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AESO/SE
2-21-96-F-368 December 26, 2001

Ms. Alexis Strauss
Director, Water Division
Environmental Protection Agency
75 Hawthorne Street
San Francisco, California 94105-3901

Dear Ms. Strauss:

This document transmits the Fish and Wildlife Service's (Service) biological opinion and conference opinion based on our review of the proposed Navajo Nation water quality standards (NNWQS) located in Arizona, Utah, and New Mexico, in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). This formal consultation and conference concerns the possible effects of the NNWQS and its effects on bald eagle (*Haliaeetus leucocephalus*), Mexican spotted owl (*Strix occidentalis lucida*), humpback chub (*Gila cypha*) and its critical habitat, razorback sucker (*Xyrauchen texanus*) and its critical habitat, Colorado pikeminnow (*Ptychochelius lucius*) and its critical habitat, southwestern willow flycatcher (*Empidonax traillii extimus*), the Navajo sedge (*Carex specuicola*) and its critical habitat, and the experimental nonessential population of the California condor (*Gymnogyps californianus*). Your August 28, 2000, request for formal consultation was received on August 30, 2000.

This biological opinion is based on information provided in the August 28, 2000, biological evaluation, the Navajo Nation water quality standards rules adopted November 9, 1999, information provided by Navajo Environmental Protection Agency, Navajo Fish and Wildlife Department, the March 2000 biological opinion on EPA's "Final Rule for the Promulgation of Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California" (CTR), telephone conversations, field investigations, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

This document also includes a conference opinion on the California condor, prepared pursuant to 50 CFR 402.10. For purposes of section 7 consultation, the condors located within the experimental population area are treated as if they are proposed for listing (except for areas located within the National Park System or National Wildlife Refuge System). Thus, Federal agencies are required to informally confer with the Service on actions that are likely to jeopardize the continued existence of the California condor within the nonessential, experimental population. Since the nonessential, experimental status promulgated by the Service (USDI 1996b) determined these birds to be nonessential to the recovery and survival of the species, the jeopardy threshold for take of condors within the nonessential, experimental area can not be met.

Consultation History

The Service received the proposed Navajo Nation water quality standards on August 8, 1996. On August 13, 1996, the Service sent the EPA a letter acknowledging the receipt of the NNWQS. A meeting occurred on February 2, 2000, between the Service, Navajo Nation Environmental Protection Agency, and EPA. Following a February 10, 2000, letter to the other Service offices, additional threatened and endangered species lists were provided to the EPA from the New Mexico Ecological Services Field Office (March 8, 2000) and Utah Ecological Services Field Office (May 18, 2000). The Arizona Ecological Services Field Office received a request to initiate formal consultation August 30, 2000. We acknowledged the receipt of the EPA's biological evaluation and the ability to access any references necessary for the biological opinion on October 18, 2000. We originally planned to provide you with our biological opinion on or before January 12, 2001 (August 30 plus 135 days). A letter requesting a 60 day-extension was sent to EPA by this office on January 10, 2001, with a goal to issue a biological opinion by March 12, 2001. Telephone discussions with Gary Wolinsky of your staff indicated that a 30-day extension was desirable. At that time, Mr. Wolinsky indicated that one of the conservation measures committed to in the August 2000 biological evaluation could not be met in the time frame provided: the sediment criteria for cadmium, copper, lead, nickel and zinc. The Service requested a second extension of the consultation period with the transmittal of the draft biological opinion on April 10, 2001. The EPA and Service had a telephone conference on October 10, 2001, to discuss the draft biological opinion and conference. The Service requested a third extension of the consultation period by e-mail December 6, 2001. Also on December 6, 2001, the EPA and Navajo Nation Environmental Protection Agency called our office to finalize changes to the draft biological opinion.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The action for this formal consultation is the proposed EPA approval of the Navajo Nation Water Quality Standards for surface waters within the boundaries of the Navajo Nation which covers the four corners region in portions of Arizona, New Mexico, Utah, and Colorado. The purpose of these water quality standards is to protect, maintain, and improve the quality of Navajo Nation surface waters for public and private drinking water supplies. New water quality standards consist of the designated uses of surface waters and the water quality criteria for such waters, and the Navajo Nation has the right to develop standards under sections 303 and 518 of the CWA. Such standards should provide protection for both human health and aquatic life. Section 303(c)(2)(B) of the Clean Water Act (CWA) requires the State to adopt numeric criteria for all toxic pollutants listed pursuant to the CWA section 307(a)(1) for which criteria have been published under section 304(a). Under section 304(a), EPA has produced a series of scientific water quality criteria guidance documents, which the State considers when adopting regulatory criteria. Pursuant to section 303(c)(3) of the CWA, the EPA approves and/or disapproves all or portions of the new water quality standards. If EPA determines that any such new standard is not consistent with the applicable requirements of the CWA, then EPA will notify the Nation of the disapproved portions and specify the changes needed to meet the requirements. EPA will promulgate standards for the disapproved portions, pursuant to section 303(c)(4), if the State has not rectified the problem. Regarding section 518(e), the State as heretofore mentioned is the Navajo Nation.

The principal application of the EPA approved and/or promulgated water quality criteria is the National Pollutant Discharge Elimination System (NPDES) permit program. The Navajo Nation water quality standards will provide generic guidelines for the NPDES permit writers to develop conditions and limits for inclusion in such permits. The action area consists of all “Waters of the Navajo Nation.”

A full description of the Navajo Nation water quality standards was prepared by the Navajo Nation Environmental Protection Agency (NNEPA, 1999). The following description of Part II: Surface Water Quality Standards includes the final versions of the Navajo Nation adopted standards of November 9, 1999.

Part II. Surface Water Quality Standards
Section 201. Antidegradation Policy

A. The following antidegradation policy is promulgated under Section 201(a) of the Navajo Nation Clean Water Act (CJY-81-99).

1. Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.
2. Where the quality of any water body is of a higher quality than is necessary to support existing uses, including but not limited to the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water body, that quality shall be maintained and protected unless the Navajo Nation finds, after full interagency coordinated and public participation, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the water body is located. In allowing such degradation or lower water quality, the Navajo Nation

shall assure water quality adequate to protect existing uses fully.

3. The Navajo Nation shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost effective and reasonable best management practices for nonpoint source pollution control.
4. Where high quality waters or unique waters constitute an outstanding resource of the Navajo Nation, such as waters of National parks and monuments, Tribal parks and wildlife refuges, and other waters of exceptional recreational, cultural or ecological significance, that water quality shall be maintained and protected.
5. This policy of antidegradation includes protection against water quality impairment associated with thermal discharges and shall be implemented consistent with section 316 of the Federal Clean Water Act (33 U.S.C. Section 1326).

Section 202. Implementation Plan

A. The Navajo Nation Water Quality Program (NNWQP) within the Navajo Nation Environmental Protection Agency (NNEPA), pursuant to the Navajo Nation Clean Water Act (NNCWA), shall implement these water quality standards, including the antidegradation policy, by establishing and maintaining controls on the introduction of pollutants into waters of the Navajo Nation. Specifically, NNWQP shall do the following:

1. Develop a comprehensive database that fully identifies all waters of the Navajo Nation, their quality and designated uses, and any activities which may detrimentally impact those waters and uses.
2. Monitor water quality to assess the effectiveness of pollution controls, and to determine whether designated uses are being supported and narrative and numeric water quality standards are being met.
3. Obtain information as to the impact of effluent on receiving waters.
4. Advise prospective dischargers of discharge requirements.
5. Assess the probable impact of effluent on the capability of receiving waters to support designated uses and achieve narrative and numeric water quality standards.
6. Require the highest degree of wastewater treatment practicable to maintain designated uses and existing water quality.
7. Develop water quality-based effluent limitations and provide comment on technology-based effluent limitations as appropriate for inclusion in any permit to be issued to a discharger pursuant to section 301 of the NNCWA, C.J.Y.-81-99, and section 402 of the Federal Clean Water Act (33 U.S.C. section 1342).
8. Require that effluent limitations or any other appropriate limitations applicable to activities with the potential for discharge to waters of the Navajo Nation be included in any permit as a condition for Navajo Nation certification pursuant to section 209 of the NNCWA, C.J.Y.-81-99 and section 401 of the Federal Clean Water Act (33 U.S.C. Section 1341).
9. Coordinate water pollution control activities with other Navajo Nation, local, state and federal agencies as appropriate.

10. Develop and pursue inspection and enforcement programs in order to ensure that dischargers comply with requirements of the NNCWA and any regulations promulgated thereunder (including these water quality standards), and in order to support the enforcement of federal permits issued by the U.S. EPA and permits issued by the NNEPA.
11. Provide technical assistance to wastewater treatment facility operators.
12. Assist publicly owned wastewater treatment facilities in the pursuit of wastewater treatment construction funds through construction grants authorized by the Federal Clean Water Act (33 U.S.C. section 1281) and other federal funding available for this purpose.
13. Encourage, in conjunction with other agencies, voluntary implementation of best management practices (BMPs) to control nonpoint sources of pollutants in order to support designated uses and meet Navajo Nation narrative and numeric water quality standards.
14. Examine existing and future Navajo Nation policies pertaining to septic systems, solid waste disposal, range management practices, and any other relevant activities to ensure that these policies are sufficient to meet narrative and numeric water quality standards.
15. Require that sufficient instream flows be maintained to support designated uses and meet narrative and numeric water quality standards.
16. Require that surface and groundwater withdrawals do not cause degradation of unique surface or ground water bodies.
17. Conduct an antidegradation analysis for regulated actions that may potentially impair water quality.

Section 203. Narrative Surface Water Quality Standards

A. All Waters of the Navajo Nation shall be free from pollutants in amounts or combinations that, for any duration:

1. Cause injury to, are toxic to, or otherwise adversely affect human health, public safety, or public welfare.
2. Cause injury to, are toxic to, or otherwise adversely affect the habitation, growth, or propagation of indigenous aquatic plant and animal communities or any member of these communities; of waterfowl accessing the water body; or otherwise adversely affect the physical, chemical, or biological conditions on which these communities and their members depend.
3. Settle to form bottom deposits, including sediments, precipitates and organic materials, that cause injury to, are toxic to, or otherwise adversely affect, the habitation, growth, or propagation of indigenous aquatic plant and animal communities or any member of these communities; of any desirable non-indigenous member of these communities; of waterfowl accessing the water body; or otherwise adversely affect the physical, chemical, or biological conditions on which these communities and their members depend.
4. Cause physical, chemical, or biological conditions that promote the habitation, growth, or propagation of undesirable, non-indigenous species of plant or animal life in the water

body.
5. Cause solids, oil, grease, foam, scum, or any form of objectionable floating debris on the surface of the water body; may cause a film or iridescent appearance on the surface of the water body; or that may cause a deposit on a shoreline, on a bank, or on aquatic vegetation.
6. Cause objectionable odor in the area of the water body.
7. Cause objectionable taste, odor, color, or turbidity in the water body.
8. Cause objectionable taste in edible plant and animal life, including waterfowl, that reside in, on, or adjacent to the water body.

Section 204. Designated Use Classification System for Navajo Nation Surface Waters

A. The following are the designated uses for the surface waters of the Navajo Nation: domestic water supply (Dom), primary human contact (PrHC), secondary human contact (ScHC), agricultural water supply (AgWS), cold water habitat (CwHbt), warm water habitat (WwHbt), ephemeral warm water habitat (EphWwHbt), and livestock watering (L&W).
B. Modifications to Designated Uses, including removal of a use or establishing a use subcategory, may be made if the requirements of 40 C.F.R. Section 131.10 are met.
C. Table 204.1 lists the uses for the currently designated surface waters of the Navajo Nation. Each surface water body is geographically listed according to the Hydrologic Unit Code system developed by the United States Geological Survey (USGS) and published in the USGS's "Water Supply Paper Number 2294". The name of the water body is followed by columns listing the Subregion (or Basin) and Cataloging Unit. A subregion includes the areas drained by a river system, a reach of a river and its tributaries in that reach. A cataloging unit is a geographic area representing part or all of a surface drainage basin, a combination of drainage basins, or a distinct hydrologic feature.

Section 205. Additional Human Health Criteria

In addition to the Designated Uses in Section 204 and the Numeric Water Quality Standards in Section 206, the following Human Health criteria, where listed, shall also apply: Consumption of Organisms Only and Consumption of Water and Organisms.

Section 206. Numeric Surface Water Quality Standards

When a water of the Navajo Nation has more than a single designated use, the applicable numeric standards shall be the most stringent of those established for that body of water.

A. The numeric surface water quality standards for the Domestic Water Supply, Primary Human Contact, Secondary Human Contact, and Agricultural Water Supply Designated Uses may be found in Tables 206A.1, 206A.2, 206A.3, and 206A.4. Also contained within these tables are the numeric standards for Consumption of Organisms Only and Consumption of Water and Organisms Human Health Criteria.
B. The numeric surface water quality standards for the Cold Water Habitat, Warm Water

Habitat, Ephemeral Warm Water Habitat, and Livestock and Wildlife Watering Designated Uses may be found in Tables 206B.1, 206B.2, 206B.3, 206B.4, 206B.5, and 206B.6.

Section 207. Sample Collection and Analysis

All sample collection methods used to obtain surface water and effluent samples shall be conducted according to the "Quality Assurance Project Plan, Assessment of Streams and lakes of the Navajo Nation" and other applicable sample collection guidance documents approved by the Navajo Nation EPA Water Quality Program.
All analytical methods conducted to evaluate compliance with water quality standards and to support any revisions to those standards, including all field and laboratory analyses to determine chemical, physical or biological conditions of water on the Navajo Nation, shall be conducted in accordance with approved procedures published in 40 CFR section 136, "guidelines Establishing Test Procedures for the Analysis of Pollutants" unless the Navajo Nation selects, by regulation, alternative test methods, including methods under review by EPA for inclusion in 40 CFR 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants" unless the Navajo Nation selects, by regulation, alternative test methods, including methods under review by EPA for inclusion in 40 CFR 136. Analytical test procedures referenced in and approved in 40 CFR Section 136 include but are not limited to those published by the American Public Health Association (*Standard Methods for the Examination of Water and Wastewater, 17^th^ edition or latest edition*); by the American Society of Testing Materials; by the U.S. Environmental Protection Agency (*Methods for Chemical Analysis of Water and Wastes and others*); and by the U.S. Geological Survey (Techniques of Water Resource Investigations of the U.S. Geological Survey publication series).

Section 208. Variances

A. The Director may grant a variance from a water quality standard for a point source discharge provided the discharger demonstrates that treatment more advanced than that required to comply with technology-based effluent limitations is necessary to comply with the water quality standard and:
   1. It is not technically feasible to achieve compliance within the next three years; or
   2. The cost of the treatment would result in substantial and widespread economic and social impact.
B. A variance may be granted only on a pollutant-specific basis. A point source discharge is required to comply with all other applicable water quality standards for which a variance is not granted.
C. A variance applies only to a specific pont source discharge. The granting of a variance does not modify a water quality standard. Other point source dischargers to the surface water shall comply with applicable water quality standards, including any water quality standard for which a variance has been granted for a specific point source discharge.
D. A variance is for a fixed term not to exceed three years. Variances are not renewable but my

be reissued upon adequate justification.

E. The Director shall reevaluate a variance upon the issuance, reissuance, or modification of the National Pollutant Discharge Eliminating System permit for the point source discharge.

F. A person who seeks a variance from a water quality standard shall submit a letter to the Director requesting a variance. A request for a variance shall include the following information:

1. Identification of the specific pollutant and water quality standard for which a variance is sought;
2. Identification of the receiving surface water;
3. For an existing point source discharge, a detailed description of the existing discharge control technologies that are used to achieve compliance with applicable water quality standards. For a new point discharge, a detailed description of the proposed discharge control technologies that will be used to achieve compliance with applicable water quality standards;
4. Documentation that the existing or proposed discharge control technologies will comply with applicable technology-based effluent limitations and that more advanced treatment technology is necessary to achieve compliance with the water quality standard for which a variance is sought;
5. A detailed discussion of the reasons why compliance with the water quality standard cannot be achieved;
6. A detailed discussion of the discharge control technologies that are available for achieving compliance with the water quality standard for which a variance is sought;
7. Documentation of one or both of the following:
   a. That it is not technically feasible to install and operate any of the available discharge control technologies to achieve compliance with the water quality standard for which a variance is sought; or
   b. That installation and operation of each of the available discharge technologies to achieve compliance with the water quality standard would result insubstantial and widespread economic and social impact;
8. Documentation that the point source discharges has reduced, to the maximum extent practicable, the discharge of the pollutant for which a variance is sought through implementation of pretreatment, source reduction, or waste minimization program;
9. A detailed description of proposed interim discharge limitations that represent the highest level of treatment achievable by the point source discharge during the term of the variance. Interim discharge limitations shall not be less stringent than technology-based effluent limitations.

G. In making a decision on whether to grant or deny the request for a variance, the Director shall consider the following factors: bioaccumulation, bioconcentration, predicted exposure of biota and the likelihood that resident biota will be adversely affected, the known predicted safe exposure levels for the pollutant of concern, and the likelihood of adverse human health effects.

H. The Director shall issue public notice and shall provide an opportunity for a public hearing on whether the request for a variance should be granted or denied.

I. The Director shall not grant a variance for a point source discharge to a Unique Water.
J. A variance is subject to review and approval by the Regional Administrator.

Section 209. Wastewater Mixing Zones

A. A wastewater mixing zone is a defined and limited part of a surface water body with defined boundaries adjacent to a point source of pollution, in which initial dilution of wastewater occurs, and in which certain numeric water quality standards may apply. All mixing zones are subject to the following requirements:

   1. Mixing zones shall be limited to perennial streams, lakes and reservoirs;
   2. All mixing zones shall have defined boundaries, beyond which applicable water quality standards shall be met;
   3. In no instance shall narrative water quality standards described in section 203 of this document be violated;
   4. In no instance shall the concentration of any toxic pollutant exceed the acute toxicity for aquatic numeric standard for the pollutant; the acute toxicity for aquatic life numeric standard for all toxic pollutants shall be met at the point of discharge;
   5. In perennial streams, a continuous zone of passage around a mixing zone shall be maintained in which all applicable water quality standards are met, and which provides for migration of aquatic life without exposure to pollutant concentrations that exceed chronic toxicity for aquatic life numeric standards. The zone of passage shall be at least 50% of the cross-sectional area of the stream; and
   6. In no instance shall mixing zones constitute more than 10% of the surface area of a lake or reservoir; boundaries of adjacent mixing zones in a lake or reservoir shall be no closer than the largest horizontal dimension of either mixing zone.

D. The Navajo Nation shall consider the requirements in subsections 1 through 6 in determining whether to grant or deny a mixing zone.
E. The water quality criteria in these regulations shall apply within a mixing zone unless specific alternative criteria have been approved by the Navajo Nation Environmental Protection Agency and concurred upon by the U.S. Environmental Protection Agency. Mixing zones shall not be granted in lieu of reasonable control measures to reduce point source pollutant discharges but will be granted to complement such control measures. A limited mixing zone, serving as a zone of initial dilution in the immediate area of a point source of pollution , may be allowed if the conditions set out in this part are met.

Section 210. Biological Standards (Reserved)

CONSERVATION MEASURES

To mitigate the potential adverse effects of the NNWQS criteria for mercury on the bald eagle, EPA has committed to some of the same terms and conditions made in the CTR (USFWS and NMFS 2000) biological opinion to the Navajo Nation, which include: (CTR p.233)

1. EPA will revise its recommended 304(a) human health criteria for mercury by January 2002. These criteria should be sufficient to protect Federally listed aquatic and aquatic-dependent wildlife species. If the revised criteria are less stringent than the range of criteria concentrations suggested by the Service to protect listed species, EPA will provide the Service with a biological evaluation/assessment and request formal consultation on the revised criteria by the time of the proposal. The Service has identified protective concentrations for mercury in water to be generally on the order 2.0ng/L as total Hg or equivalent methylmercury concentration as determined by site specific data;
2. EPA will work in close cooperation with the Service to evaluate the degree of protection afforded to federally listed species by the revised criterion. EPA will provide the Service with semi-annual reports regarding the status of EPA's revision of the mercury criterion and /or any draft biological evaluation/assessment associated with the revision. EPA will invite scientists representing the Service to participate in efforts to jointly evaluate mercury concentrations protective of fish and wildlife.
3. EPA will identify water bodies in the Navajo Nation where mercury criteria necessary to protect federally listed species are not met, and will annually submit to the Service a list of NPDES permits due for review to allow the Service and EPA to identify any potential adverse effects on listed species and /or their habitats. EPA will annually submit to the Services a list of NPDES permits due for review to allow the Service and EPA to identify any potential for adverse effects on listed species and/or their habitats from mercury.
4. EPA will coordinate with the Service on any permits containing limits for mercury that the Service or EPA identify as having potential for adverse effects for listed species and/or their habitat in accordance with procedures agreed to by the Agencies in the draft MOA published in the Federal Register at 65 FR 2775 (January 15, 1999). If discharges are identified that have the potential to adversely affect federally listed species and/or habitat, EPA will work with the Service and the Navajo Nation to address the potential effects to the species. This will include, where appropriate, decreasing the allowable discharge of mercury. As the permit writing authority for the Navajo Nation (pending delegation to the Navajo Nation), EPA will consult on all NPDES permits consistent with section 7 of the Endangered Species Act.

To mitigate the potential effects of the NNWQS for formula-based dissolved metals on the razorback sucker, humpback chub, and the Colorado pikeminnow, EPA has agreed to the CTR biological opinion Terms and Conditions which include:

1. By December 2000, EPA, in cooperation with the Service, will develop sediment criteria guidelines for cadmium, copper, lead, nickel and zinc, and by December of 2002 for chromium and silver.
2. Before the end of 2000, EPA, in cooperation with the Service, will issue two clarifications to the *Interim Guidance on the Determination and Use of Water-Effects Ratios for Metals* concerning the use of calcium-to-magnesium ratios in laboratory water and the proper acclimation of test organisms prior to testing in applying water-effects ratios (WERs). EPA shall also allow the use of WERs only when the specific LC_{50} and

the laboratory LC_{50} are significantly different using a 95% confidence interval.

3. By June of 2003, EPA, in cooperation with the Service, will develop a revised criteria calculation model-based on the best available science for deriving aquatic life criteria on the basis of harness (calcium and magnesium), pH, alkalinity, and dissolved organic carbon (DOC) for metals. This will be done in conjunction with the development of a national methodology to derive site-specific criteria to protect threatened and endangered species described below.
4. In certain circumstances, the Navajo Nation or specific dischargers may develop site-specific translators, using EPA or equivalent state/tribe guidance, to translate dissolved metals criteria into total recoverable permit limits. A translator is the ratio of dissolved metal to total recoverable metal in the receiving water downstream from a discharge. A site-specific translator is determined on site-specific effluent and ambient data. Whenever a threatened or endangered species or critical habitat is present within the geographic range downstream from a discharge where a translator will be used and conditions listed below exist, EPA will work, in cooperation with the Service and the Navajo Nation, to use available ecological safeguards to ensure protection of federally listed species and/or critical habitat. Ecological safeguards include: a) sediment guidelines; b)biocriteria; c)bioassessment; d) effluent and ambient toxicity testing; or e) residue-based criteria in shellfish.
   i) Conditions for use of ecosystem safeguards:
      A. A water body is listed as impaired on the CWA section 303 (d) list due to elevated metal concentrations in sediment, fish, shellfish, or wildlife; or,
      B. A water body receives mine drainage; or,
      C. Where particulate metals compose a 50% or greater component of the total metal measured in a downstream water body in which a permitted discharge (subject to translator method selection) is proposed and the dissolved fraction is equal to or within 75% of the water quality criteria.
   ii) Whenever a threatened or endangered species is present downstream from a discharge where a translator is used, EPA will work with the permitting authority to ensure that appropriate information, which may be needed to calculate the translator in accordance with the applicable guidance, will be obtained and used. Appropriate information includes:
      A. Ambient and effluent acute and chronic toxicity data;
      B. Bioassessment data; and/or,
      C. An analysis of the potential effects of the metals using sediment guidelines, biocriteria and residue-based criteria for shellfish to the extent such guidelines and criteria exist and are applicable to the receiving water body.
   iii) EPA, in cooperation with the Service, will review these discharges and associated monitoring data and permit limits, to determine the potential for the discharge to impact federally listed species and /or critical habitats. If dischargers of metals are identified that have the potential to adversely affect federally listed species and/or critical habitat, EPA will work with the Service and the Navajo Nation to address these adverse impacts in accordance with the procedures agreed to by the Agencies in

the draft MOA published in the Federal Register at 64 FR 2755 (January 15, 1999). Among other options to resolve the issue, the EPA may make a formal objection to a permit (upon delegation of the NPDES program to the Navajo Nation). If EPA objects to a NPDES permit, EPA will follow the permit objection procedures outlined in 40 CFR 123.44 and coordinate with the Service. As the current permitting authority, EPA will consult with the Service prior to issuance of a NPDES permit in accordance with section 7 of the Endangered Species Act.

OTHER ACTIONS

EPA will initiate a process to develop a national methodology to derive site-specific criteria to protect federally listed threatened and endangered species, including wildlife, in accordance with the draft MOA between EPA and the Service concerning section 7 consultations. EPA will invite input and participation from the Service in developing this methodology and will share reports and written products as this methodology development will be provided to the Divisions of Environmental Contaminants and Endangered Species of the Fish and Wildlife Service's Arlington Office.

STATUS OF THE SPECIES

The following species and critical habitat designations are considered in this consultation:
Bald eagle (Haliaeetus leucocephalus) Threatened
Mexican spotted owl (Strix occidentalis lucida) Threatened
Humpback chub (Gila cypha) Endangered*
Razorback sucker (Xyrauchen texanus) Endangered*
Colorado pikeminnow (Ptychocheilus lucius) Endangered*
Southwestern willow flycatcher (Empidonax traillii extimus) Endangered
California condor (Gymnogyps californianus) Endangered
Navajo sedge (Carex specuicola) Threatened*

*Species with critical habitat within the action area.

BALD EAGLE

The bald eagle south of the 40th parallel was listed as endangered under the Endangered Species Preservation Act of 1966, on March 11, 1967 (USFWS 1967), and was reclassified to threatened status on July 12, 1995 (USFWS 1995). No critical habitat has been designated for this species. The bald eagle was proposed for delisting on July 6, 1999 (USFWS 1999). The bald eagle is a large bird of prey that historically ranged and nested throughout North America except extreme northern Alaska and Canada, and central and southern Mexico.

The bald eagle occurs in association with aquatic ecosystems, frequenting estuaries, lakes, reservoirs, major rivers systems, and some seacoast habitats. Generally, suitable habitat for bald eagles includes those areas which provide an adequate food base of fish, waterfowl, and/or carrion, with large trees for perches and nest sites. In winter, bald eagles often congregate at specific wintering sites that are generally close to open water and offer good perch trees and night roosts (USFWS 1995).

There were an estimated one-quarter to one-half million bald eagles on the North American continent when Europeans first arrived. Initial eagle population declines probably began in the late 1800s, and coincided with declines in the number of waterfowl, shorebirds, and other prey species. Direct killing of bald eagles was also prevalent. Additionally, there was a loss of nesting habitat. These factors reduced bald eagle numbers until the 1940s when protection for the bald eagle was provided through the Bald Eagle Protection Act (16 U.S.C. 668). This Act accomplished significant protection and slowed the decline in bald eagle populations by prohibiting numerous activities adversely affecting bald eagles and increasing public awareness of bald eagles. The widespread use of dichloro-diphenyl-trichloroethane (DDT) and other organochlorine compounds in the 1940s for mosquito control and as a general insecticide caused additional declines in bald eagle populations. DDT accumulated in individual birds following ingestion of contaminated food. DDT breaks down into dichlorophenyl-dichloroethylene (DDE) and accumulates in the fatty tissues of adult females, leading to impaired calcium release necessary for egg shell formation. Thinner egg shells led to reproductive failure, which is considered a primary cause of declines in the bald eagle population. DDT was banned in the United States in 1972 (USFWS 1995a).

Since listing, bald eagles have increased in number and expanded in range due to the banning of DDT and other persistent organochlorine compounds, habitat protection, and additional recovery efforts. Surveys in 1963 indicated 417 active nests in the lower 48 states with an average of 0.59 young produced per nest. Surveys in 1974 resulted in a population estimate of 791 occupied breeding areas in the lower 48 states (USFWS 1999). In 1994, 4,450 occupied breeding areas were reported with an estimated average of 1.16 young produced per occupied nest (USFWS 1995). The Service estimates that the breeding population exceeded 5,748 occupied breeding areas in 1998 (USFWS 1999).

Although not considered a separate subspecies, bald eagles in the southwestern United States have been considered as a distinct population for the purposes of consultation and recovery efforts under the Act. A recovery plan was developed in 1982 for bald eagles in the Southwest recovery region. However, new information has indicated that the bald eagles in Arizona and the Southwest recovery region are not a distinct, reproductively isolated population as was previously believed. In 1994, a male bald eagle which originated from eastern Texas was discovered nesting at Luna Lake in east-central Arizona. The origin of the unbanded female was not determinable. Also, some of the eagles observed in recent years in Arizona with silver leg bands have been suspected to have immigrated into this region. The Service has determined that bald eagles in the Southwest recovery region are part of the same bald eagle population found in the remaining lower 48 states (USFWS 1995). The Service proposed delisting of the bald eagle in the lower 48 states including Arizona, stating that the number of breeding pairs in the Southwestern Recovery Unit has more than doubled in the last 15 years (USFWS 1999).

It is not known if the population of bald eagles in Arizona declined as a result of DDT contamination because records were not consistently kept during that time period. However, the possibility for contamination was present as DDT was used in Arizona and Mexico. Use of DDT in Mexico could potentially have contaminated waterfowl that then migrated through Arizona in addition to directly affecting juvenile and subadult eagles that traveled into Mexico. Many of the nest sites in Arizona are in rugged terrain not suitable for agricultural development, and may therefore have avoided the direct effects of DDT (Hunt et al. 1992).

Bald eagle breeding areas in Arizona are predominantly located in the upper and lower Sonoran life zones. The Luna Lake breeding area is one of the few territories in Arizona that is found in coniferous forests, as opposed to the majority which occur in Sonoran vegetation communities. All breeding areas in Arizona are located in close proximity to a variety of aquatic habitats including reservoirs, regulated river systems, and free-flowing rivers and creeks. The alteration of natural river systems has had both beneficial and detrimental affects to the bald eagle. While large portions of riparian forests were inundated or otherwise destroyed following construction of dams and other water developments, the reservoirs created by these structures enhance habitat for the waterfowl and fish species (often nonnative species) on which bald eagles prey.

Bald eagles in the Southwest are additionally unique in that they establish their breeding territory in December or January and lay eggs in January or February, which is early compared with bald eagles in more northerly areas. It is believed that this is a behavioral adaptation so chicks can avoid the extreme desert heat of midsummer. Young eagles will remain in the vicinity of the nest until June (Hunt et al. 1992).

Bald eagles in the Southwest consume a diversity of food items, including some invertebrates. However, their primary food is fish, which are generally consumed twice as often as birds, and four times as often as mammals. Bald eagles are known to catch live prey, steal prey from other predators (especially osprey), and use carrion. Carrion constitutes a higher proportion of the diet for juveniles and subadults than it does for adult eagles. Diet varies depending on what species are available locally. This can be affected by the type of water system on which the breeding area is based (Hunt et al. 1992).

Even though the bald eagle has been reclassified to threatened, and the status of the birds in the Southwest is on an upward trend, the Arizona population remains small and under threat from a variety of factors. Human disturbance of bald eagles is a continuing threat which may increase as numbers of bald eagles increase and human development continues to expand into rural areas (USFWS 1999). These include extensive loss and modification of riparian breeding and foraging habitat through clearing of vegetation, changes in groundwater levels, and changes in water quality. Threats persist in Arizona largely due to the proximity of bald eagle breeding areas to major human population centers and recreation areas. Additionally, because water is a scarce resource in the Southwest, recreation is concentrated along available water courses. Some of the continuing threats and disturbances to bald eagles include entanglement in monofilament fish line and fish tackle; overgrazing and related degradation of riparian vegetation; malicious and accidental harassment, including shooting, off-road vehicles, recreational activities (especially watercraft), and low-level aircraft overflights; alteration of aquatic and riparian systems for water distribution systems and maintenance of existing water development features such as dams or diversion structures; collisions with transmission lines; poisoning; and electrocution (Beatty et al. 1999; Stahlmaster 1987).

MEXICAN SPOTTED OWL

A detailed account of the taxonomy, biology, and reproductive characteristics of the MSO is found in the Final Rule listing the MSO as a threatened species (USDI 1993) and in the Final MSO Recovery Plan (USDI 1995). Critical habitat for the MSO was designated on February 1, 2001, (66 FR 8530), although none exists on the Navajo Nation. The information provided in those documents is included herein by reference. Although the MSO's entire range covers a broad area of the southwestern United States and Mexico, much remains unknown about the species' distribution and ecology. This is especially true in Mexico where much of the MSO's range has not been surveyed. The MSO currently occupies a broad geographic area but does not occur uniformly throughout its range. Instead, it occurs in disjunct localities that correspond to forested isolated mountain systems, canyons, and in some cases, steep, rocky canyon lands. The primary administrator of lands supporting MSO in the United States is the U.S. Forest Service. Most owls have been found within Forest Service Region 3 (including 11 National Forests in Arizona and New Mexico). Forest Service Regions 2 and 4 (including 2 National Forests in Colorado and 3 in Utah) support fewer owls. According to the Recovery Plan, 91% of MSO known to exist in the United States between 1990 and 1993 occurred on lands administered by the Forest Service.

Surveys have revealed that the species has an affinity for older, well-structured forest, and the species is known to inhabit a physically diverse landscape in the southwestern United States and Mexico. The range of the MSO has been divided into six Recovery Units (RUs), as discussed in the MSO Recovery Plan (USDI 1995). The Recovery Plan reports an estimate of owl sites. An owl "site" is defined as a visual sighting of at least one adult owl or a minimum of two auditory detections in the same vicinity in the same year. This information was reported for 1990-1993. The greatest known concentration of known owl sites in the United States occurs in the Upper Gila Mountains RU (55.9%), followed by the Basin and Range-East RU (16.0%), Basin and Range-West RU (13.6%), Colorado Plateau RU (8.2%), Southern Rocky Mountain-New Mexico RU (4.5%), and Southern Rocky Mountain-Colorado RU (1.8%). Owl surveys conducted from 1990 through 1993 indicate that the species persists in most locations reported prior to 1989.

A reliable estimate of the numbers of owls throughout its entire range is not currently available (USDI 1995) and the quality and quantity of information regarding numbers of MSO vary by source. USDI (1991) reported a total of 2,160 owls throughout the United States. Fletcher (1990) calculated that 2,074 owls existed in Arizona and New Mexico.

At the end of the 1995 field season, the Forest Service reported a total of 866 management territories (MTs) established in locations where at least a single MSO had been identified (U.S. Forest Service, *in litt*. November 9, 1995). The information provided at that time also included a summary of territories and acres of suitable habitat in each RU. Subsequently, a summary of all territory and monitoring data for the 1995 field season on Forest Service lands was provided to the Service on January 22, 1996. There were minor discrepancies in the number of MTs reported in the November and January data. For the purposes of this analysis we are using the more recent information.

From 1991 through 1997, Gutierrez et al. (1997, 1998) studied the demographic characteristics of two Mexican spotted owl populations in the Upper Gila Mountains Recovery Unit. The owl populations studied were located on the Coconino and Gila National Forests. Results of this several-year study have shown a decline in the population trend of Mexican spotted owls within these areas. The reason for the reported decline is unknown. According to Gutierrez et al. (1997), such a trend could be a result of: 1) density dependent responses to an increase over carrying capacities; 2) a response to some environmental factor; or 3) senescence. The latter (i.e. senescence) seems unlikely because there was also a negative linear trend in survival estimates for owls less than three years of age. Regarding carrying capacities, responses to density dependence are difficult to prove in the absence of removal or addition experiments. Environmental factors undoubtably play a role in owl survival, either through weather events causing direct mortality or indirectly through reduced habitat or prey (Gutierrez et al. 1997). This study found that the ability of adult birds to survive successive years of poor environmental conditions may be low (Gutierrez et al. 1998).

The Forest Service has converted some MTs into PACs following the recommendations of the Draft MSO Recovery Plan released in March 1995. The completion of these conversions has typically been driven by project-level consultations with the Service and varies by National Forest.

The action area for the Navajo Nation Water Quality Standards is located within the Colorado Plateau Recovery Unit. The Colorado Plateau RU includes most of southern and south-central Utah, plus portions of northern Arizona, northwestern New Mexico, and southwestern Colorado. Grasslands and shrub-steppes dominate the Colorado Plateau at lower elevations, but woodlands and forest dominate the higher elevations. Forest types in the woodland zone include ponderosa pine, mixed conifer, and spruce-fir. Conifers may extend to lower elevations in canyons. Deciduous woody species dominate riparian communities, and are most common along major streams (USDI 1995).

MSO habitat appears to be naturally fragmented in this RU, with most owls found in disjunct canyon systems or on isolated mountain ranges. In southern Utah, breeding owls primarily inhabit deep, steep-walled canyons. These canyons are typically surrounded by terrain that does not appear to support breeding MSO. Owls apparently prefer canyon terrain in southwestern Colorado, particularly in and around Mesa Verde National Park. In northern Arizona and New Mexico, MSO have been reported in both canyon and montane situations. Recent records of

MSO exist for the Grand Canyon and Kaibab Plateau in Arizona, as well as for the Chuska Mountains, Black Mesa, Fort Defiance Plateau, and the Rainbow/Skeleton Plateau on the Navajo Reservation. In addition, records exist for the Zuni Mountains and Mount Taylor in New Mexico. Federal lands account for 44% of this RU. Tribal lands collectively total 30%, with the largest single entity being the Navajo Reservation (USDI 1995). Threats in the southeastern portion of this RU according to the MSO Recovery Plan (USDI 1995) include timber harvest, overgrazing, catastrophic fire, oil, gas, and mining development, and recreation.

HUMPBACK CHUB

The humpback chub is a medium-sized freshwater fish (less than 500 mm) of the minnow family, Cyprinidae. The adults have a pronounced dorsal hump, a narrow flattened head, a fleshy snout with an inferior-subterminal mouth, and small eyes. It has silvery sides with a brown or olive colored back.

The humpback chub is endemic to the Colorado River Basin and is part of a native fish fauna traced to the Miocene epoch in fossil records (Miller 1955; Minckley et al. 1986). Humpback chub remains have been dated to about 4000 B.C., but the fish was not described as a species until the 1940's (Miller 1946), presumably because of its restricted distribution in remote white water canyons (USFWS 1990). Because of this, its original distribution is not known. The humpback chub was listed as endangered on March 11, 1967 (32 FR 4001).

Until the 1950's, the humpback chub was known only from Grand Canyon. During surveys in the 1950's and 1960's humpback chub were found in the upper Green River including specimens from Echo Park, Island Park, and Swallow Canyon (Smith 1960, Vanicek et al. 1970). Individuals were also reported from the lower Yampa River (Holden and Stalnaker 1975), the White River in Utah (Sigler and Miller 1963), Desolation Canyon of the Green River (Holden and Stalnaker 1970) and the Colorado River near Moab (Sigler and Miller 1963).

Today the largest populations of this species occur in the Little Colorado and Colorado Rivers in the Grand Canyon, and in the Black Rocks area of the Colorado River. The other five populations are found in Black Rocks, Westwater Canyon, Cataract Canyon, Desolation/Grey Canyon, and Yampa Canyon (Valdez and Clemmer 1982, USFWS 1990). One individual was recently captured in the Gunnison River (Burdick 1995).

Little is known about the specific spawning requirements of the humpback chub. It is known that the fish spawn soon after the highest spring flows when water temperatures approach 20^{0} C (Kaeding et al. 1990; Karp and Tyus 1990; USFWS 1990). The collection of ripe and spent fish indicated that spawning occurred in Black Rocks during June 2-15, 1980, at water temperatures of 11.5° to 16° C; in 1981, spawning occurred May 15-25, at water temperatures of 16°- 16.3° C (Valdez et al. 1982). Humpback chub spawned in Black Rocks on the Colorado River in 1983 when maximum daily water temperatures were 12.6° to 17° C (Archer et al. 1985).

Backwaters, eddies, and runs have been reported as common capture locations for young-of-year humpback chub (Valdez and Clemmer 1982). These data indicate that in Black Rocks and Westwater Canyon, young utilize shallow areas. Habitat suitability index curves developed by Valdez et al. (1990) indicate young-of-year prefers average depths of a 0.64 m (2.1 ft) with a maximum of 1.55 m (5.1 ft). Average velocities were reported at 0.0057 cms (0.2 cfs).

Generally, humpback chub show fidelity for canyon reaches and move very little (Archer et al. 1985; Burdick and Kaeding 1985; Kaeding et al. 1990). Movements of adult humpback chub in Black Rocks on the Colorado River were essentially restricted to a one mile reach. These results were based on the recapture of Carlin-tagged fish and radiotelemetry studies conducted from 1979 to 1981 (Valdez et al. 1982) and 1983 to 1985 (Archer et al. 1985; USFWS 1986; Kaeding et al. 1990).

Seven reaches of the Colorado River system were designated as critical habitat for humpback chub for a total river length of 379 mi (610 km) (59 FR 13374). Critical habitat in Arizona includes most of the habitat now used by the Grand Canyon population of humpback chub. Critical habitat in Utah exists outside of the Navajo Nation. Designated reaches are the lower 8 mi (13 km) of the Little Colorado River (LCR) and from river mile (RM) 34 to RM 208 (Granite Park) along the Colorado River.

Adult humpback chub may be found in deep, swift waters with varying depths. Humpback chub spawn in the spring between March and May in the LCR when water temperatures are between 16° and 22° C. Swimming abilities of young-of-year (y-o-y) humpback chub were determined to be significantly reduced when laboratory water temperatures were reduced from 20° to 14° C. Many y-o-y humpback chub are displaced from the LCR into the mainstem by monsoonal floods from July through September (Valdez and Ryel 1995). Young humpback chub are found in low velocity shorelines and backwaters. Survival rates are extremely low and believed to be less than 1 in 1,000 to two years of age. Low water temperatures and predation are believed to be the primary factors. Valdez and Ryel (1995) estimate that 250,000 young humpback chub are consumed by brown trout, rainbow trout (although not those stocked at Lees Ferry), and channel catfish. Most of the predation occurs between the LCR and Bright Angel Creek (RM 87.7).

RAZORBACK SUCKER

The following species status was summarized in the Draft Final Recovery Goals for Razorback Sucker (*Xyrauchen texanus*) of the Colorado River Basin: A Supplement to the Razorback Sucker Recovery Plan (SWCA 2000b). The razorback sucker is a large catostomid fish endemic to the Colorado River Basin (Minckley et al. 1991). It was listed as "endangered" under the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 *et. seq.*), under a final rule published on October 23, 1991 (56 FR 54957). Critical habitat for the razorback sucker and three other listed Colorado River fishes was designated on March 21, 1994 (59 FR 13374). A recovery plan was approved on December 23, 1998 (U.S. Fish and Wildlife Service 1998).

Historical distribution of razorback suckers in the upper basin included the Colorado, Green, and San Juan drainages (Minckley et al. 1991; Holden 1999; Muth et al. 2000). Distribution and abundance of razorback suckers declined throughout the 20th century over all its historical range, until now it exists naturally only in a few small, non-contiguous populations or as dispersed individuals. These fish have evidenced little natural recruitment in the last 40-50 years, and wild populations are composed primarily of aging adults, with steep declines in numbers. Reproduction occurs, but very few individuals are found.

Critical habitat was established March 21, 1994 (59 FR 13398), including the San Juan River and its 100-year flood plain from the Hogback Diversion to the full pool elevation at the mouth of Neskahai Canyon on the San Juan arm of Lake Powell.

COLORADO PIKEMINNOW

The following species status was previously published in the Draft Final Recovery Goals for Colorado Pikeminnow (*Ptychocheilus lucius*) of the Colorado River Basin: A Supplement to the Colorado Squawfish Recovery Plan (SWCA 2000a). The Colorado pikeminnow is a large cyprinid fish endemic to the Colorado River Basin (Tyus 1991). It is currently listed as endangered under the Act. It was first included in the List of Endangered Species issued by the Office of Endangered Species on March 11, 1967 (32 FR 4001), and was considered endangered as provided for by the Endangered Species Conservation Act of 1969 (16 U.S.C. 668aa). The Colorado pikeminnow was included in the United States List of Endangered Native Fish and Wildlife issued June 4, 1973 (38 FR No. 106), and received protection as endangered under Section 4(c)(3) of the original ESA of 1973. A recovery plan was approved on August 6, 1991 (U.S. Fish and Wildlife Service 1991), and critical habitat was designated on March 21, 1994 (50 FR 13374). Recovery goals for this species are being re-evaluated.

The Colorado pikeminnow is the largest member of the minnow family (Cyprinidae) in North America with an estimated maximum total length (TL) of about 1.8 m (5.9 ft) and weight of 36 kg (79.2 lbs) (Miller 1961). The Colorado pikeminnow is a long, slender, cylindrical fish with silvery sides, greenish back, and creamy-white belly. The tail trunk is thick with a triangular black patch at the base of the caudal fin. The head is large with a terminal mouth and thickened lips and jaws which lack teeth, and a maxillary upper jaw) that extends past the middle of the eye. Large adults are silvery-white throughout and salmon-like in appearance. Spawning adults in June-August are tinged with light rosy-red on the head and body, with pimple-like tubercles on the head and paired fins. Dorsal and anal fins typically have 9 principal rays each. Scales are small, cycloid, and silvery with 83-87 along the lateral line. Teeth of the pharyngeal arch are spaced apart and barely hooked in a typical pattern of 2,5-4,2 (Girard 1856).

The Colorado pikeminnow is endemic to the Colorado River Basin, where it was once widespread and abundant in warmwater rivers and tributaries (Kirsch 1889; Jordan and Evermann 1896; Tyus 1991; Quartarone 1995). It was common in the lower basin in California and Arizona, where it was commercially harvested in the early 1900's (Minckley 1973).

Numbers in the lower basin declined in the 1930's (Miller 1961), with few caught in the 1960's (Minckley 1973), and the last specimens reported in the mid-1970's (Moyle 1976; Minckley1985). The species was first reported in the upper basin in 1825 by Colonel William H. Ashley (Morgan 1964), and was common to abundant in the Green and upper Colorado rivers and their tributaries (Banks 1964; Vanicek 1967; Holden and Stalnaker 1975; Seethaler 1978). Wild populations of Colorado pikeminnow are found only in the upper basin, and the species currently occupies only about 25% of its historic range basin-wide.

Colorado pikeminnow live in warm regions of the mainstem and larger tributaries of the Colorado River Basin. Adults occupy deep, low-velocity eddies, pools, and runs year-around (Tyus 1990, 1991), including winter (Valdez and Masslich 1989), and frequent seasonally flooded bottomlands in spring (Tyus 1991). Spawning occurs in canyon areas over cobble substrates with interstitial voids containing little or no organics (Lamarra et al. 1985; Tyus and Haines 1991). Colorado pikeminnow are broadcast spawners that scatter adhesive eggs over cobble substrate which incubate in interstitial spaces. Spawning typically occurs after the peak of spring runoff during June-August at water temperatures of 20-22° C (Vanicek and Kramer 1969; Hamman 1981). Young emerge as larvae and drift downstream to shallow backwaters in sandy, alluvial regions, where they remain through most of the first year of life (Holden 1977; Tyus and Haines 1991; Muth and Snyder 1995). A considerable body of knowledge exists for nursery backwaters habitats used by young Colorado pikeminnow (Tyus and Karp 1989; Haines and Tyus 1990; Tyus 1991; Tyus and Haines 1991).

Adult Colorado pikeminnow are generally considered piscivores and the main predator of the Colorado River Basin because of their large size and large mouth (Vanicek and Kramer 1969; Minckley 1973; Holden and Wick 1982). As a member of the cyprinid family, Colorado pikeminnow lack jaw, vomerine, or palatine teeth, but possess instead large pharyngeal teeth, located on the first modified gill arch at the back of the throat. Cladocerans, copepods, and midge larvae are the principal food items of young up to 50 mm TL (1.97 in) in nursery backwaters (Vanicek 1967; Jacobi and Jacobi 1982; Muth and Snyder 1995). Insects became important for fish up to 100 mm TL (3.94 in), after which fish are the main food item; Vanicek (1967) reported Colorado pikeminnow as small as 50 mm TL with fish remains in its gut, and Muth and Snyder (1995) reported fish remains in the gut of a Colorado pikeminnow 21 mm TL (0.83 in). Young in hatchery troughs may become cannibalistic at sizes of less than 50 mm TL (1.97 in) (Frank Pfeifer, U.S. Fish and Wildlife Service, pers. comm.). Adults consume primarily soft-rayed fishes, including bluehead sucker (*Catostomus discobolus*), flannelmouth sucker (*C. latipinnis*), red shiners (*Cyprinella lutrensis*), sand shiners (*Notropis stramineus*), and fathead minnows (*Pimephales promelas*) (Osmundson 1999). Colorado pikeminnow have also been reported with channel catfish (*Ictalurus punctatus*) lodged in their throat, possibly leading to death of the fish (Pimental et al. 1985).

Recovery of the Colorado pikeminnow is based on three management areas, including the upper Colorado River Basin, San Juan River Basin, and the Lower Colorado River Basin. These management areas are under different and separate recovery and conservation programs; i.e., the

Upper Colorado River Endangered Fish Recovery Program, the San Juan River Basin Recovery Implementation Program, and the Lower Colorado River Multi-Species Conservation Plan. These management areas represent two recovery units (i.e., the upper basin including the San Juan River; and the lower basin), in which recovery can take place independently or linked across units.

SOUTHWESTERN WILLOW FLYCATCHER

Life History

The southwestern willow flycatcher is a small grayish-green passerine bird (Family Tyrannidae) measuring approximately 146.05 mm (5.75 in). It has a grayish-green back and wings, whitish throat, light gray-olive breast, and pale yellowish belly. Two white wingbars are visible (juveniles have buffy wingbars). The eye ring is faint or absent. The upper mandible is dark, and the lower is light yellow grading to black at the tip. The song is a sneezy fitz-bew or a fit-a-bew, the call is a repeated whitt.

The southwestern willow flycatcher is one of four currently recognized willow flycatcher subspecies (Phillips 1948, Unitt 1987, Browning 1993). It is a neotropical migrant that breeds in the southwestern U.S. and migrates to Mexico, Central America, and possibly northern South America during the non-breeding season (Phillips 1948, Stiles and Skutch 1989, Peterson 1990, Ridgely and Tudor 1994, Howell and Webb 1995). The historic breeding range of the southwestern willow flycatcher included southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, extreme southern Nevada, and extreme northwestern Mexico (Sonora and Baja) (Unitt 1987).

Endangered Status

The southwestern willow flycatcher was listed as endangered, without critical habitat on February 27, 1995 (USFWS 1995). Critical habitat was later designated on July 22, 1997 (USFWS 1997a), but has since been set aside by the 10th Circuit Court of Appeals.

Declining southwestern willow flycatcher numbers have been attributed to loss, modification, and fragmentation of riparian breeding habitat, loss of wintering habitat, and brood parasitism by the brown-headed cowbird (Sogge et al. 1997, McCarthey et al. 1998). Habitat loss and degradation are caused by a variety of factors, including urban, recreational, and agricultural development, water diversion and groundwater pumping, channelization, dams, and livestock grazing. Fire is an increasing threat to willow flycatcher habitat (Paxton et al. 1996), especially in monotypic saltcedar vegetation (DeLoach 1991) and where water diversions and/or groundwater pumping desiccates riparian vegetation (Sogge et al. 1997). The presence of livestock and range improvements such as waters and corrals; large scale agriculture; urban areas such as golf courses, bird feeders; and trash areas, may provide feeding sites for cowbirds. These feeding areas coupled with habitat fragmentation, facilitate cowbird parasitism of flycatcher nests (Hanna 1928, Mayfield 1977a, Tibbitts et al. 1994).

Habitat
The southwestern willow flycatcher breeds in dense riparian habitats from sea level in California to just over 7000 feet in Arizona and southwestern Colorado. Historic egg/nest collections and species' descriptions throughout its range, describe the southwestern willow flycatcher's widespread use of willow (*Salix* spp.) for nesting (Phillips 1948, Phillips *et al.* 1964, Hubbard 1987, Unitt 1987, T. Huels *in litt.* 1993, San Diego Natural History Museum 1995). Currently, southwestern willow flycatchers primarily use Geyer willow, Gooddings willow, boxelder (*Acer negundo*), saltcedar (*Tamarix* sp.), Russian olive (*Elaeagnus angustifolio*) and live oak (*Quercus agrifolia*) for nesting. Other plant species less commonly used for nesting include: buttonbush (*Cephalanthus* sp.), black twinberry (*Lonicera involucrata*), cottonwood (*Populus* spp.), white alder (*Alnus rhombifolia*), blackberry (*Rubus ursinus*), and stinging nettle (*Urtica spp.*). Based on the diversity of plant species composition and complexity of habitat structure, four basic habitat types can be described for the southwestern willow flycatcher: monotypic willow, monotypic exotic, native broadleaf dominated, and mixed native/exotic (Sogge *et al.* 1997).

Open water, cienegas, marshy seeps, or saturated soil are typically in the vicinity of flycatcher territories and nests; flycatchers sometimes nest in areas where nesting substrates were in standing water (Maynard 1995, Sferra *et al.* 1995, 1997). However, hydrological conditions at a particular site can vary remarkably in the arid Southwest within a season and between years. At some locations, particularly during drier years, water or saturated soil is only present early in the breeding season (i.e., May and part of June). However, the total absence of water or visibly saturated soil has been documented at several sites where the river channel has been modified (e.g. creation of pilot channels), where modification of subsurface flows has occurred (e.g. agricultural runoff), or as a result of changes in river channel configuration after flood events (Spencer *et al.* 1996).

Breeding Biology
Throughout its range the southwestern willow flycatcher arrives on breeding grounds in late April and May (Sogge and Tibbitts 1992, Sogge *et al.* 1993, Sogge and Tibbitts 1994, Muiznieks *et al.* 1994, Maynard 1995, Sferra *et al.* 1995, 1997). Nesting begins in late May and early June and young fledge from late June through mid-August (Willard 1912, Ligon 1961, Brown 1988a,b, Whitfield 1990, Sogge and Tibbitts 1992, Sogge *et al.* 1993, Muiznieks *et al.* 1994, Whitfield 1994, Maynard 1995). Southwestern willow flycatchers typically lay three to four eggs per clutch (range = 2 to 5). Eggs are laid at one-day intervals and are incubated by the female for approximately 12 days (Bent 1960; McCabe 1991). Young fledge approximately 12 to 13 days after hatching (King 1955, Harrison 1979). Typically one brood is raised per year, but birds have been documented raising two broods during one season and renesting after a failure (Whitfield 1990, Sogge and Tibbitts 1992, Sogge *et al.* 1993, Sogge and Tibbitts 1994, Muiznieks *et al.* 1994, Whitfield 1994, Whitfield and Strong 1995). The entire breeding cycle, from egg laying to fledging, is approximately 28 days. The southwestern willow flycatcher is an insectivore, foraging in dense shrub and tree vegetation along rivers, streams, and other wetlands.

Brown-headed cowbird (*Molothrus ater*) parasitism of southwestern willow flycatcher broods has been documented throughout its range (Brown 1988a,b, Whitfield 1990, Muiznieks *et al.* 1994, Whitfield 1994, Hull and Parker 1995, Maynard 1995, Sferra *et al.* 1995, Sogge 1995a). Where studied, high rates of cowbird parasitism have coincided with southwestern willow flycatcher population declines (Whitfield 1994, Sogge 1995b,c, Whitfield and Strong 1995) or, at a minimum, resulted in reduced or complete nesting failure at a site for a particular year (Muiznieks *et al.* 1994, Whitfield 1994, Maynard 1995, Sferra et al. 1995, Sogge 1995b,c, Whitfield and Strong 1995). Cowbird eggs hatch earlier than those of many passerine hosts, thus giving cowbird nestlings a competitive advantage (Bent 1960, McGeen 1972, Mayfield 1977a,b, Brittingham and Temple 1983). Flycatchers can attempt to renest, but it often results in reduced clutch sizes, delayed fledging, and reduced nest success (Whitfield 1994). Whitfield and Strong (1995) found that flycatcher nestlings fledged after July 20th had a significantly lower return rate and cowbird parasitism was often the cause of delayed fledging.

Rangewide Distribution and Abundance
Unitt (1987) documented the loss of more than 70 southwestern willow flycatcher breeding locations rangewide (peripheral and core drainages within its range) estimating the rangewide population at 500 to 1000 pairs. There are currently 182 known southwestern willow flycatcher breeding sites (in CA, NV, AZ, UT, NM, and CO) holding approximately 915 territories. Given sampling errors that may bias population estimates positively or negatively (e.g. incomplete survey effort, double-counting males/females, composite tabulation methodology), natural population fluctuation, and random events, it is likely that the total breeding population of southwestern willow flycatchers fluctuates. Unpublished data from USGS (M. Sogge, USGS pers. com.) indicates that after the 1999 breeding season, just over 900 territories at 143 sites were known throughout the bird's range.

Seventy percent of the breeding sites where flycatchers have been found are comprised of five or fewer territorial birds. The distribution of breeding groups is highly fragmented, with groups often separated by considerable distances. To date, survey results reveal a consistent pattern rangewide; the southwestern willow flycatcher population is comprised of extremely small, widely-separated breeding groups including unmated individuals.

Unitt (1987) concluded that "probably the steepest decline in the population level of *E.t. extimus* has occurred in Arizona...". Historic records for Arizona indicate the former range of the southwestern willow flycatcher included portions of all major river systems (Colorado, Salt, Verde, Gila, Santa Cruz, and San Pedro) and major tributaries, such as the Little Colorado River and headwaters, and White River. As of 1999, 289 territories were known from 47 sites along 12 drainages statewide (Table 1). The lowest elevation where territorial pairs were detected was 197 feet at Adobe Lake on the Lower Colorado River; the highest elevation was at the Greer town site (8300 feet). The majority of breeding groups in Arizona are extremely small. Of the 47 sites where flycatchers have been documented, 70 percent (n=33) contain 5 or fewer territorial flycatchers.

Reproductive Success

In 1999, a total of 327 nesting attempts were documented in Arizona at 47 sites (Paradzick *et al.* 2000). The outcome from 227 nesting attempts from 12 sites was determined (not every nesting attempt was monitored). Of the 227 nests, 50 percent (n=114) of the nests were successful. Causes of nest failure (n=113) included predation (n=73), nest abandonment (n=21), brood parasitism (n=5), infertile clutches (n=9), weather (n=2), and unknown causes (n=3).

Ten nests in Arizona were known to be parasitized; two parasitized nests fledged at least one willow flycatcher along with cowbird young. Eight of 10 monitoring sites had cowbird trapping in 1999. Two additional breeding sites (Bill Williams National Wildlife Refuge and Alamo Lake) had traps, but no nest monitoring occurred. The upper San Pedro River in BLM's conservation area had cowbird trapping, but no breeding flycatchers were known to be present.

NAVAJO SEDGE

Navajo sedge (*Carex specuicola*) is a slender, perennial forb, 25.4 to 40.6 cm (10 to 16 in) high. The triangular stem extends from an elongate, slender rhizome. Numerous stems grow from a rhizome, giving each plant a clumped form. The leaves are pale green, 1 to 2 mm (<0.1 inch) wide, 12 to 20 cm (about 5 to 8 in) long, and are clustered near the plant's base. The flowers are concentrated in 2 to 4 groups or spikes. The terminal spike has both male and female flowers, with the female flowers situate above the male flowers. The flowers are reduced and inconspicuous; they consist of small green-brown, scale-like parts 2 to 3 mm (<0.12 inch) long and 1 to 1.5 mm (<0.06 inch) wide. The Navajo sedge is unusual in having both two-branched styles with lenticular achenes, and three-branched styles with trigonous achenes. Flowering and fruit set occur from spring through summer, but most reproduction appears to be vegetative (Hermann 1970).

This rare endemic species is limited in distribution to Cococino, Navajo, and Apache counties, Arizona and San Juan County, Utah. Navajo sedge occurs in seep-spring pockets on Navajo Sandstone Formation bedrock at an elevation of 1,740 to 1,830 m (5,700 to 6,000 feet). Navajo sedge grows in a variety of situations on Navajo Sandstone, ranging from almost inaccessible sheer cliff faces to accessible alcoves (USFWS 1987). Critical habitat was designated May 8, 1985 (50 FR 19370) and encompasses all habitat for the Navajo sedge that was known at the time (600 m^2 (0.15 ac)). Three populations were designated near the Inscription House Ruin on the Navajo Indian Reservation in Coconino County, AZ. Each population covers an area of less than 200 m^2 (2.152 ft^2) along the outflow from its respective seep-spring.

The dominant associated species that are found with *Carex specuicola* include *Mimulus eastwoodiae* (monkey flower), *Epipactis gigantea* (helleborine), *Agrostis semiverticillata* (water bentgrass), *Andropogon hallii* (sand bluestem), *Cirsium* sp. (thistle), *Hordeum jubatum* (foxtail barley), and *Phragmites communis* (common reed) (Phillips et al. 1981). Although *Hordeum jubatum* was noted by Phillips et al. (1981), it was not observed in the 1986 field season by Navajo Natural Heritage Program personnel.

The two major threats to *Carex specuicola* are grazing of accessible sites and lowering of the water table by water development. Water is vital to the survival of the Navajo sedge; thus, any change in the water table level will have an effect on the populations. Water development (e.g. for wells, troughs) has already affected a subpopulation. This water development has caused livestock to congregate in the area and forage on Navajo sedge. Additional factors and potential threats including water source improvement, capturing free-flowing water, reduction of flows, channelization of flows and seasonal interference of flows. Also, the endemism and rarity of *Carex specuicola* make it vulnerable to collection. Collection by scientists and other interested parties could affect the species' populations.

CALIFORNIA CONDOR

This document represents the Service's conference opinion on the effects of that action on the experimental population of the California condor (*Gymnogyps californianus*) treated as proposed for listing within the experimental area and endangered outside the experimental area and without critical habitat in the effected area.

Information on the California condor is described in the 1996 Recovery Plan (USFWS 1996a), the 10(j) rule and Environmental Assessment designating the experimental nonessential population for Arizona (USFWS 1996b, The Peregrine Fund 1996), and other documents, and is summarized below. The California condor was listed as an endangered species on March 11, 1967 (32 FR 4001), although the condor had long been recognized as a vanishing species (Cooper 1890, Koford 1953, Wilbur 1978). Critical habitat for the California condor was designated on September 24, 1976 (41 FR 187). There is no condor critical habitat outside of California. The California condor is a member of the family Cathartidae, the New World vultures, and is among the rarest bird species in North America. Adult condors can weigh up to 22 lbs (10 kg) and have a wingspan of 9.5 ft (2.9 m). Condors are opportunistic scavengers, feeding only on carcasses (USFWS 1996a).

The fossil record of the range of this large, formerly widespread vulture includes the California Coastal Ranges, Central Transverse Range, Southern Sierra Nevada Mountains, to Arizona, Mexico, and Texas (USFWS 1996a). Published records of historic California condor sightings include observations in Arizona and Utah, many of them within reasonable proximity of the Grand Canyon (Snyder and Snyder 2000) and as recently as 1924 north of Williams, Arizona (Rea 1983). Habitats include rocky cliffs and trees for roosting, open grasslands, and oak woodlands (USFWS 1996a). In 1987, the last wild California condors were captured and a captive rearing program was established to restore condor numbers and genetic lineages. Since 1994, captive reared condors have been released and monitored in California to reestablish a wild population. Beginning in 1996, captive reared California condors have been released in northern Arizona in an attempt to establish a second wild population of 150 condors to fulfill a downlisting requirement established in the recovery plan (USFWS 1996a). California condors in Arizona were given the Endangered Species Act's "non-essential, experimental population" designation, in order to facilitate efforts by the Fish and Wildlife Service and other Federal, state, and private organizations to return the condors to the wild (USFWS 1996b).

In early 2000, there were approximately 164 California Condors in the world; 53 in the wild in California and Arizona and 111 in captive breeding facilities (World Center for Birds of Prey, Zoological Society of San Diego, and Los Angeles Zoo). Additional captive birds were released in Arizona in December 2000. The first egg from a captive-released condor was laid in the wild in Arizona in March 2001.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

The Navajo Nation encompasses over 16 million acres and includes portions of three states (AZ, NM, and UT) to make it the largest Native American tribe in the southwestern United States. There are many different biotic communities in the Navajo Nation, including mixed conifer forests, pinyon-juniper woodlands, alpine and subalpine grasslands, plains grasslands, and desert scrub habitat. Mean annual precipitation varies between 146 mm (desert scrub) to 291 mm (pinyon juniper) (5.75 to 11.46 in) on the Navajo Nation. The Navajo Nation altitude ranges from 1302 m to 2221 m (4271 to 7286 feet). The Navajo Fish and Wildlife Department, Division of Natural Resources, provides protection for endangered species listed by the Navajo Nation. The humpback chub, razorback sucker, and Colorado pikeminnow are all Group 2 Navajo Endangered Species. Group 2 species are in danger of being eliminated from all or a significant portion of their range on the Navajo Nation. Group 3 species, bald eagle, Mexican spotted owl, and Navajo sedge, are likely to become endangered species, within the foreseeable future, throughout all or a significant portion of their range on the Navajo Nation. The southwestern willow flycatcher is a Group 4 species on the Navajo Endangered Species list. Group 4 species are those species for which sufficient information is not available to warrant a higher group designation. The following species have Federal critical habitat designated within the Navajo Nation: Navajo sedge, razorback sucker, Colorado pikeminnow, and humpback chub.

BALD EAGLE

Despite the fact that eagles are only known to overwinter in the Navajo Nation (Greg Beatty, USFWS, pers. comm.), interest in bald eagles and exposure to contaminants remain. Concentrations of heavy metals in bald eagle eggs are a concern in Arizona. Thirteen Arizona bald eagle eggs collected from 1994 to 1997 contained from 1.01 to 8.02 ppm dry weight mercury (Beatty et al. unpubl. data). Concentrations in the egg are highly correlated with risk to reproduction. Adverse effects of mercury on bald eagle reproduction might be expected when eggs contain about 2.2 ppm mercury or more. Five of 10 eggs approached or exceeded the 2.2 ppm threshold concentration. What is especially alarming is that mercury concentrations in addled eggs appears to be increasing over time. Addled bald eagle eggs collected in Arizona in 1995-97 contained more than two- to six-times higher concentrations of mercury than eggs collected in 1982-84 (appx. 0.39-1.26 ppm) (K. King pers. comm.).

Bald eagles are generalized predator/scavengers adapted to edges of aquatic habitats. Their primary foods, in descending order of importance, are fish (taken both alive and as carrion), waterfowl, mammalian carrion, and small birds and mammals. Although there are no data for bald eagles and mercury within the Navajo Nation, bald eagles elsewhere in Arizona are exposed to mercury. King et al. (1991) detected elevated levels of mercury in prey items of the bald eagle. Individual concentrations ranged from 0.06 to 0.97 ug/g Hg and highest mean levels were recovered in fish from Lake Pleasant (0.41 ug/g), Salt River (0.21 ug/g), and Alamo Lake (0.19 ug/g). The highest means were above the National Contaminant Biomonitoring Program (NCBP) 85^{th} percentile of 0.17 ug/g and a recommended no observable effects concentration for piscivorous birds of 0.1 ug/g (Eisler 1987). Arizona bald eagle eggs collected between 1977 and 1985 reported elevated levels of mercury when compared to other North American locations (Grubb et al. 1990). Subsequently, thirteen eggs were collected from 1994 to 1997 and revealed mercury concentrations ranging from 2.11 to 8.02 ppm (Beatty et al. unpublished data). Mercury tissue burdens ranging from 1.5 to 4.5 ppm (dry weight) in birds are toxic (Ohlendorf 1993) and eggs containing 2.3 ppm (dry weight) mercury or more will demonstrate adverse effects (Wiemeyer et al. 1984). Embryos of birds are extremely sensitive and vulnerable to relatively minute concentrations of mercury in the egg.

Both organic and inorganic mercury bioaccumulate, but methylmercury accumulates at greater rates than inorganic mercury. Most mercury in fish or wildlife organisms is in the form of methylmercury (Bloom 1989) as this form is more efficiently absorbed (Scheuhammer 1987) and preferentially retained (Weiner 1995). And almost all of the mercury in bird eggs is methylmercury (Wolfe et al. 1998). Reproductive effects may extend beyond the embryo to adversely effect the juvenile survival rates. Mercury in the eggs of mallards caused brain lesions in hatched ducklings. The adult mallards were fed 3.0 ppm methylmercury dicyandiamide over two successive years. Mercury was accumulated in the eggs to an average of 7,180 and 5,460 ng/g on a wet weight basis in 2 successive years. Lesions included demyelination, neuron shrinkage, necrosis and hemorrhage in the meninges overlying the cerebellum (Heinz and Locke 1975). Diet is the primary route of methylmercury uptake by fish in natural waters, contributing more than 90 percent of the methylmercury accumulated. The assimilation efficiency for uptake of dietary methylmercury in fish is probably 65 to 80 percent or greater. To a lesser extent, fish may obtain mercury from water passed over the gills, and fish may also methylate inorganic mercury in the gut (Wiener and Spry 1996). Developing embryos are the most vulnerable life stage to mercury exposure.

Concentrations in the egg are typically most predictive of mercury risk to avian reproduction, but concentrations in liver have also been evaluated for predicting reproductive risk. The documented effects of mercury on reproduction range from embryo lethality to sublethal behavioral changes in juveniles at low dietary exposure. Reproductive effects in birds typically occur at only twenty percent of the dietary concentrations which produce lethal effects in adult birds (Scheuhammer 1991).

MEXICAN SPOTTED OWL

A total of 519 projects have undergone formal consultation for the owl in Arizona and New Mexico. Of that aggregate, 255 projects resulted in a total anticipated incidental take of 465 owls plus an additional unknown number of owls. These consultations have primarily dealt with actions proposed by the Forest Service, Region 3, but have also addressed the impacts of actions proposed by the Bureau of Indian Affairs, Department of Defense (including Air Force, Army, and Navy), Department of Energy, National Park service, and Federal Highway Administration. These proposals have included timber sales, road construction, fire/ecosystem management projects (including prescribed natural and management ignited fires), livestock grazing, recreation activities, utility corridors, military overflights, and other construction activities.

HUMPBACK CHUB

The beginning of the designated critical habitat on the Lower Colorado River is located in the Navajo Nation. Known constituent elements include water, physical habitat, and biological environment as required for each life stage. The dominant factor affecting critical habitat in the Colorado River mainstem is the presence of Glen Canyon Dam. Humpback chub in the Lower Colorado is challenged by the large numbers of non-native fishes which have resulted in predation and competition with native fishes.

RAZORBACK SUCKER

Scientifically documented records of wild razorback suckers in the San Juan River are limited to two fish captured in 1976 in a riverside pond near Bluff, Utah, and one fish captured in the river in 1988, also near Bluff (Ryden 2000). No wild razorback suckers were found during the 7-year research period (1991-1997) of the San Juan River Basin Recovery Implementation Program, but preliminary estimates of wild adult razorback suckers in the San Juan are less than 50 individuals (Holden 1999). Large numbers were anecdotally reported to have been found in a drained pond near Bluff in 1976, but no specimen was preserved to verify the presence of the species. Hatchery-reared razorback suckers, especially larger fish > 350 mm (13.78 in), introduced into the San Juan River in the 1990s have survived into subsequent years and reproduced, as evidenced by recapture data and collection of larval fish (Ryden 2000).

In the San Juan River, where hatchery-reared, radio-tagged adults preferred swifter mid-channel currents during summer-autumn base-flow periods (Ryden 2000). Razorback suckers breed in spring, when flows in riverine environments are high. Ryden (2000) recorded behavior among introduced razorback suckers in the San Juan River, where radiotelemetered adults chose habitats warmer than the main channel in March-April; eddies during the ascending limb of the hydrograph in May; and low-velocity habitats along the river margin, including inundated vegetation, during the highest flows in June. The fish moved back into eddies on the descending limb of the hydrograph in July.

Hatchery-reared adults in the San Juan River generally moved out of the main channel into edge pools during low winter base flows, using these habitats exclusively in January, the coldest month of the study (Ryden 2000). During the other winter months, fish ventured into the main channel during the warmest part of the day, presumably to feed. In a study of stocked razorback suckers in the San Juan River, Ryden (2000) found that fish < 351 mm TL (13.82 in) comprised 68.3% of stocked fish but only 9.3% of recaptures, while fish > 400 mm (15.75 in) comprised 85.2% of recaptures. He suggests that > 410 mm (16.14 in) may be the predation threshold for razorback suckers in the San Juan River. Among stocked razorback suckers in the San Juan River, no difference was seen in growth between female and male fish, but, as expected, smaller fish grew faster than larger fish (Ryden 2000).

COLORADO PIKEMINNOW

Wild populations occur in the San Juan river downstream of present-day Navajo Dam, New Mexico (Jordan 1891; Koster 1960; Olson 1962; Propst 1999). The Colorado pikeminnow inhabits 240 km (149 mi) of the San Juan from Shiprock to the Lake Powell inflow. Irrigation diversions block upstream movement while Lake Powell restricts downstream migration (SWCA 2000). Natural reproduction of Colorado pikeminnow is currently known in the San Juan River. There are less than 100 wild adult fish remaining in the San Juan River, and over 100,000 hatchery produced Colorado pikeminnow have been released in the mainstem as part of the San Juan River Recovery Program (Ryden and Ahlm 1996; Holden 1999); releases were made in 1998 and there has been no evidence of reproduction or recruitment of these hatchery fish. Numbers of age 0 and subadults in the other rivers are low with no extensive surveys, except for the San Juan River.

SOUTHWESTERN WILLOW FLYCATCHER

The only southwestern willow flycatchers found in the Navajo Nation were documented by Sogge (1995b). Southwestern willow flycatchers were using two sites along the San Juan River, Utah. Although no nests were located and the birds were located during a migratory period, the observations suggest that southwestern willow flycatchers may be breeding along the San Juan River, which forms the northern border of the Navajo Nation in Utah.

Because of the bird's low numbers, the effects of management and research activities are a concern. Survey and nest monitoring activities, handling and banding procedures are regulated by Federal and State permitting processes to remove and reduce effects to the bird. Trapping, handling, banding, and determining the nest's status, and removing cowbird eggs can, even with the most careful biologist result in injury or death to a bird. Specific training in standardized survey and monitoring procedures (Sogge et al. 1997) are required throughout its range. To date, with over 900 birds handled, only one known death has occurred from trapping and banding southwestern willow flycatchers (M. Sogge, USGS, pers. comm.)

The development of limited and sparsely-distributed water resources in the Southwest has resulted in large-scale changes to aquatic and riparian systems. Those changes include losses of perennial aquatic ecosystems due to dams, diversions, and groundwater pumping; conversion of alluvial-influenced riparian areas to lacustrine-influenced reservoirs; loss and fragmentation of riparian and aquatic habitats due to residential, commercial, and agricultural development, overgrazing in riparian areas and in watersheds; modifications to stream systems from bank stabilization efforts and channelization; and invasion of remaining riparian areas by exotic species such as saltcedar. These activities and impacts are common among major stream systems in the Southwest.

Recovery of the southwestern willow flycatcher depends upon reversing the current population status of the bird. Therefore, throughout the subspecies range, it is important to increase the abundance and decrease the distance between meta-populations. To accomplish this task, watersheds must be improved, suitable riparian habitat developed, and in many cases, natural hydrologic processes restored (especially where dams and/or diversions occur along streams).

NAVAJO SEDGE

The entire range of Navajo sedge is within the Navajo Nation. Despite the designation of critical habitat and the development of a recovery plan, populations within the critical habitat do not appear to be improving. The plants found within the critical habitat were healthy and vigorous in 1980 (50 CFR 19370). Today, many of these plants are gone due to overgrazing. Navajo sedge has a wider distribution than previously described (USFWS 1987), likely due to increased survey effort. However, the condition of these plants is poor and the veracity of some of these new populations has yet to be established (Daniela Roth, Navajo Nation Heritage Program, pers. comm.). Although the distribution has increased, this plant is still threatened by grazing and lowering of the water table. This is the first formal consultation for the Navajo sedge.

CALIFORNIA CONDOR

The release of California condors in Arizona on December 12, 1996, was a joint project of The Peregrine Fund, the U.S. Fish and Wildlife Service, the Bureau of Land Management, and the Arizona Game and Fish Department. California condors in Arizona were given the Endangered Species Act's "non-essential, experimental population" designation, as authorized under 10(j) of the Act, in order to facilitate efforts by the Fish and Wildlife Service and other Federal, state, and private organizations to return the condors to the wild.

The Arizona birds have been designated experimental, nonessential, within the boundaries formed by Interstate Highway 40, Highway 191, Interstate Highway 70, Interstate Highway 15, and Highway 93 (USDI 1996b).

The initial release site, Vermilion Cliffs in Coconino County, is on Federal land managed by the Bureau of Land Management. On November 18, 1998, six condors were released from a second release aviary on public lands on the Hurricane Cliffs north of the Grand Canyon in Mohave County, Arizona. A total of 35 condors have been released from these two release aviaries. Five condors have been returned to captivity for behavioral reasons with the hope of being re-released following adequate behavioral modification training. Fifteen condors have died from being shot (1), power line collision (1), aspiration (1), eagle and coyote predation (3 and 2), undetermined causes (2), and lead poisoning (5). Lead poisoning events took place between March and June, 2000, and evidence suggests birds ingested lead pellets while feeding on carrion contaminated with lead shotgun pellets from an unknown source probably along the south rim of the Grand Canyon (Notes from the Field 2000). The Service released additional condors in December 2000. The first egg was laid by a captive-released bird in Arizona in March 2001.

All of the Arizona birds are fitted with radios allowing field biologists to monitor their movements. Free-flying condors in Arizona are generally located in the Grand Canyon vicinity. Condors released from both release sites tend to roost in the west Vermilion Cliffs area, particularly during fall and winter months and regularly take a 30-mile (48.2 km) “commute” from the Vermillion Cliffs area to the Colorado River between Lees Ferry and the Soap Canyon confluence. During the late spring and summer the condors range more extensively. Flights in 1999 and 2000 took the Arizona condors west to the Virgin Mountains near Mesquite, Nevada, south to the San Francisco peaks outside of Flagstaff Arizona, north to Zion and Bryce Canyon National Parks and beyond to Minersville, Utah and east to Mesa Verde, Colorado and the Four Corners region. Condors initially depended on supplemental feeding stations with livestock carcasses near the release sites. Feeding stations continue to be supplied with calf carcasses, however, particularly during summer months, condors are successfully foraging across an extensive area and some birds are not returning to supplemental feeding stations for months at a time (Notes from the Field, 2000).

While all released condors and their progeny were expected to remain in the experimental area due to the geographic extent of the designation, California condors have briefly ventured out of the experimental area on a few occasions. In June, 1999, two condors flew east to Mesa Verde, Colorado and the Four Corners region crossed the Navajo Nation (Notes from the Field, 2000) exceeding the Highway 191 boundary of the nonessential, experimental area. The special rules in the nonessential, experimental population designation state that the Service or its authorized agents will “relocate California condors that have moved outside the experimental population area.” The Service’s principal agent for condor recovery activities in northern Arizona (The Peregrine Fund) has pursued condors exiting the experimental area, but the brevity of such condor sorties has not yet warranted or enabled the recapture and return of these birds to the experimental area.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action, that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on a larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

This section includes an analysis of the direct and indirect effects of the approval/disapproval of the Navajo Nation Water Quality Standards by the U.S. Environmental Protection Agency on the bald eagle, Mexican spotted owl, humpback chub and its critical habitat, razorback sucker and its critical habitat, Colorado pikeminnow and its critical habitat, southwestern willow flycatcher, California condor, and Navajo sedge and its critical habitat and its interrelated and interdependent activities. Factors considered in this section include the proximity of the action, distribution, timing, nature of the effect, duration, disturbance (frequency, intensity, and severity), direct effects, interrelated actions, interdependent actions, and indirect effects.

Section 201. Antidegradation Policy

The Navajo Nation has not identified antidegradation implementation procedures as required under 40 CFR 131.12(a). Without implementation procedures, the antidegradation rule would not be effective in preventing further degradation of Navajo Nation navigable waters and result in degraded water quality. Degraded water quality would cause decreases in dissolved oxygen; increases or decreases in pH; increases in turbidity, temperature, nutrients (phosphorus or nitrogen), and toxic pollutants; and the bioconcentration of some toxic pollutants. The results of poor water quality are likely to adversely affect listed fish species. Poor water quality may alter useable habitat used for spawning areas, nursery grounds, or the interactions with predators and competitors. The environmental impact of these changes added to other physical and biological characteristics of Navajo Nation waters may alter growth, reproduction, or cause direct mortality for fish species, and reduce prey or decrease fitness for riparian dependent avian species. A reduction in prey for the listed avian species would result in general nutritional loss, reduced reproduction, increased foraging time, and decreased fitness because of food stress. Discharge or runoff with elevated levels of pollutants will not provide the aquatic conditions necessary for healthy populations of Navajo sedge.

Assessing the impact of degraded water quality is difficult in a species like the bald eagle or southwestern willow flycatcher which are highly migratory and may accumulate contaminants over broad geographic areas. Organochlorine residues, particularly DDE, in birds collected from the southwestern United States have historically been higher than the rest of the nation (Cain 1981, Fleming and Cain 1985). Residues of DDE collected from starlings in the lower Gila River far exceed the national geometric mean (King et al. 1997). Contaminants found in dead individuals in Arizona may or may not reflect local conditions, although liver tissue usually reflects recent exposure. Few studies have been conducted on the southwestern willow flycatcher. The high rate of brood parasitism by the brown-headed cowbird in some areas and habitat loss throughout their range are likely the most significant threats to the species. These effects coupled with degraded water quality are likely to continue to adversely affect the species.

Section 202. Implementation Plan

Lack of specific inspection and enforcement programs for water quality standards is likely to result in unfavorable water quality. The Service believes that a more explicit plan for inspection and enforcement is necessary in order to protect the following species: bald eagle, Mexican spotted owl, humpback chub and its critical habitat, razorback sucker and its critical habitat, and Colorado pikeminnow and its critical habitat, southwestern willow flycatcher, Navajo sedge and its critical habitat, and the California condor. Without an outlined inspection and enforcement program, agencies within the Navajo Nation, state, and Federal government as well as dischargers into the waters of the Navajo Nation will be unclear as to how these water quality standards will be implemented. While it is good to develop standards for aquatic and wildlife dependent uses, the Navajo Nation needs to be able to enforce these standards to ensure the integrity of the waters and the organisms which depend on them. The effect of the lack of definitive enforcement programs is not likely to jeopardize the existence of any of the species mentioned above. However, lack of explicit implementation criteria is likely to result in suboptimal aquatic conditions and contamination which will result in losses to aquatic and aquatic-dependent species.

Section 208. Variances

The Director may grant a variance from a water quality standard for a point source discharge. Granting of the variance is discharger and pollutant specific, and is limited to three years. This provision prevents a watershed or water body variance which would be equivalent to modifying a water quality standard or removing a designated use.

The rule provides a provision for variances if installation and operation of each of the available discharge technologies to achieve compliance with the water quality standard would result in substantial and widespread economic and social impact. The Service understands the realities of communities with limited funds. It is not practical to close facilities which are unable to comply with a particular standard, particularly if they are seeking funds. Nevertheless, listed species may be negatively impacted by this rule. Given the opportunity to evaluate individual requests for variances, the Service believes jeopardy and the destruction or adverse modification of critical habitat will be avoided.

Ammonia, which is common in wastewater effluent, is toxic to fish and is also influenced by pH and temperature. Further, copper in combination with ammonia, mercury, and zinc produce additive toxic effects on fish (Eisler 1987). It is difficult to state which constituents should or should not be issued variances. A watershed with naturally high levels of constituents must be evaluated differently from those watersheds without high levels or with different constituent levels. For example, copper is a contaminant of concern in the lower Gila River but cadmium is not (King et al. 1997). Variance effects must be evaluated on a site specific basis. The granting of variances might occur in waters that are designated as critical habitat but do not presently contain populations of a listed species. Designation of critical habitat provides an avenue to recognize and protect areas important for the survival and recovery of species. The EPA has committed to site specific section 7 consultation for variances pursuant to the Act prior to approval of requests for variances.

For example, natural populations of the razorback sucker were extirpated from historical habitats in the Gila, Salt, and Verde rivers by the 1960's. During the late 1970's and into the 1980's, efforts were made to reestablish these populations using hatchery reared fish. These efforts have not been as successful as hoped, resulting in the perception by some people that these areas are no longer suitable habitat. The Service believes that some of the introduced fish have survived in these systems and these critical habitats should continue to be protected. The granting of variances should not conflict with long-term goals of maintaining the chemical, physical, and biological integrity of the Navajo Nation's surface waters.

Section 209. Wastewater Mixing Zones

Mixing zones may occur in any perennial stream. Future requests for mixing zones which occur in habitat or designated critical habitat for listed species must be evaluated separately. The EPA has committed to site specific section 7 consultation for wastewater mixing zones pursuant to the Act prior to approval of requests for wastewater mixing zones.

It is assumed that mixing zones will not encroach or impact adjacent riparian areas or biologically sensitive areas. Properly applied, mixing zones must host a sufficient volume of water to allow proper dilution. Acute toxicity must be avoided and all organisms passing through the mixing zone are expected to survive. Mixing zones increase the mass loadings of pollutant to the water body and decrease treatment requirements in the immediate area. Compliance is met by dilution not treatment. Numeric water quality standards are exceeded, but acute toxicity must be avoided, meaning no lethality should result from temporary passage through the mixing zone. The effects of the magnitude, duration, and frequency of the mixing zone must be evaluated for each listed aquatic species likely to use the area. Conditions within the mixing zone are not adequate to ensure the survival, growth, and reproduction of all organisms that might otherwise attempt to reside continuously within the mixing zone. Mixing zones are not likely to adversely affect the Mexican spotted owl, southwestern willow flycatcher, or California condor since these species do not exist in the aquatic environment of a mixing zone. Navajo sedge does not occur in any perennial waters that would be subject to a mixing zone. Bald eagle, humpback chub, razorback sucker, and Colorado pikeminnow are likely to exist in or feed upon species which exist in mixing zones and are therefore likely to be adversely affected, depending on the pollutant and the duration and intensity of the substance.

Section 206 (Table 206.B1) Aquatic, Wildlife, and Livestock Numeric Surface Water Quality Standards for Bacteria and Physical Parameters

Wildlife associated with riparian habitats are dependent upon the water not only as a physical source in which they live and breath, but also as a chemical source. The water is a delivery vehicle for oxygen and a means for removal of wastes. However, if the water that wildlife depend upon is polluted with fecal coliform, the function of the water is diminished. When wildlife have to expend energy to fight off infection and disease as a result of an overburden of fecal coliform in an aqueous medium, then they have less available energy to devote to maintenance, growth, and reproduction.

Section 206 (Table 206B.3-4) Standards for Ammonia

The Service concurs with the EPA's determination that ammonia standards may affect, but are not likely to adversely affect the bald eagle, Mexican spotted owl, southwestern willow flycatcher, Navajo sedge, or the California condor. However, the Service finds that the criteria for acute ammonia proposed in the Navajo Nation Water Quality Standards (NNWQS 1999) are not sufficient to protect the three listed fish dependent on the aquatic ecosystem for development and/or foraging. Chronic ammonia toxicity should also be included since sublethal effects like reduced brood survival, decreased hatching success, and compromised growth rates can severely limit young of year recruitment. While fish may be able to avoid areas persistently affected by ammonia discharges, there are three endangered fish species with critical habitat within the boundaries of the Navajo Nation. The establishment of an acute water quality standard for the San Juan River is a good first step in the long term preservation of the critical habitat and will be beneficial to the fishes. The inclusion of a chronic ammonia criteria would further protect the San Juan River.

Section 206 (Table 206B.5) Aquatic, Wildlife, and Livestock Numeric Surface Water Quality Standards for Metals. This includes mercury as well as formula based dissolved metals.

MERCURY

<u>Bald Eagle</u>:
In the August 28, 2000, biological evaluation, the EPA states that its approval of the mercury criteria in the Navajo Nation Water Quality Standards, is likely to adversely affect the bald eagle. To mitigate the potential effects of mercury criteria, EPA has agreed to the adopt the CTR biological opinion terms and conditions which have been included in this biological opinion under Conservation Measures. The Navajo Nation has a proposed acute mercury criterion of 2.4 ug total mercury/L and a chronic mercury criterion of 0.012 ug total mercury/L. Both of these values exceed 2.0 ng/L (total Hg or equivalent methylmercury) value that the Service believes is protective for wildlife from mercury in water.

EPA has committed, as a Conservation Measure, that the human health criteria for mercury be changed by January 2002. Even with the adoption of new human health criteria, the Service anticipates the criteria will not be sufficiently protective of the potential for maternal transfer of harmful concentrations of mercury to vertebrate eggs and embryos. Food chain transfer is the most important exposure pathway in all ecosystems (EPA 1997). Methylmercury is one of the rare compounds which not only bioaccumulates but also biomagnifies across trophic levels such that BAFs for methylmercury are commonly in the millions for top trophic level fish. Listed wildlife species which are high trophic level predators include the bald eagle and California condor. California condor are still dependent on managed feeding stations; otherwise, they feed upon large carcasses of elk, deer, or other mammals (USDI 1996a) and not aquatic species associated with the Navajo Nation. Because fish and wildlife typically have more restricted diets than humans, they are more susceptible to local contamination. Wildlife, particularly piscivorous wildlife, are often at greatest risk from mercury exposure within any ecosystem (EPA 1997). Even with appropriate bioaccumulation factors for evaluating human fish consumption, the use of humans as the surrogate species to represent the bioaccumulation hazards presented to wildlife is not scientifically supported.

Reproduction is one of the most sensitive toxicological responses, with effects occurring at very low dietary concentrations. Effects of mercury on reproduction are currently likely in bald eagles as demonstrated by concentrations of mercury observed the potential prey of bald eagles in Arizona (King et al. 1991). Embryos of birds are extremely sensitive and vulnerable to relatively minute concentrations of mercury in the egg. Almost all of the mercury in bird eggs is methylmercury (Wolfe et al. 1998). Adverse reproductive effects due to methylmercury are offset by Conservation Measures #1, #2, #3 which recommend toxicological research on piscivorous birds and fishes.

Fish:

Acute mercury standards at 2.4 micrograms/liter (ppb) and chronic mercury standards at 0.012 ppb will not protect listed fish species in waters on the Navajo Nation. Application of EPA bioaccumulation factors predicts reproductive adverse affect concentrations at 5 ng/L total aqueous mercury (USFWS and NMFS 2000). In a review of mercury toxicity to fish, Wiener and Spry (1996) noted direct adverse effects in a variety of fish species on behavior, growth, histology, reproduction, development and survival of fish at concentrations well below the proposed chronic criterion, many of the same conditions that would be expected to impact the humpback chub, razorback sucker, and Colorado pikeminnow.

Aquatic systems have more complex food webs and more trophic levels, and the primary producers in aquatic systems may themselves accumulate more mercury from water and sediment than do soil based primary producers in terrestrial systems (EPA 1997). Top predators in aquatic systems, like Colorado pikeminnow, and species with long life spans, therefore are at greatest risk from mercury bioaccumulation. Listed fish species potentially at risk of mercury bioaccumulation at concentrations anticipated under the proposed action are razorback sucker, humpback chub, and the Colorado pikeminnow.

In those watersheds that are high in mercury, the development of a TMDL may assist in the protection of listed species. Information on impaired waterbodies is not known on the Navajo Nation.

FORMULA-BASED DISSOLVED METALS

A discussion of the development and use of metals criteria effects can be found in the March 2000 biological opinion on the California Toxics Rule (USFWS and NMFS 2000). EPA originally proposed to develop sediment criteria guidelines for cadmium, copper, lead, nickel, and zinc by December 2000. Unfortunately, the EPA has not accomplished this conservation measure, which was scheduled for completion by the end of 2000. Until new criteria guidance are developed and implemented, fish resources in the Navajo Nation are likely to be affected by the Navajo Nation Water Quality Standards. Specifically, endangered humpback chub, razorback sucker, and Colorado pikeminnow populations may be limited in their ability to recover if point source dischargers do not have priority pollutant discharge limits that are protective of endangered species.

The Service found that most of the formula-based dissolved metals in the Navajo Nation Water Quality Standards result in higher limits than are recommended by the EPA National Recommended Water Quality Criteria Correction (EPA 1999). Using 100 mg/L hardness ($CaCO_3$) for all comparisons, the Navajo Nation's copper formula results in limits of 18 ug/L acute and 12 ug/L chronic. These standards are 1.38 and 1.33 times higher than the EPA's recommended water quality criteria for acute and chronic copper, respectively. The Navajo Nation Water Quality Standards for lead are also higher than the EPA recommended criteria. For example, the acute lead criterion recommended by EPA is 65 ug/L. This is 1.26 times higher than the Navajo Nation's acute lead standard of 82 ug/L. Similarly, for chronic lead, the Navajo Nation's standard is 1.28 times higher (3.2 ug/L vs. 2.5 ug/L). The Navajo Nation Water Quality Standards for nickel are 1418 ug/L and 158 ug/L, acute and chronic, respectively. The EPA's recommended criteria are 470 ug/L acute and 52 ug/L chronic. The Navajo Nation's nickel standards for aquatic and wildlife designated uses are over 3 times the recommended acute and chronic nickel criteria.

The formula-based metal method does not sufficiently consider the environmental fate, transport, and transformations of metals in natural environments. The use of hardness alone as a universal surrogate for all water quality parameters that may modify toxicity, while perhaps convenient, will clearly leave gaps in protection when hardness does not correlate with other water quality parameters such as DOC, pH, Cl^-, or alkalinity and will not provide the combination of comprehensive protection and site specificity that a multivariate water quality model could provide. It is the purpose of the Clean Water Act, through the NPDES program to insure that discharges do not change water chemistry, even if effluent does not result in toxicity, because the aquatic communities present in a water body may prefer the unaltered environment over the affected receiving waters. Biological criteria may be necessary to detect adverse ecological effects downstream of discharges, whether or not toxicity is expressed.

The Service assumes the use of site specific translators in metals discharge permits will not be used to allow significant increases in metal loadings in water bodies with mine drainage, or where water bodies are listed as impaired due to metals where listed species may be affected by such increases. The Service also assumes that when implemented, the revised guidance on the use of water effect ratios will reduce chances for inaccurate or under protective criteria. The Service assumes that sediment guidelines for cadmium, copper, lead, nickel, zinc, chromium, and silver will increase protection for federally listed endangered species and critical habitat. The Service also assumes sediment guidelines will be used to limit particulate metal loadings into aquatic ecosystems in the Navajo Nation.

The effects of metals may be generalized to include: central nervous system disruption, altered liver and kidney function, impaired reproduction, decreased olfactory response, impaired ability to avoid predation and capture prey, growth inhibition, growth stimulation, changes in prey species community composition, increased foraging budgets, and lethality. The Service believes that the razorback sucker, Colorado pikeminnow, and humpback chub and their critical habitats will be negatively affected by concentrations of particulate and/or dissolved metals at or below those that would be allowable under criteria procedures provided in the proposed Navajo Nation Water Quality Standards.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Cumulative effects on the bald eagle, Mexican spotted owl, humpback chub, razorback sucker, Colorado pikeminnow, southwestern willow flycatcher, Navajo sedge, and California condor considered in this biological opinion include future anticipated non-Federal actions that may occur in or near surface water in the Navajo Nation such as:

1. Water management such as diversions, levee maintenance, channel dredging, channel enlargement, flood control projects, drainage pumps, diversion pumps, siphons, continuing or future non-Federal diversions of water, flood flow releases, and changes in water management;

2. Introduction of non-native fish, wildlife, and plants, inbreeding of small populations, and genetic isolation;

3. Runoff from overgrazed rangelands, municipal and industrial stormwater discharges (permitted and non-permitted), inland spills of oil and other pollutants, and illegal, non-

permitted discharges;

4. Land management practices such as improper rangeland management resulting in sedimentation of surface waters, plowing, discing, grubbing; and application of pesticides, herbicides, fungicides, fumigants, fertilizers and other soil/water amendments, urban refuse disposal, road building and maintenance, oil and gas exploration and development, sand and gravel operations and conversion and reclamation of wetland habitats; and

5. Recreational disturbances including water sports, illegal fishing, off-road vehicle use, hiking, camping, vandalism, road kills, chronic disturbance, noise, disturbances from domestic dogs and equestrian uses.

CONCLUSION

After reviewing the current status of the bald eagle, Mexican spotted owl, humpback chub, razorback sucker, Colorado pikeminnow, southwestern willow flycatcher, Navajo sedge, and the experimental, nonessential population of the California condor, the environmental baseline for the action area, the effects of the proposed Navajo Nation Water Quality Standards and the cumulative effects, it is the Service's biological opinion and conference opinion that the EPA's approval of the Navajo Nation Water Quality Standards, as proposed, is not likely to jeopardize the continued existence of the aforementioned species, and is not likely to destroy or adversely modify designated critical habitat for the humpback chub, razorback sucker, Colorado pikeminnow, and Navajo sedge. Critical habitat for the Mexican spotted owl has been not been designated within the Navajo Nation, therefore none will be affected.

We base our conclusion on the following:

1. Aggressive conservation measures have been included as a part of the proposed action to address mercury concentrations and the protection of aquatic and aquatic dependent species.
2. The proposed Navajo Nation EPA water quality standards ensure the development of adequate monitoring and enforcement support, for the protection of threatened and endangered species, and other resources.
3. The quality of primary constituent elements of critical habitat will not be impaired by the proposed water quality standards. Spawning habitat and juvenile rearing habitat, the areas most susceptible to water quality, will be protected if standards are met.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the EPA so that they become binding conditions of any grant or permit issued to the Navajo Nation, as appropriate, for the exemption in section 7(o)(2) to apply. The EPA has a continuing duty to regulate the activity covered by this incidental take statement. If the EPA (1) fails to assume and implement the terms and conditions or (2) fails to require the Navajo Nation to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the EPA and/or the Navajo Nation must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of Navajo sedge and other listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of Federally listed endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any regulation of any State or in the course of any violation of a State criminal trespass law.

AMOUNT OR EXTENT OF TAKE

The Service does not anticipate the proposed action will incidentally take Mexican spotted owls or southwestern willow flycatchers.

The Service anticipates incidental take of the bald eagle, humpback chub, razorback sucker, and Colorado pikeminnow to be in the form of harm and harass. Take of these species can be anticipated as a result of loss of primary productivity due to water quality degradation, nutrient loading (phosphorus and nitrogen from animal/human wastes), and loss of prey base for fishes. Treated water, although meeting Navajo Nation standards, may introduce multiple stressors to the aquatic environment that fish cannot simultaneously handle. In the case of acute exposure, fish may implement behavioral modification in order to avoid the stressful situation. This expected take will be difficult to detect for the following reason(s): these species are wide-ranging and very mobile; finding a dead or impaired specimen is unlikely; losses may be masked by seasonal fluctuations in numbers or other causes (e.g., oxygen depletions for aquatic species); or sublethal effects upsetting normal reproductive function are difficult to detect/diagnose. As a surrogate measure of take, incidental take will be assumed to be exceeded if the death of any fish or bird species can be linked to water quality conditions.

The Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat in the Navajo Nation when the reasonable and prudent measures and terms and conditions are implemented.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measure(s) are necessary and appropriate to minimize take of the bald eagle, humpback chub, razorback sucker, and Colorado pikeminnow :

1. The EPA shall monitor incidental take resulting from the approval of the Navajo Nation Water Quality Standards and report to the Service the findings of that monitoring.

2. The EPA shall minimize take associated with the proposed numeric criteria for mercury.

3. The EPA shall develop procedures for minimizing take associated with the proposed formula based dissolved metals criteria.

4. The EPA shall ensure no increase in loading of pollutants, including bioaccumulative chemicals or other toxics.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the EPA must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

To implement reasonable and prudent measure #1:

1.1 Monitoring within the Navajo Nation at sites where NPDES permits are issued shall be done to ascertain impacts to individuals of the species and/or loss of habitat that causes harm or harassment.

1.2 The EPA shall submit annual monitoring reports to the Arizona Ecological Services Field Office by December 31, beginning in the year in which the Navajo Water Quality Standards are approved by EPA. These reports shall briefly document for the previous calendar year the effectiveness of the terms and conditions and locations of listed species observed, and, if any are found dead, the suspected cause of mortality. The report shall also summarize tasks accomplished under the proposed minimization measures and terms and conditions.

1.3 The EPA shall require the Navajo Nation to include whole effluent toxicity testing (WET) in all NPDES permits that it approves, with a minimum of annual monitoring.

To implement reasonable and prudent measure #2:

2.1 Pursuant to CWA section 303(c), EPA shall require the Navajo Nation to adopt the January 2001 methylmercury human health criterion update (EPA-823-R-01-001; 0.002 ug/L total recoverable) as a chronic mercury wildlife criteria that is protective of threatened or endangered species in the next triennial review of the NNWQS.

2.2 EPA shall monitor the prey base of the bald eagle for mercury concentrations.
- i) Monitoring would occur under the EPA Priority Pollutant Sampling Program with the Navajo Nation EPA from 2001 until the next triennial review.

To implement reasonable and prudent measure #3:

3.1 Until sediment guidance are developed, the EPA shall adopt ecological safeguards where an endangered or threatened species exists downstream from a discharger to insure the safety of these species.
- A. Ecological safeguards shall include at least one of the following analyses: sediment guidelines, biocriteria, bioassessment, effluent and ambient toxicity testing, or residue-based criteria in shellfish.
- B. A site specific translator may be used, but must be determined on site specific effluent and ambient data.

3.2 EPA shall continue to develop sediment criteria guidelines for cadmium, copper, lead, nickel, and zinc and issue clarifications.

To implement reasonable and prudent measure # 4:

4.1 The EPA shall require the Navajo Nation to strengthen its antidegradation policy by developing implementation procedures to insure that the waters of the Navajo Nation are not compromised. Implementation procedures specific to the antidegradation rule need to be developed and applied within one year of program adoption. The implementation procedures should include language that specifies chemical, physical, and biological methods of monitoring and assessment.

4.2 The EPA shall require the Navajo Nation to establish boundaries for mixing zones. Ecological factors need to be considered when granting mixing zone permits. Mixing zone boundaries need to be clearly defined.
i) Coordinate the derivation of guidance for mixing zone boundaries with the Service.
ii) The discharge outfall needs to maximize dilution of treated wastewater at the point of entry into the surface water.

4.3 The decision making scheme for approval of mixing zones needs to include a section that considers the ecological impacts of the point source discharge.
i) Consider the following factors when reviewing an application for a mixing zone: sediment deposition, bioaccumulation, bioconcentration, predicted exposure of biota and the likelihood that resident biota will be adversely affected, whether there will be acute toxicity in the mixing zone, the known or safe predicted safe exposure levels for the pollutant of concern, the size of the mixing zone, location of the mixing zone relative to biologically sensitive areas in the surface water, concentration gradient in the mixing zone, the physical habitat, the potential for attraction of aquatic life to the mixing zone, and the cumulative impacts of other mixing zones and other discharges to the surface water.

4.4 Implementation procedures shall be developed which will insure that the narrative and numeric water quality standards set forth in the Navajo Nation Water Quality Standards are enforced before the next triennial review.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The EPA must immediately provide an explanation of the causes of the taking and review with the AESO the need for possible modification of the reasonable and prudent measures.

Upon locating a dead, injured, or sick bald eagle, Colorado pikeminnow, humpback chub, or razorback sucker, initial notification must be made to the Service's Law Enforcement Office, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona (telephone: 480/835-8289) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. We recommend that the EPA, in cooperation with the Service and other appropriate parties, conduct research on the toxic effects of mercury, to the reproduction of fish-eating birds using appropriate surrogate species. Research should include the most toxic forms of mercury and include sensitive life stages and exposure protocols that include dietary routes of exposure to females and maternal transfer as a route of embryonic exposure.

2. We recommend that the EPA conduct research to develop a tissue-based criterion for mercury protective of reproduction of aquatic dependent fish and wildlife species on the Navajo Nation.

3. We recommend that the EPA use existing authorities to develop or require testing to develop site-specific bioaccumulation factors for mercury to assess risk of mercury exposure to bald eagles throughout the Navajo Nation.

4. We recommend that the EPA conduct toxicity tests in waters where particulate concentrations are high and dissolved metal concentrations are low. These studies should ideally include a dietary exposure component (*in situ* studies) to determine the effects of these discharges on the growth, survival, and reproduction on listed fishes.

5. We recommend adopting the EPA chronic ammonia criteria by the next triennial review.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation and conference on the EPA's approval of the Navajo Nation Water Quality Standard outlined in the August 30, 2000, biological evaluation. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if:

(1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The Service appreciates EPA's efforts on this project. For further information, please contact Carrie Marr (x214) or Debra Bills (x239). Please refer to consultation number 2-21-96-F-368 in future correspondence concerning this project.

Sincerely,

/s/ David L. Harlow
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES);
Regional Director, Fish and Wildlife Service, Denver, CO
Field Supervisors, Fish and Wildlife Service, Albuquerque, NM; Salt Lake City, UT

Director, Navajo Environmental Protection Agency, Window Rock, AZ
Director, Navajo Fish and Wildlife Department, Window Rock, AZ
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Table 1. Summary of the Service's determination of effects for Navajo Nation water quality standards and listed species.

Water Quality Standard	EPA effect determination	List "B"
Part I General Provisions	no effect	no effect
Section 201 Antidegradation Policy	not likely to adversely affect	no concurrence; not likely to jeopardize
Section 202 Implementation Plan	not likely to adversely affect	no concurrence; not likely to jeopardize
Section 203 Narrative Surface Water Quality Standards	not likely to adversely affect	concur
Section 204 Designated Use A. Designated use definitions B. Designated use modifications C. Content and location of designated uses	A.& C. no effect B. not likely to adversely affect	concur with contingency that changes to B will be approved on case-by-case basis; concur with A&C
Section 205 Additional Human Health Criteria	no effect	concur
Section 206 Numeric Surface Water Quality Standards	not likely to adversely affect	no concurrence; not likely to jeopardize
Section 207 Sample Collection and Analysis	no effect	concur
Section 208 Variances	likely to adversely affect	is not likely to jeopardize all list B species
Section 209 Wastewater Mixing Zones (perennial water sources only)	likely to adversely affect	is not likely to jeopardize all list B species
Table 204.1 Designated Uses for Navajo Nation Surface Waters	no effect	concur

Water Quality Standard	EPA effect determination	List “B”
Tables 206A. 1-4 Human Health and Agricultural Numeric Surface Water Quality Standards	no effect	concur
Table 206B.1 Standards for Physical Parameters including Fecal Coliform	not likely to adversely affect	not likely to jeopardize
Table 206B.2 Standards for Inorganics, Asbestos, and Radiological Constituents	not likely to adversely affect	concur
Table 206B.3-4 Standards for Ammonia	not likely to adversely affect	no concurrence; not likely to jeopardize fish species.
Table 206B.5-6 Criteria for Metal and Organic Compounds All priority pollutants, except: Mercury Formula based dissolved metals	 not likely to adversely affect likely to adversely affect bald eagle likely to adversely affect razorback sucker, humpback chub, and Colorado pikeminnow	 concur is not likely to jeopardize listed fishes and bald eagle is not likely to jeopardize listed fishes

List “B” = bald eagle, C. condor, MSO, WIFL, razorback, humpback chub, C. pikeminnow, Navajo sedge. Refer to list “B” in EPA’s Biological Evaluation split all of the potentially affected species into those associated/not associated with riparian habitats.