the Colorado River and its tributaries, including the San Juan River from Farmington, New Mexico, to Lake Powell, Utah (USFWS 1994).

Colorado pikeminnow are adapted to rivers with seasonally variable flow, high silt loads, and turbulent waters (USFWS 1991). Young-of-year live in shallow backwater areas that have little or no current (over silt and sand substrates). At about 20 centimeters (cm) in length, there is a change in habitat preference, with the larger fish selecting deeper water with low velocities. Adult pikeminnow are large river fish, and are found in a variety of depths and velocities over silt, sand, gravel, and boulder substrates (Holden 1999).

Colorado pikeminnow were once abundant in the mainstem of the Colorado River in the United States and Mexico, and in most of its tributaries in California, Arizona, Nevada, New Mexico, Colorado, Utah, and Wyoming (USFWS 1991). The decline of Colorado pikeminnow is attributed to alteration of river conditions and loss of habitat caused by dam construction, irrigation water withdrawals, channelization, and introduction of non-native fish species (USFWS 1991, USFWS 1994). Today there are fewer than 10,000 adult pikeminnow in the wild, primarily in the Colorado River from Palisade, Colorado, downstream to Lake Powell; the Green River below the confluence with the Yampa River; the Yampa River below Craig, Colorado; and the White River from Taylor Draw Dam near Rangely downstream to the confluence with the Green River (USFWS 1991).

Research and monitoring of Colorado pikeminnow and razorback sucker populations has been ongoing in the San Juan River since 1987. Young-of-year sampling on the river between 1987 and 1996 resulted in the capture of 48 young-of-year Colorado pikeminnow (Holden 1999). Between 1996 and 2001, more than 800,000 Colorado pikeminnow (primarily larvae and young-of-year) were stocked into the San Juan River (Ryden 2002). However, despite good initial returns, relatively few of these stocked fish have been recaptured (Ryden 2002).

Based on research conducted to date, the SJRBRIP has initiated several management actions to meet the ecological needs of Colorado pikeminnow (Holden 1999, Ryden 2002, Bureau 2002). Management actions include reoperation of Navajo Dam and reservoir to better meet species needs, control of non-native fish species, augmentation of Colorado pikeminnow populations, and identification and removal of fish passage barriers (Bureau 2002). A long-term monitoring program has been developed by the SJRBRIP to assess the effectiveness of implemented management actions (Ryden 2002).

Razorback Sucker

Razorback sucker, a species endemic to the Colorado River basin, was federally listed as endangered in 1991 (USFWS 1991a). Critical habitat for razorback sucker has been designated

on 2,776 kilometers (km) of the Colorado River and its tributaries, including the San Juan River from the Hogback Diversion in New Mexico, to Lake Powell, Utah (USFWS 1994).

Razorback sucker are adapted to rivers with seasonally variable flow, high silt loads, and turbulent waters (USFWS 1991a). Larval razorback sucker prefer shallow littoral zones in lotic and lentic habitats (Holden 1999). After a few weeks in the littoral zone, larvae disperse to deeper waters. Larvae move into the drift and are transported downstream. Habitat preference of juvenile razorback sucker is not well known, as very few juveniles have been collected in the last 40 years (Holden 1999). Juveniles that have been collected have primarily been captured in backwater areas or flooded bottomlands (Holden 1999). Backwater and flooded bottomland habitats are important to, and may be the preferred habitats of, juvenile razorback sucker. Adult razorback sucker occupy a variety of habitats including edge pools, eddies, main channel runs, shoals, backwaters, and impoundments (USFWS 1991a, Holden 1999).

Razorback sucker populations have declined precipitously in the last 50 years. The population decline is attributed to alteration of riverine conditions and loss of habitat caused by dam construction, irrigation water removal, channelization, and introduction of non-native fish species (USFWS 1991a). Razorback sucker are now present in the San Juan River upstream of Lake Powell, Utah, but few fish have been captured (USFWS 1991a, Holden 1999).

Research and monitoring of razorback suckers has been ongoing in the San Juan River since 1987 (Ryden 2002). Between 1994 and 2001, over 6,836 razorback sucker were released into the San Juan River (Ryden 2002). Recapture data indicates that razorback sucker stocked at a total length of 300 millimeters (mm) or greater have a higher probability of survival than fish stocked at a smaller body size. To increase the probability of survival, the SJRBRIP has committed to releasing only razorback sucker 300 mm or greater into the river (Ryden 2002).

To date, the SJRBRIP has initiated several management actions to meet the ecological needs of razorback sucker (Holden 1999, Ryden 2002, Bureau 2002). Management actions include re-regulation of releases from Navajo Dam to better meet species needs, control of non-native fish species, augmentation of razorback sucker populations, and identification and removal of fish passage barriers (Bureau 2002). A long-term monitoring program, developed by the SJRBRIP, is being used to assess the effectiveness of implemented management actions (Ryden 2002).

Southwestern Willow Flycatcher

The southwestern willow flycatcher is federally listed as an endangered species with critical habitat in Catron, Grant, and Hidalgo Counties (USFWS 1995, USFWS 1997).

Southwestern willow flycatchers are a sparrow-sized, dark-headed, olive-green bird with a whitish throat, pale olive breast and pale yellow belly (USFWS 1995). This species lacks a conspicuous eye ring and has dusky wings which have two whitish bars. Southwestern willow flycatchers have a habit of flicking their tail upward and their song sounds like a sneezy "fitz-bew", a whistle superimposed on a buzz (USFWS 1995).

Deep-shaded mature woodlands, swamps, willow or alder thickets along streams, bogs, muskegs, edges of mountain meadows, orchards, and dry, brushy upland pastures provide habitat for southwestern willow flycatchers (USFWS 1997). They make a neat but loosely woven cup nest in an upright crotch of a low shrub. Southwest willow flycatchers can be found over a wide elevational range, but primarily occur between 1,100-1,700 meters (m) (USFWS 1997).

Currently, southwestern willow flycatcher population centers are small and widely dispersed. The New Mexico portion of the population is estimated at 100 pairs (USFWS 1997). In New Mexico, southwestern willow flycatchers summer in the San Juan, Chama, Rio Grande, San Francisco, Gila Valleys, and San Juan Mountains. Breeding area records for this species in New Mexico include: the Jemez Mountains; Red River, Carson National Forest; Eagle Nest Lake, Colfax County; Philmont Scout Camp, Colfax County; Maxwell National Wildlife Refuge (NWR), Colfax County; Las Vegas, San Miguel County; Santa Rosa, Guadalupe County; Bitter Lake NWR; Silver City, Grant County; and Artesia, Eddy County (USFWS 1997).

The decline of southwest willow flycatchers is in part attributed to loss of riparian habitat and nest parasitism by brown-headed cowbirds (USFWS 1995, USFWS 1997). Protection of existing riparian habitats in the southwest and promotion of native riparian revegetation along stream corridors are important management actions which, if implemented, can help protect and maintain southwest willow flycatcher populations.

Bald Eagle

The bald eagle is federally listed as a threatened species (USFWS 1995a). It is also listed as a threatened species by the New Mexico Department of Game and Fish.

Bald eagles are large hawk-like birds that are 0.9 m long and have a 1.8-2.1 m wingspan (USFWS 1982). Adults have a white head, neck, and tail. Body color is a dark brownish black. While soaring, wings are kept flat, not uplifted like vultures (USFWS 1982). Immature bald eagles are mostly dark without the characteristic white head and tail, and may be confused with golden eagles. Bald eagles have curved yellow beaks and unfeathered feet. They feed primarily on fish, but waterfowl, small mammals, and carrion constitute a portion of their diet (USFWS 1982).

Bald eagles require large trees or cliffs near water with abundant fish for nesting (USFWS 1983). They spend the winters along major rivers, reservoirs, or in areas where fish and/or carrion are available. For nesting eagles, fish are the primary food source. Waterfowl, rabbits, and carrion are important food items for transient and wintering eagles (USFWS 1983). In New Mexico, habitats are found in the riparian zones along the Rio Grande, Pecos, Chama, Gila, San Juan, and Canadian Rivers (USFWS 1982).

Historically, bald eagles ranged throughout the contiguous United States, Canada, and northern Mexico. They were, however, not very abundant in the southwestern United States (USFWS 1982). The species occupies New Mexico primarily as a migrant and winter resident, with several historic and two recent nesting records known from Colfax and Sierra Counties.

The decline of bald eagles is attributed to reproductive failure from pesticide use, namely DDT, and killing by humans (USFWS 1995). Current threats are habitat loss, human encroachment on nesting sites, and lead poisoning, usually from the ingestion of gunshot in carrion (USFWS 1995).

Mexican Spotted Owl

The Mexican spotted owl is federally listed as a threatened species (USFWS 1993). It is a medium-sized owl with large dark eyes and no ear tufts, that closely resembles the barred owl. Plumage is brown with numerous white spots and posterior underparts with short, horizontal bars or spots. Length is about 0.4 m and wingspan is 1.0 m (USFWS 1995).

Mexican spotted owl occur in a variety of habitats, consisting primarily of mature montane forest and woodland, shady wooded canyons, and steep canyons (USFWS 1995). In forested habitats, uneven-aged stands with a high canopy closure, high tree density, and a sloped terrain appear to be key habitat components. Nests are found in live trees, snags, and canyon-lined wall cavities (USFWS 1995).

Historically, the range of the Mexican spotted owl extended from the southern Rocky Mountains in Colorado and the Colorado Plateau in southern Utah southward through Arizona and New Mexico, and western Texas, through the Sierra Madre Occidental and Oriental, to the mountains at the southern end of the Mexican Plateau (USFWS 1993).

The present range is thought to be similar to the historic range. In New Mexico, the owl has been recorded in all montane regions from the San Juan, Jemez, and Sangre de Cristo Mountains in the north, to the Guadalupe and Animas Mountains in the south (USFWS 1995). The largest concentrations occur in the Mogollon and Sacramento Mountains. Other records exist for Navajo Reservoir, Mountainair, Lower San Francisco Valley, Estancia, Grants, Hurley, Burro

Mountains, Carlsbad Caverns National Park, and San Andres National Wildlife Refuge (USFWS 1995). The records probably represent dispersing individuals.

The decline of the Mexican spotted owl is attributed to habitat alteration from uneven-aged forest management practices (USFWS 1993). Fuel accumulation and forests overstocked with trees place spotted owl habitat at risk to stand-replacing and catastrophic fires. Lack of small-scale low intensity ground fires have increased this risk.

Mountain Plover

The mountain plover is classified by the Service as a proposed threatened species. Unbarred white underparts separate this plover from all other brown-backed plover. The mountain plover is sandy brown above and has a black crown patch which is offset by a white forehead and eyebrow and less distinct dark eyeline (Knopf 1996). A thin white wing-line is apparent in flight, as is the white-edged tail with a broad, smudgy dark terminal band (Knopf 1996).

Mountain plover habitat consists of expansive flats of dry short-grass prairie, high plains, dry upland habitats, semidesert, alkali flats, prairie dog towns and over-grazed areas at middle to lower elevations (Knopf 1996). The mountain plover, which migrates almost statewide, is often found far from water and in the winter may be found in bare dirt fields. It summers in the eastern plains westward to the San Augustin Plains and Animas Mountains area, and southward to the Tularosa Basin.

The decline of mountain plover is attributed to loss of habitat from agricultural urbanization, range management, gas and oil development, mining disturbance, prairie dog control, contaminants, and vehicle disturbance (Knopf 1996). The Service monitors populations and trends and is recommending agencies to manage, through appropriate grazing practices, short-grass prairie habitat for both nesting and wintering plovers.

Mesa Verde Cactus

The Mesa Verde cactus is federally listed as a threatened species (USFWS 1984). This species is also protected by the State of New Mexico.

Mesa Verde cactus have spherical stems which grow alone or in clusters, and are about 5-8 cm tall (USFWS 1984). There are about 8-10 tannish or straw colored radial spines per areole (spine cluster), and no central spines. The color of the spines allow the plants to blend in well with the fine soil on which they grow (USFWS 1984). Flowers are yellow to greenish-white, and appear

in the spring. The cactus is restricted to dry clay soils along drainage ways on the eastern edge of the Navajoan Desert and is associated with *Atriplex spp.* at 1,219-1,829 m in elevation (USFWS 1984).

Historically, the Mesa Verde cactus was found in San Juan County, New Mexico, and Montezuma and possibly Montrose Counties, Colorado (USFWS 1984). Presently, it is found in the same counties, but reduced in distribution and numbers.

Reasons for decline in the Mesa Verde cactus include: limited distribution, over-collecting, habitat degradation due to overgrazing, habitat destruction due to mining, oil and gas exploration and drilling, commercial and residential development, off-road vehicle use, road building and maintenance, construction of power lines and pipelines, and pesticide use (USFWS 1984).

PROTECTION AND RESTORATION OF IMPORTANT RESOURCES

Under the Endangered Species Act, every Federal agency has a responsibility to recover listed species. As a result, implementation of the preferred alternative in this EIS should further the recovery of listed species in the project area. Designated critical habitat for Colorado pikeminnow and razorback sucker, and habitats important to southwestern willow flycatcher, bald eagle, and Mesa Verde cactus occur in the project area.

Multiple direct impacts to aquatic species may occur as a result of this project. Some of these impacts may include: entrainment of fish or other aquatic species in diversion canals and/or impingement on screens, reduced habitat availability and quality, and reduced accessibility to important habitats. Multiple indirect impacts, some of which may develop over a long time period, could also occur. Indirect impacts may occur as a result of long-term geomorphic and/or hydrologic changes which alter aquatic, riparian, and/or wetland ecosystems.

Maintenance of a natural hydrograph (both quantity and timing) is important to the natural processes which maintain and/or improve fish and wildlife habitat along the San Juan River. Instability in rivers occurs when sediment either aggrades or degrades in the channel (Rosgen 1996). Reduced water flow downstream of the point of diversion may alter sediment transport in the river. If sediment transport is disrupted, aggradation and braiding may occur. Geomorphic and hydrologic studies should be conducted to identify and evaluate changes to the river and/or water table and subsequent impacts to fish, wildlife, and vegetation resulting from a yearly water diversion of 40,000 acre-feet.

Under the SJRD alternative, water would be diverted at either the Hogback site or the PNM Diversion. The PNM Diversion, located several river miles upstream of the Hogback Diversion, would divert water higher in the river system. As a result, water diversions at the PNM

Diversion may impact a greater amount of aquatic habitat than water diversion at the Hogback site. However, water diversions at the Hogback site would likely impact more riparian and wetland habitats, due to the extensive infrastructure developed in the riparian corridor under this alternative.

The Affected Environment section of the draft EA, specifically the Species and Habitat Description subsections, relies heavily upon previously published literature. Much of this literature is nearly twenty years old (*e.g.*, Bureau 1983). Harvest data upon which some of this literature is based are dated and may not reflect current conditions. Recent literature should be reviewed to determine if species diversity and abundance have changed. If recent literature is unavailable, then recent harvest information from within the project area should be analyzed to estimate species abundance and evaluate if changes have occurred over time.

Riparian and wetland habitat along the San Juan River is important to many species, including the endangered southwestern willow flycatcher. Detailed surveys for threatened and endangered species as well as wetlands should be completed in the riparian zone as recommended by ERI (ERI 2001a). At the Hogback site, Ranney Collector Wells would be installed to collect and annually divert water. The total amount of riparian and wetland habitat impacted as a result of well installation should be determined. Well maintenance requirements should be identified and evaluated, as should short- and long-term impacts to riparian and wetland habitat resulting from construction and maintenance activities.

The Mesa Verde cactus is located within the proposed pipeline route identified for the SJRD (USFWS 1981, ERI 2001). The feasibility of altering the pipeline route to protect and preserve this threatened plant species in its current location should be evaluated. Federally listed and sensitive vegetation should be given special consideration during planning. Where appropriate, modifications to the project such as pipeline realignment may be necessary to ensure that listed species are not adversely impacted.

To protect fish, wildlife, and vegetation resources in the project area, a comprehensive mitigation plan should be developed and included into the work plan for this project. Potential impacts to fish, wildlife, and vegetation resources should be included in the plan as should impact avoidance or minimization measures.

MONITORING

Long-term monitoring of fish and wildlife resources in the area will be essential to determine the effects of the proposed project. A monitoring plan should be developed that includes regular surveys for endangered species, representative migratory and resident bird species, and aquatic species (fish and amphibians). In addition, responses of vegetation to changing hydrology,

geomorphology, and physical floodplain characteristics should be conducted annually until habitat conditions stabilize. Monitoring of mitigated habitats should also occur until habitat conditions stabilize.

CONCLUSION

The San Juan River and proposed pipeline routes provide important habitat to a variety of fish, wildlife, and vegetation species. Opportunities for protection and enhancement of these resources occur in the project area. Providing year-round natural flows in this reach is important to the survival and recovery of Colorado pikeminnow, razorback sucker, and southwestern willow flycatcher, as well as other fish, wildlife, and vegetation resources. Native riparian vegetation, especially cottonwood and willow, should be protected, and, where possible, enhanced. Existing wetlands in this area should be protected, and, where possible, new wetlands created. The identification and characterization of southwestern willow flycatcher habitat is especially important. Long-term monitoring of these resources in the project area will be essential to determine the effects of the proposed project.

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