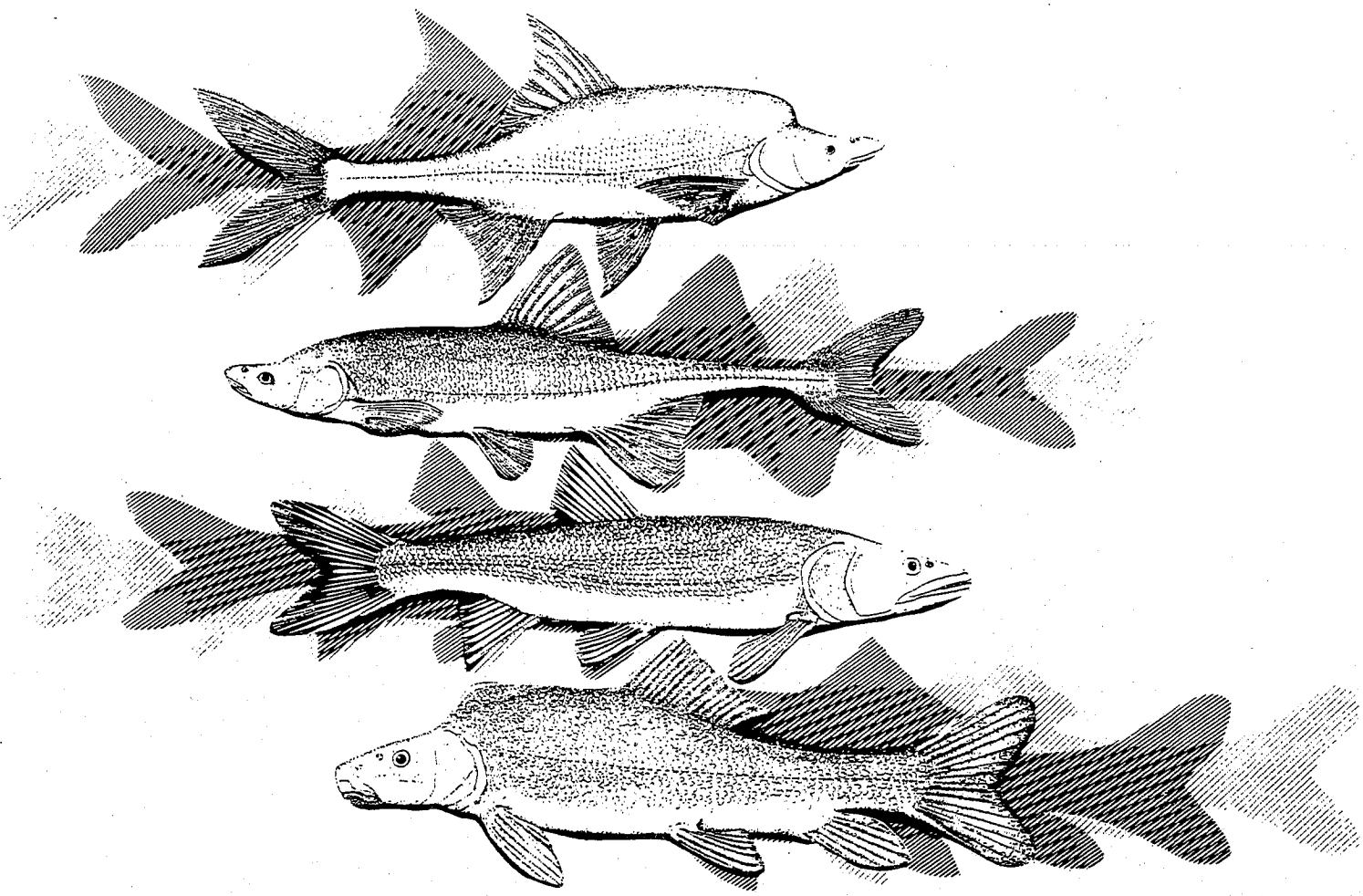


FINAL
ENVIRONMENTAL ASSESSMENT
RECOVERY IMPLEMENTATION PROGRAM FOR ENDANGERED FISH SPECIES IN THE UPPER COLORADO RIVER BASIN

United States Department of the Interior
Fish and Wildlife Service
Region 6, Denver, Colorado

November, 1987

Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin

Environmental Assessment
November 1987

Authorities: Endangered Species Act
Fish and Wildlife Coordination Act
Fish and Wildlife Act

U.S. Fish and Wildlife Service

Department of the Interior
U.S. Fish and Wildlife Service

FINDING OF NO SIGNIFICANT IMPACT FOR A SECRETARIAL DECISION TO APPROVE DEPARTMENT OF THE INTERIOR PARTICIPATION IN A RECOVERY IMPLEMENTATION PROGRAM FOR ENDANGERED FISH SPECIES IN THE UPPER COLORADO RIVER BASIN

The Secretary of the Interior (Secretary) is requested to approve Department of the Interior participation in a Federal/State/private Recovery Implementation Program (program, Proposed Action) for endangered fish species in the Upper Colorado River Basin. The U.S. Fish and Wildlife Service has prepared the attached programmatic environmental assessment to provide an analysis and assessment of impacts to the environment from program implementation.

Based upon the information in the environmental assessment, it has been determined that a Secretarial decision to approve Department of the Interior participation in the Recovery Implementation Program does not constitute a major Federal action having a significant impact on the environment. Actions that can be meaningfully evaluated at this time do not appear to cause significant impacts (See Executive Summary, environmental assessment). Impacts were evaluated using the best available data and assumptions.

In addition, two important observations were made with respect to future impacts:

1. The greatest potential adverse impacts arise from actions taken to comply with existing statutory responsibilities. As described in the environmental assessment, the greatest potential adverse impacts (electrical generation, recreational boating, coldwater sport fish and sportfishing) arise from mandatory actions required under the Endangered Species Act to avert jeopardy to endangered species, and not from discretionary research and recovery activities proposed under the program. The Department of the Interior's participation (or non-participation) in the Recovery Implementation Program will not affect Section 7 consultation requirements and consequent impacts.

   Section 7 consultations are a statutory responsibility of the Secretary. Both the Cooperative Agreement (Item 7) and the "Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin" (Section 3.3) recognize that participation in this program cannot alter the statutory responsibilities of those who choose to participate.

2. The Secretary's approval of Department of the Interior participation in the program affects discretionary research and recovery actions. However, these actions are unlikely to result in significant new

impacts because, in most respects, the Recovery Implementation Program is simply an acceleration of current species management efforts, that is, the "No Action" alternative. With respect to habitat development and maintenance, stocking of rare fish species, control of nonnative fish and sportfishing, and research, data management, and monitoring actions, the two alternatives tend to differ only in the speed of implementation (see Table II-1-B and Appendix B, environmental assessment).

The greatest difference between the Proposed Action and the "No Action" alternative occurs in the area of habitat management actions. A program to acquire and appropriate water rights for instream flows for endangered fishes is what most differentiates the Proposed Action from the "No Action" alternative. This action is not likely to result in significant socioeconomic impacts because it will be a limited program, combined with other forms of instream flow protection, and implemented in cooperation with States and within the context of existing laws and regulations.

If a future action differs substantially from that assumed, or new information becomes available, National Environmental Policy Act review can be reinitiated and revised, prior to implementation. In addition, speculative actions that cannot be meaningfully evaluated at this time can be analyzed at a future date, as necessary, in site-specific National Environmental Policy Act documents.

Robert B. Butterbaugh — NOV. 13, 1987

Regional Director — Date
U.S. Fish and Wildlife Service
Denver, Colorado

EXECUTIVE SUMMARY

A. Purpose

The Secretary of the Interior is requested to approve Department of the Interior participation in a Recovery Implementation Program for three endangered fish species (Colorado squawfish, humpback chub, bonytail chub) and one rare fish species (razorback sucker) in the Upper Colorado River Basin. The Recovery Implementation Program (program) was developed by the Upper Colorado River Basin Coordinating Committee, which is comprised of representatives from the U.S. Fish and Wildlife Service, Bureau of Reclamation, and the States of Colorado, Utah, and Wyoming. Water development and conservation interests also participated. The program is intended to avoid a possible major confrontation between water development and endangered species' instream flow needs. The purpose of this document is to analyze and assess impacts to the human environment from implementing this program.

This document is a programmatic (or umbrella) environmental assessment that discloses potential impacts or areas of concern. It will be supplemented by future, site-specific National Environmental Policy Act documents prepared for individual program actions to ensure thorough environmental review. By staging environmental analysis in this manner, meaningful National Environmental Policy Act analysis is assured for the entire program.

B. Alternatives Evaluated in Depth

Two alternatives were evaluated in depth: the "No Action" alternative and the Proposed Action.

The "No Action" alternative is to continue current Federal and State efforts to conserve the endangered and rare fishes. It is primarily a protection effort that guards the fishes from extinction, and is not considered sufficient to ensure recovery. Its major components are to: continue Section 7 consultation on proposed water projects and operating Reclamation projects, conduct research on and monitor the fish and their habitat needs (as funds permit), and conduct recovery actions (as funds permit).

The Proposed Action is to participate in the Recovery Implementation Program. This program is a cooperative Federal/State/private program that works within the context of State water rights systems to: continue Section 7 consultation, accelerate research efforts, and significantly strengthen and expand recovery and management efforts in order to recover the endangered fishes and manage the razorback sucker so that it does not require the protection of the Endangered Species Act after a 15-year period.

The two alternatives are compared in Tables II-1-A and II-1-B. A complete description of the Proposed Action is available as a separate document entitled "Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin."

C. Affected Environment

The area potentially affected by the Proposed Action includes all of the Upper Colorado River Basin above Glen Canyon Dam but excludes the San Juan River and its tributaries (See Figure III-1).

D. Environmental Consequences of the Alternatives

Prediction of future impacts is hampered by the dynamic, adaptable nature of the Recovery Implementation Program. Program implementation will be influenced greatly by future research results. Many actions cannot be defined in detail until underlying research is completed and various options for implementation are identified. Detailed impact analyses were possible only in instances where detailed assumptions could be developed and justified. Generalized impact analyses were prepared when detailed, justifiable assumptions could not be developed. Table ES-1 summarizes impacts. Major conclusions are as follows:

1. The Proposed Action is expected to have:

   a. Positive impacts on rare and endangered fishes and future water development in the Upper Basin.

   b. Negative impacts on nonnative warmwater fish species which compete with or prey on endangered fishes and which can be affected by control measures. This may affect warmwater sportfishing for these species.

   c. Negative impacts on power revenues (in the short term) and on regional electricity rates (in the long term). These might be offset by future measures to reduce impacts, such as allowing operational flexibility at Flaming Gorge Dam.

   d. Mixed impacts (i.e., both positive and negative impacts, depending on location, time of year, and other variables) on nonnative coldwater sport fishes, coldwater sportfishing, recreational boating, and pumping costs for waterfowl management areas.

   e. Unpredictable, but likely minimal, impacts on nonendangered warmwater native fishes and irrigation-associated riparian habitat.

   f. Neutral, redistributional impacts (changes that are neither positive or negative in value) on Federal water management, water rights, and natural riparian habitat.

   g. No or minimal impacts on water quality, channel maintenance, coldwater native fishes, terrestrial wildlife, other endangered and threatened species, candidate species, and archaeological/ cultural resources.

2. Overall, the greatest potential adverse impacts arise from nondiscretionary actions required under Section 7 of the Endangered Species Act. These nondiscretionary actions are common to both alternatives. Section 7 consultation will result in flow release recommendations for Federal water projects that avoid jeopardy to endangered fishes. The electrical generation, coldwater sport fish and sportfishing, and recreational boating impacts which arise from refinement of these dams' operations would be identical under both alternatives. Moreover, since refinement of Federal dams' operations account for all or most of the impacts in the above-mentioned areas, there is ultimately no difference or very little difference between the two alternatives' impacts on electrical generation, coldwater sport fish and sportfishing, and recreational boating.

3. Activities contemplated under the two alternatives are often the same or similar (see Table II-1-B), hence, impacts are correspondingly the same or similar (see Table ES-1). If one compares the future with the Recovery Implementation Program (Proposed Action) and the future without the Recovery Implementation Program ("No Action" alternative), this "with/without" analysis would show that the added benefits of the Proposed Action are achieved with relatively small additional costs to the human environment.

E. Consultation and Coordination with Others

The Recovery Implementation Program was developed by the multi-interest Upper Colorado River Basin Coordinating Committee, with the assistance of water development and conservation organizations. The preliminary draft was circulated to 59 organizations, and the public review draft was circulated to 109 organizations for review and comment. A Notice of Intent was published in the Federal Register to scope out issues and solicit public comment to assist in preparation of the environmental assessment. The major issues surfaced during these review processes are summarized in Chapter V.

Table ES-1
Impact Findings of Environmental Assessment
Executive Summary1/

Potentially Affected Resource	Impacts of the Proposed Action	Impacts of the "No Action" Alternative
A. Water Resources		
1. Water management		
a. Federal	Reclamation dams and reservoirs will refine their operation to protect endangered fishes, resulting in altered storage and releases. (See Table IV-A-2.)	Same as Proposed Action, except Aspinall will not be required to meet an interim 2,000 cfs minimum flow requirement prior to completion of consultation.
b. State and private	Proposed State and private projects requiring Federal authorization will not be required to modify their design or operations because of depletion impacts to endangered fishes. Instead, project sponsors can make a monetary contribution to the recovery program to fund management and recovery actions that would address depletion impacts.	Proposed State and private projects requiring Federal authorization could be required to modify their design or operations and/or provide a monetary contribution toward recovery efforts to offset depletion impacts to endangered fishes.
2. Water rights	Water rights will be purchased by the Program to protect instream flows in rivers not controlled by Reclamation dams.	Section 7 consultation and water acquisition by the private sector will provide water for instream flows in rivers not controlled by Reclamation dams.
	Section 7 consultation will not affect the ability of water developers to use their water rights because of depletion impacts to endangered fishes.	Section 7 consultation could affect the ability of water developers to use their water rights because of depletion impacts to endangered fishes.
	The Secretary of the Interior will not condemn water rights to protect rare fishes covered under this program. There will be no impact on water rights holders, other than those encountered under normal water law administration.	Under extreme circumstances, the Secretary of the Interior may condemn water rights to protect rare fishes from jeopardy, impacting water rights holders.

Table ES-1 (Continued)
Impact Findings of Environmental Assessment
Executive Summary1/

Potentially Affected Resource	Impacts of the Proposed Action	Impacts of the "No Action" Alternative
3. Water quality	No substantial change in water quality is expected.	Same as Proposed Action.
4. Channel maintenance	Assumed flows will have minimal effects on channel erosion and sediment deposition. Slight changes in channel stability may occur.	Same as Proposed Action.
B. Rare and Endangered Fishes	The Colorado squawfish, humpback chub, and bonytail chub will be recovered and taken off the Endangered Species list; the razorback sucker will be managed so that it would not need the protection of the Endangered Species Act. [Note: If the razorback sucker is listed, it will be treated as the other species under the Proposed Action.]	Although the Colorado squawfish, humpback chub, and bonytail chub will be protected from extinction, it is not clear that they will be recovered under this alternative. The razorback sucker may need to be federally listed as an endangered species to prevent its extinction.
C. Native Fishes (other than the rare and endangered fishes)	There will be no impacts to coldwater native fishes in headwaters. Exact impacts to warmwater native fishes are uncertain, though flow changes, habitat development, and control of nonnative fishes may result in minor shifts in species composition and benefits to warmwater native fishes, overall.	There will be no impacts to coldwater native fishes in headwaters. Warmwater native species may decline in abundance as nonnatives continue to proliferate, competing with or preying on native species.

Table ES-1 (Continued)
Impact Findings of Environmental Assessment
Executive Summary1/

Potentially Affected Resource	Impacts of the Proposed Action	Impacts of the "No Action" Alternative
D. Nonnative Fishes (with emphasis on sport fish)	Coldwater fish: The Proposed Action has the potential to benefit or adversely impact coldwater fishes in tailwaters as a result of changes in dam releases. Ruedi releases are expected to cause some loss of brown trout spawning habitat, but the remaining habitat is still greater than the amount necessary to sustain a quality trout population. Flaming Gorge summer releases should benefit the tailwater trout fishery, but enhanced autumn/winter releases might result in a negative impact. Aspinall August-September releases in dry years should benefit the trout fishery downstream.	Coldwater fish: Same as Proposed Action.
	Warmwater fish: The program could have an adverse impact on nonnative fishes identified as "problem" species, i.e., nonnative species known to prey on or compete with the rare and endangered fishes. The degree of impact would depend on the control method used, the species involved, and the intensity of the control effort. However, impacts are not expected to be major.	Warmwater fish: Similar to Proposed Action, i.e., this alternative could adversely impact problem warmwater nonnative fish. However, adverse impacts to problem warmwater fish would occur more gradually than under the Proposed Action.
E. Terrestrial Biological Resources 1. Waterfowl habitat	The assumed flow releases from Flaming Gorge will not affect waterfowl nesting in the spring. Increased autumn flows will benefit migrating waterfowl. Reduced summer flows from Flaming Gorge will likely result in increased pumping costs at waterfowl management areas in average to wet years.	Same as Proposed Action.

Table ES-1 (Continued)
Impact Findings of Environmental Assessment
Executive Summary1/

Potentially Affected Resource	Impacts of the Proposed Action	Impacts of the "No Action" Alternative
2. Natural riparian-wetland habitat	The assumed flow changes are expected to have only minor, redistributional effects on existing riparian-wetland habitat.	Similar to Proposed Action.
3. Irrigation-associated riparian habitat	There is a possibility that some agricultural wetlands might be lost if water for instream flows is purchased from farmers. However, these potential losses could be offset by downstream benefits from water purchases or improvement of other wetlands.	Agricultural wetlands may not be lost as a result of rare fish conservation efforts, but could be lost anyway if farmers decide to sell water for municipal and irrigation uses.
4. Terrestrial wildlife	No significant impacts to stream-associated wildlife species are anticipated from assumed flow changes.	Similar to Proposed Action.
F. Other Endangered and Threatened Species	No significant impacts are anticipated to other listed species (Table III-F-1) from the assumed flow changes. Site-specific actions which might adversely impact other listed species would be preceded by Section 7 consultation to avoid or minimize any adverse impacts.	Same as Proposed Action.
G. Candidate Species	No significant impacts are anticipated.	Same as Proposed Action.
H. Recreational Boating	Ruedi: Increased probability that two reservoir boat ramps will be unusable in July (2 percent) and August (8 percent).	Ruedi: Same as Proposed Action.

Table ES-1 (Continued)
Impact Findings of Environmental Assessment
Executive Summary1/

Potentially Affected Resource	Impacts of the Proposed Action	Impacts of the "No Action" Alternative
	Flaming Gorge: Downstream, whitewater rafters would experience flows 0-100 cfs below the minimal level of acceptable flows (1,500 cfs) 11 percent of the time between Jones Hole and Rainbow Park in August and September in an average year. However, this would be less of a problem in wetter years.	Flaming Gorge: Same as Proposed Action.
	Aspinall: Under worst-case conditions, releases could cause problems in providing recreation-related services in the reservoir, but could make possible some rafting experience in dry years in the Gunnison and Colorado Rivers.	Aspinall: Same as Proposed Action.
	Acquisition of water rights on the Yampa and White Rivers could benefit rafters.	Section 7 consultation may preserve some instream flows.
I. Sportfishing	Coldwater: Impacts to sportfishing would depend on impacts to sport fish populations and fisherman access. As noted in the section on nonnative fishes, impacts to coldwater trout fisheries could range from beneficial to adverse. Therefore, impacts on sportfishing would range similarly. Modified dam releases may also enhance or diminish angler access.	Coldwater: Same as the Proposed Action.
	Warmwater: Warmwater sportfishing opportunities may be reduced. Impacts depend on which species are identified as problem species, the degree to which problem sport fish must or can be controlled, and what specific sportfishing management measures need to be implemented. Impacts are not expected to be significant to important sportfishing opportunities.	Warmwater: Similar to Proposed Action. Impacts to warmwater sport fish may occur more slowly. However, there may be increased control of sportfishing in areas of high incidental take of rare fishes by fishermen.

Table ES-1 (Continued)
Impact Findings of Environmental Assessment
Executive Summary1/

Potentially Affected Resource	Impacts of the Proposed Action	Impacts of the "No Action" Alternative
J. Electrical Power Generation	The assumed flow regimes would result in unavailable generating capacity and/or rescheduled generation at Flaming Gorge and Aspinall, causing a short-term financial loss to Western of $858,451/year. Western would respond by increasing the SLCA-IP rate by 1.1 percent after 1999.	Same as the Proposed Action.
	Since the region is presently experiencing excess capacity, there will be no need to replace the unavailable generating capability until after the turn of the century. If a thermal facility were built as a replacement measure, its annual cost is estimated as $5.8 million, and could cause retail rates to increase as much as 4 percent. However, there may be less costly means to replace the unavailable capacity.	Same as the Proposed Action.
	In addition, if sufficient operational flexibility can be accommodated in the flow regime for Flaming Gorge without causing significant adverse impacts elsewhere, capacity impacts would be eliminated, causing the future retail rate impact to drop below 0.2 percent.	Same as the Proposed Action.
K. Social Concerns	The Recovery Implementation Program would reduce conflict and litigation between endangered species preservation and water development.	There would be increasing conflict and litigation over endangered species preservation and water development.

Table ES-1 (Continued)
Impact Findings of Environmental Assessment
Executive Summary1/

Potentially Affected Resource	Impacts of the Proposed Action	Impacts of the "No Action" Alternative
	Future water development will be facilitated by a Section 7 approach which permits water developers to offset depletion impacts with a monetary contribution toward the recovery program.	Future water development could be hindered by Section 7 consultation which could require a developer to modify project design or operations to avoid depletion impacts to endangered fish.
	The construction planned within the program ($5 million fund for capital expenditures) will have minor, positive impacts on population, employment, and income within the Upper Basin.	Similar to the Proposed Action, though the positive impacts from planned construction would be less.
L. Archeological/Cultural Resources	The assumed flow releases are unlikely to adversely affect archeological/cultural resources.	Same as the Proposed Action.

1/Future actions may be different from those assumed in the environmental assessment. If so, appropriate site-specific National Environmental Policy Act review will be conducted.

TABLE OF CONTENTS

CONTENTS

TABLES

MAPS, FIGURES, AND CHARTS

I. PURPOSE AND NEED

A. Introduction
B. Purpose of the Action
C. Need for the Action

CHAPTER I

PURPOSE AND NEED

A. Introduction

In 1984, the Upper Colorado River Basin Coordinating Committee (Coordinating Committee) was formed to address the issue of endangered species conservation and water development in the Upper Basin. The Coordinating Committee is composed of representatives from the U.S. Fish and Wildlife Service (Service), Bureau of Reclamation (Reclamation), and the States of Colorado, Utah, and Wyoming. Water development interests and conservation groups also participated.

The Coordinating Committee developed a program to conserve three endangered and one rare fish species. The program, known as the "Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin," offers constructive measures to preserve these species while permitting new water development to proceed. The Coordinating Committee has presented the program to the Secretary of the Interior (Secretary) and the Governors of the States of Colorado, Utah, and Wyoming for their consideration and support.

The National Environmental Policy Act of 1969, as amended, and its implementing regulations require environmental analysis of proposed actions before decisions are made or actions taken by Federal officials. Accordingly, this programmatic environmental assessment has been prepared to analyze the environmental consequences of implementing the Recovery Implementation Program, should the Secretary approve Department of the Interior participation.

This programmatic environmental assessment discloses those impacts that can be meaningfully evaluated. Uncertain actions and issues that would be premature to analyze at this time will be analyzed in future site-specific National Environmental Policy Act documents prior to implementation.

B. Purpose of the Action

The goal of the Proposed Action is to recover and delist three endangered fish species (Colorado squawfish, humpback chub, and bonytail chub) and manage a rare fish species which is a candidate for listing as endangered (razorback sucker) so it would not need the protection of the Endangered Species Act. This goal is to be accomplished in a manner that allows water development to proceed and does not disrupt State water rights systems, interstate compacts, and court decrees that allocate rights to use Colorado River water among the States. The Proposed Action is limited to the Upper Basin (excluding the San Juan subbasin) and proposes an initial timeframe of 15 years to accomplish its goal.

C. Need for the Action

The Colorado squawfish, bonytail chub, humpback chub, and razorback sucker were once more abundant in the Upper Basin. However, man's activities have altered the Colorado River system to the detriment of these species. The first three species are now federally listed as endangered species, while the razorback sucker is a candidate for listing. For the purpose of simplifying references, all four species are collectively referred to as rare in this document.

The Service attributes the decline of these native fishes to changes in the Colorado River ecosystem. The dams and reservoirs that regulate the river system have altered historic flows, obstructed migration routes, and created lentic (stillwater) and coldwater habitat. These changes have reduced the carrying capacity of the river for the rare fishes. In addition, many fisheries biologists believe that introduced nonnative species compete with and prey on the rare fishes, further reducing their numbers. A detailed discussion of the imperiled status of these species may be found in this assessment (Section III.B and Appendix A), "Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin" (Section 1.2, Appendix 6.1), "Endangered and Threatened Fishes of the Upper Colorado River Basin" (R.J. Behnke and D.E. Benson, 1983), and in the most current recovery plans for the three endangered fishes.

Section 7 consultation under the Endangered Species Act has been used as the primary means to protect the endangered fishes from extinction. Section 7(a)(2) of the Endangered Species Act requires Federal agencies to consult with the Secretary of the Interior to insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. Authority to conduct consultations has been delegated by the Secretary of the Interior to the Service. If it is determined by the Service that a Federal action is likely to jeopardize a listed species, the Service develops reasonable and prudent alternatives to the action that will avoid jeopardy, where possible.

However, the Service has found it increasingly difficult to develop reasonable and prudent alternatives to avoid jeopardy to the fishes from water depletions in the Upper Basin. If the situation is left unchanged, development in the Upper Basin could enter a period in which reasonable and prudent alternatives that avoid jeopardy to the endangered fish which will allow water development to proceed can no longer be identified. The Upper Basin would then face a wrenching choice: end further water development or petition the Endangered Species Committee to exempt projects that jeopardize the endangered fish from compliance with the Endangered Species Act.

Congress expects a constructive solution. This was made clear in a 1982 amendment adding Section 2(c)(2) to the Endangered Species Act: "It is further declared to be the policy of Congress that Federal agencies shall cooperate with State and local agencies to resolve water resource issues in concert with conservation of endangered species." Since Section 7 consultation is running out of constructive solutions to resolve water-use

conflicts in the Upper Basin, it must be supplemented with additional measures. The Proposed Action, developed through cooperative effort, addresses that need. A discussion of events leading up to the development of the Proposed Action may be found in Appendix A.

II. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

A. Introduction
B. "No Action" (Continue Current Management) Alternative
   1. Conduct Section 7 Consultation on Proposed Water Projects
   2. Conduct Section 7 Consultation on Operating Reclamation Projects
   3. Conduct Basic and Applied Research on Fish and Their Habitat Needs, as Funds Permit
   4. Monitor the Status of the Fish, as Funds Permit
   5. Conduct Recovery Actions, as Funds Permit
C. The Proposed Action
   1. Habitat Management
   2. Habitat Development and Maintenance
   3. Stocking of Rare Fish Species
   4. Nonnative Fish Species and Sportfishing
   5. Research, Monitoring, and Data Management
D. Comparison of the Proposed Action with the "No Action" Alternative
   1. Coordination
   2. Recovery Timeframe
   3. Funding
   4. Recovery Elements
E. Alternatives Considered, But Not Evaluated in Depth
   1. Infeasible Alternatives
   2. Alternatives Which Will Not Accomplish the Recovery Goal

CHAPTER II

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

A. Introduction

Two alternatives are evaluated in depth--the "No Action" alternative and the Proposed Action.

The "No Action" alternative is to continue current Federal and State efforts to conserve rare fish species. It is primarily a protection effort, with research, monitoring, and recovery actions undertaken as resources permit. Although this alternative may guard the fishes from extinction, it is not sufficient to recover the fishes.

The Proposed Action is to participate in the Recovery Implementation Program developed under the auspices of the Coordinating Committee. It is a cooperative Federal/State/private program that works within the context of State water rights systems to:

- -continue the protection effort required under Section 7 of the Endangered Species Act,
- -accelerate the research effort to identify the habitat needs of the fishes and devise effective recovery measures, and
- -significantly strengthen and expand current recovery and management efforts in order to recover the endangered fishes, and manage the razorback sucker so it would not require the protection of the Endangered Species Act after a 15-year period.

Other alternatives were considered but not evaluated in depth. These alternatives, and the reasons they were not given further consideration, are discussed at the end of this chapter.

B. "No Action" (Continue Current Management) Alternative

Under this alternative, Federal and State agencies are assumed to continue current efforts to conserve the fishes, specifically:

1. conduct Section 7 consultation on proposed water projects,
2. conduct Section 7 consultation on operating Reclamation projects,
3. conduct basic and applied research on endangered fish and their habitat needs, as funds permit,

4. monitor the status of these fish, as funds permit, and

5. conduct recovery actions, as funds permit.

This analysis assumes that the "No Action" alternative would be funded at an average level of $1.2 million per year over the next 15 years. The Service contribution is assumed to continue at $600,000/year and the States' contribution is assumed to continue at $200,000/year. As consultation is completed on major Federal facilities (Flaming Gorge Dam, Aspinall Unit) and conducted on smaller Federal facilities in the future, Reclamation's contribution is expected to diminish over the next 15 years as follows: $1.5 million/year in 1987 and 1988, $0.5 million/year in 1989-1991, and $150,000/year in 1992-2001. This averages out to $400,000/year for Reclamation's contribution.

A description of the "No Action" alternative follows:

1. Conduct Section 7 consultation on proposed water projects. Section 7(a)(2) of the Endangered Species Act requires each Federal agency to insure that their actions are not likely to jeopardize the continued existence of any endangered species. If an agency action is likely to jeopardize listed species, the Service suggests reasonable and prudent alternatives to the action, if available. Alternatives are developed on a case-by-case basis, and address depletion impacts (such as flow reductions and corresponding changes in temperature, salinity, and turbidity) and nondepletion impacts (such as obstructions to migration routes, alteration of physical habitat, construction, inundation, or temperature modification from reservoir releases).

   Future Section 7 consultation will be conducted in the manner of present-day Section 7 consultation. Service alternatives will be based on what is known at the time of consultation of endangered fishes habitat requirements in the area of impact, an assessment of impacts expected from project construction and operation (including cumulative impacts), and selection of a "reasonable and prudent" alternative that takes into account project purpose, planned operation, and resources. In seeking reasonable and prudent alternatives, the Service will continue to suggest measures to avoid or compensate for adverse impacts. A variety of measures will be investigated, including (but not limited to) changing the timing, amount, or location of diversions, providing offsetting flows from reservoir reoperation or storage, building fish passage structures, conducting research studies to collect critical information on habitat requirements of endangered fish in affected reaches, and/or improving habitat. In addition, the Service anticipates that monetary contributions for research and recovery measures will be used as a reasonable and prudent alternative for small-volume depletions, but only when other reasonable and prudent alternatives cannot be developed for those projects. However, even with this

array of options, there may be future projects likely to jeopardize the fish for which the Service would be unable to develop reasonable and prudent alternatives.

2. Conduct Section 7 consultation on operating Reclamation projects. The operation of water storage projects by Reclamation constitutes a Federal action which may affect endangered fishes. Therefore, Reclamation is involved in Section 7 consultation to ensure their project operations do not jeopardize endangered fishes. Reclamation has sponsored, and is continuing to sponsor, studies to determine the effects of their operations on endangered fishes. After research efforts identify the specific flow and habitat needs of the endangered fish, the Service and Reclamation will examine the data and, where necessary, determine the degree to which Reclamation project operations will be refined to protect these fish.

   Four existing Reclamation projects have recently completed or are scheduled for consultation in the near term and will, if necessary, refine their operations to protect endangered fishes: Green Mountain, Ruedi, Flaming Gorge, and Blue Mesa Reservoirs. Consultation has just been completed on water sales proposed from Green Mountain Reservoir and on a second round of water sales proposed from Ruedi Reservoir. Research investigations began in 1985 on the impacts of Flaming Gorge Reservoir operations on endangered fishes, with consultation planned to be completed in 1989. Consultation on Blue Mesa Reservoir will be scheduled for completion following completion of the Flaming Gorge biological opinion.

   Since Section 7 consultation (and National Environmental Policy Act compliance) has not been completed on the latter two projects, there are no definitive data on how these dams will be operated in the future to protect endangered fish. However, assumptions on future flow releases have been developed for purposes of analysis. Presented in Table IV-A-2, these figures represent the best assumptions on future flow releases that can be made at this time.

   Other existing Reclamation projects will be consulted on in the future. As yet, it would be premature to speculate on when consultation will occur or what refinements might be requested.

3. Conduct basic and applied research on fish and their habitat needs, as funds permit. The Service and Reclamation will continue efforts to identify essential habitats and delineate their physical characteristics. Researchers also plan to examine ecosystem relationships (e.g., interspecific competition, primary and secondary productivity), develop computer models that simulate river conditions under alternative flow management scenarios, and evaluate the feasibility and effectiveness of various recovery techniques (e.g., using "grow-out ponds" [artificial rearing areas] to produce fish). These studies will also identify options for hydrologic flexibility within the system while protecting the fish and their habitat.

4. Monitor the status of the fish, as funds permit. The Service, Reclamation, and the States of Colorado and Utah will continue to participate in an interagency standardized monitoring program for endangered fish populations in essential habitats of the Upper Basin. Data will be compiled into a centralized data base for use by all parties in evaluating species status and trends and for developing specific recovery goals for listed fish. If data indicate that the razorback sucker is nearing extinction, it would be listed as an endangered species.

5. Conduct recovery actions, as funds permit. Though recovery actions have an equal priority with protective and research actions, the high cost of many recovery actions tends to limit their implementation. Recovery actions will be undertaken after research has been completed and when funds permit. Examples of recent and near-term recovery actions include: The State of Colorado modified its fishing regulations to reduce incidental take of rare fishes. The State of Utah is undertaking information and education programs. A feasibility study was completed on an experimental fish passage facility at Redlands Diversion Dam near Grand Junction, Colorado. Both hatcheries and grow-out ponds are being evaluated as fish rearing areas.

   If funding is available, and research demonstrates that these actions are beneficial, and the States are cooperative, then recovery actions such as creation or enhancement of essential habitat and management of nonnative species will be undertaken at a later date. However, though releases from Federal water projects appear to be a promising source of water for instream flows, the outlook for acquiring water from private sources appears dim unless Congress appropriates additional funding and States are willing to protect any acquired instream flows under State law.

All activities described above will be reviewed and conducted in accordance with Federal and State law, including the National Environmental Policy Act, Endangered Species Act, Fish and Wildlife Coordination Act, and National Historic Preservation Act.

C. The Proposed Action

The Proposed Action is a logical extension of the activities described under the "No Action" alternative. It outlines a range of activities determined to be necessary to recover the three endangered fishes and manage the fourth rare fish in the Upper Basin. A Recovery Implementation Committee, composed (at a minimum) of representatives from the Service; Reclamation; the States of Colorado, Utah, and Wyoming; water development interests; and conservation organizations will oversee the recovery program. The Recovery Implementation Committee will develop recommendations for specific recovery actions to be implemented, in accordance with program guidelines and agency authorities. Funds will be provided from agency budgets, special Congressional appropriations, and private contributions. An initial timeframe of 15 years is suggested for program completion.

The Proposed Action is composed of five recovery elements:

1. Habitat management
2. Habitat development and maintenance
3. Stocking of rare fish species
4. Nonnative fish species and sportfishing
5. Research, monitoring, and data management

The Coordinating Committee which developed the program recommended that each element be fully implemented. This means that the Recovery Implementation Committee will fully investigate all actions described in the Proposed Action and members will implement those actions shown to be necessary and effective. For example, a new hatchery for rearing rare fishes will not be constructed unless the research program confirms that hatchery-reared fish will survive and reproduce successfully in the wild, and existing facilities are inadequate to produce fish needed for stocking projects.

The Proposed Action is a dynamic agenda. Although a variety of future actions are described, few actions are defined in detail. The majority of the actions are nonspecific with regard to location, degree, and timing of implementation. They will become specific only after further research is completed and the Recovery Implementation Committee determines the most appropriate course of action. Site-specific National Environmental Policy Act documents will be completed, as appropriate.

The basic components of the Proposed Action are summarized below. A complete description may be found in "Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin," available as a separate document. Additional information on the relative priority, cost, and scope of various program actions can be found therein.

1. Habitat management. Recovery cannot be accomplished without permanent assurance of sufficient flows and habitat. Water and water rights for instream flows must be acquired to meet that purpose. Under the Proposed Action, instream flow needs will be determined, then appropriated or acquired from various sources in a manner consistent with State law, as follows:

   The Service will identify habitat and flow needs of the rare fishes through research efforts in sensitive reaches. The Recovery Implementation Committee will decide on the best means to provide the flows, and recommend such to the Secretary to implement. Water will be acquired as needed on a site-specific basis pursuant to State law. The Secretary will not condemn water rights nor acquire water from other than a willing seller. Possible sources of water include:

   (a) Allocating and releasing water from new and existing water storage projects,

   (b) Refining operations at existing and new Federal reservoirs,

(c) Purchasing or leasing existing water rights and converting these rights into instream flow rights,

(d) Acquiring "excess" water resulting from agricultural water conservation and salinity control projects and converting acquired water into instream flows,

(e) Changing the point of diversion for senior water rights to downstream locations,

(f) Acquiring nontributary ground water that could be pumped and put into streams, or

(g) Applying for original appropriation of instream flows in surface streams.

Positive efforts taken under the Proposed Action would affect Section 7 consultation on future projects. As a prime example, if significant progress were made in acquiring instream flows, future project depletions will be less likely to jeopardize endangered fish, and alternatives other than direct offset of depletions by the project sponsor will be acceptable. Once the program is successfully underway, the Service will agree that indirect depletion impacts can be offset by the contribution of funds to purchase water and implement other recovery activities. Contribution amounts will be proportional to the amount of water depleted, and will cost $10/acre-foot, based on average annual depletion and adjusted annually for inflation. Nondepletion impacts will be subject to Section 7 consultation as described in the "No Action" alternative.

Operating Federal water projects will undergo Section 7 consultation almost exactly as described in the "No Action" alternative. The only difference will be that an interim flow regime will be adopted for Blue Mesa Reservoir. Specifically, it will be operated to ensure a 2,000 cfs minimum flow below the confluence of the Gunnison and the Colorado Rivers an average of 9 out of 10 years until Section 7 consultation was completed.

2. Habitat development and maintenance. Recovery of the rare fish could be furthered by developing or enhancing specific habitat areas. Untested habitat development and enhancement techniques will be studied and applied experimentally to determine if rare fishes will use developed habitat and if such techniques contribute to recovery. Based on the best available knowledge at this time, major areas of investigation will be as follows:

Backwaters are thought to provide nursery and feeding habitat for young-of-year Colorado squawfish, and could be created by manipulating river flow or by constructing artificial backwaters.

Available spawning habitat could be increased by improving access to potential spawning areas in river segments that are apparently not

being used (e.g., by providing fish passage structures); reintroducing eggs or larvae into unoccupied spawning habitat; modifying instream characteristics to create new spawning habitat; or constructing spawning habitat within the natural stream channel or in modified side channels.

Adult squawfish over-winter in runs and embayments. It may be possible to simulate this habitat by building jetties. But, because jetties may also enhance habitat for nonnative predatory fish or reduce shallow ephemeral areas, they should not be constructed in areas that might be occupied by young squawfish subject to predation, or in spawning areas.

Dams have blocked historic migration routes for squawfish, reducing habitat availability. Locations under consideration for constructing fish passage facilities are Redlands, Taylor Draw, or other dams to reestablish Colorado squawfish in parts of their historic range now unoccupied.

3. Stocking of rare fish species. Artificial propagation could provide a means to avoid extinction and enhance populations for recovery purposes. Research will be conducted using hatchery-reared fish. Studies will range from basic species research (e.g., migration behavior, imprinting/homing, spawning, and interaction with wild populations) to fish culture research (e.g., appropriate hatchery loading densities, water requirements, and feeding rates). If results show that disease-free, genetically viable, hatchery-reared fish will survive and reproduce successfully in the wild, a hatchery production program may be used to augment stocks so that self-sustaining populations can become established.

Grow-out ponds could be used as rearing areas for fry and young-of-year fishes. Grow-out ponds in Grand Junction, Colorado have produced Colorado squawfish in 1 year to a size that takes 3 years in the wild.

Existing hatchery facilities will be evaluated to determine if they can produce enough genetically acceptable, disease-free fish for the research program. If necessary, additional capability could be provided through the modification of existing hatcheries or through grow-out ponds. Hatcheries will also be used as refugia for the rare fishes, with emphasis placed on maintaining genetically diverse and viable stock.

If hatchery-reared fish survive and reproduce in the wild, a hatchery production program should be implemented to augment wild populations. Additional hatcheries could be necessary. Due to its precarious status in the Upper Basin, the bonytail chub will be reintroduced immediately. Where it would benefit existing wild populations, consideration will be given to supplementing existing populations of the other three fishes after sufficient research was completed.

4. Nonnative fish species and sportfishing. Many fishery biologists believe competition with and predation from nonnative fish (e.g., largemouth bass, green sunfish, redside shiner, channel catfish) is partially responsible for the decline of the rare fish. Further study will identify nonnative species of concern, the extent of the problem, and potential solutions.

   Competing or predatory nonnative fish may be controlled through several means. River flows might be managed to favor native species. Stocking of nonnatives will continue to be restricted to species and areas where absence of conflict with natives could be demonstrated. It may be feasible to eliminate or remove predatory or competing nonnatives from specific reaches (e.g., backwaters).

   Sportfishing, and management practices enhancing sportfishing opportunities, can be detrimental to the rare fish. Sportfishing practices and regulations will be reviewed for impact on the rare fishes. Studies will be done to determine the extent of incidental take of the rare fishes and how to reduce such take. Information and education programs, angling restrictions, seasonal or permanent closures, and a rigorous enforcement program are some of the measures that have been identified as means to reduce incidental take.

5. Research, monitoring, and data management. Well-defined research, monitoring, and data management efforts will be an integral part of the overall Recovery Implementation Program. Research programs will identify criteria for recovery, test recovery strategies, and examine and evaluate the needs of the fish. Specific research projects will be identified and ranked in order of priority for implementation. Detailed study plans will be developed for each project. Criteria will be developed for each research project to evaluate success and to determine the project's contribution to recovery.

   A monitoring program will track population status and trends for the rare fishes and help define the overall success of the recovery program. If monitoring data indicate that the razorback sucker is verging on extinction, it may be listed as an endangered species and a recovery goal developed. Recovery goals will be quantified, and relative progress toward these goals will be measured.

   A data management system will provide timely analysis of research program data, allow analysis and reporting of monitoring program data, and generally be an information resource for directing management and recovery activities. It will combine existing and future Federal, State, and private data bases.

All actions described above will be reviewed and implemented by the appropriate party in accordance with Federal and State law, including the National Environmental Policy Act, Endangered Species Act, Fish and Wildlife Coordination Act, and National Historic Preservation Act.

D. Comparison of the Proposed Action with the "No Action" Alternative

A tabular comparison of the two alternatives is provided in Tables II-1-A and II-1-B. The two alternatives appear very similar in the types of actions to be undertaken. However, important differences exist, and are discussed below to facilitate understanding:

1. Coordination: The Proposed Action outlines a coordinated Federal/State/private effort overseen by a Recovery Implementation Committee. Under the "No Action" alternative, project sponsors, Federal agencies, and State agencies will coordinate on a case-by-case basis.

2. Recovery timeframe: The Proposed Action sets an initial recovery timeframe of 15 years. Since the "No Action" alternative is primarily a protective effort, no recovery timeframe is specified.

3. Funding:

   a. Special one-time funds: The Proposed Action assumes at least $15 million is provided by Congress for water rights acquisition and construction purposes. Under the "No Action" alternative, special funding is unlikely.

   b. Annual funds: The Proposed Action assumes $2.1 million/year from Federal agencies and $0.2 million/year in total from participating States. The "No Action" alternative assumes $1.0 million/year will be contributed by Federal agencies and $0.2 million/year in total by participating States.

   c. Intermittent funds: Once the program is successfully underway, the Proposed Action will allow all project sponsors to make a monetary contribution to offset indirect depletion impacts. The "No Action" alternative is expected to allow small-volume depleters to offset depletion impacts through monetary contributions, but only if other reasonable and prudent alternatives are not available.

4. Recovery elements:

   a. Water and water rights:

      (1) Condemnation of water rights: Under the Proposed Action, the Secretary will not condemn water. Under the "No Action" alternative, extraordinary circumstances might compel the Secretary to condemn water to avoid jeopardy to the endangered fishes.

      (2) Water acquisition: The Proposed Action will provide the Secretary with the financial resources necessary to purchase or lease water. Under the "No Action" alternative, acquisition of water through purchase or lease arrangements

is unlikely since the necessary funds are assumed unlikely and because the States may not administer instream flow rights.

(3) Water rights acquisition: Under the Proposed Action, States will commit to cooperate in obtaining water rights to protect instream flows. Under the "No Action" alternative, States have no such commitment.

b. Section 7 consultation: Under the Proposed Action, the Recovery Implementation Committee may suggest actions which can be used in Section 7 opinions in the Upper Basin to recover the rare fishes. Assuming the Committee can secure instream flows and reduce the threat posed by depletions, under future Section 7 consultation, depletion impacts can be indirectly offset with a monetary contribution toward the Recovery Implementation Program. The "No Action" alternative does not have a means to counteract the threat posed by depletions other than through the Section 7 consultation process. Because of this, Section 7 biological opinions are likely to pursue direct offset of project depletions, i.e., require project sponsors to offset depletion impacts through physical measures such as changing project design, operation, or by providing offsetting flows.

c. Fish passage facilities: Under the Proposed Action, a special $5 million construction fund will help finance construction of fish passage facilities at sites essential to the recovery of the rare fishes. Under the "No Action" alternative, limited recovery funding will probably constrain construction to one fish passage facility, at best.

d. Actions common to both alternatives--rate of implementation: In general, enhanced cooperation and funding will allow actions to proceed at a faster pace under the Proposed Action than the "No Action" alternative. However, the following should be noted:

(1) Section 7 consultation on operating Reclamation projects is expected to proceed at the same pace under both alternatives. The pace of consultation for these projects is determined more by research needs than funding.

(2) Section 7 consultation on Reclamation projects under construction will examine depletion and nondepletion impacts under the "No Action" alternative, and nondepletion impacts only under the Proposed Action.

(3) Section 7 consultations on proposed water projects are expected to be completed in a more expeditious fashion under the Proposed Action, since it will take less time for the Service to calculate a monetary contribution than formulate a project-specific modification directly offsetting depletion impacts.

(4) Research and recovery actions common to both alternatives will most likely proceed at a slower pace under the "No Action" alternative due to lower funding levels and lesser cooperation. Potential funding levels were used to estimate relative rates of implementation for the two alternatives over the next 15 years (See Appendix B). If the public sector were the sole funding source, research and recovery actions common to both alternatives would proceed 53 percent more quickly under the Proposed Action. However, private sector contributions will supplement public funds under both alternatives. Making certain assumptions on the rate of water project construction and depletion over the next 15 years, the amount of private contributions used to fund flow vs. nonflow measures under the Proposed Action, and the amount of money contributed by small-volume depleters allowed to offset depletion impacts with monetary contributions for conservation measures under the "No Action" alternative, the research and recovery measures common to both alternatives are estimated to be implemented anywhere from 37 to 103 percent more quickly under the Proposed Action than under the "No Action" alternative.

The above estimate is based on relative funding levels for actions common to both alternatives. It is expected that enhanced cooperation between involved parties will result in an even faster pace for the Proposed Action.

The Recovery Implementation Program improves the degree of cooperation, level of funding, the array of recovery actions available, and the timeliness of their implementation. The most critical improvement is the opportunity to obtain and protect instream flows under the States' water rights systems. A high proportion of the funding recommended for the Proposed Action will be used to acquire water rights for instream flows.

Table II-2 summarizes the impacts expected from implementing these alternatives.

E. Alternatives Considered, But Not Evaluated in Depth

The following alternatives were considered but eliminated from further consideration because they were infeasible or did not accomplish the stated goal, i.e., to recover the three endangered fishes and manage the rare fish so that it does not require the protection of the Endangered Species Act, consistent with future water development, State water rights systems, interstate compacts, and court decrees that allocate rights to use Colorado River water among the States.

1. Infeasible Alternatives:

a. No Action (at all). The Endangered Species Act is not permissive legislation. At a minimum, Federal agencies must comply with Section 7 of the Act, which requires each Federal agency to insure

Table II-1-A
Comparison of Administrative and Financial Components of Each Alternative

Component	Alternative 1: Proposed Action	Alternative 2: No Action
Administration	a. Recovery Implementation Committee representing Federal, State, private water development, and conservation interests will oversee implementation of recovery actions for the rare fishes. This committee will make recommendations to the Secretary of the Interior and the States, who will use their independent authorities to make and implement final decisions.	a. There will be no Federal/State/private oversight committee. Instead, agencies and developers will consult with the Service under Section 7 of the Endangered Species Act on a project-by-project basis. Reclamation will ensure its projects are operated to avoid jeopardizing the fish. The States would continue current efforts, as funds permit.
	b. Recovery and delisting timeframe to be 15 years.	b. Indefinite recovery timeframe. Most likely greater than 15 years.
Funding	a. Special:1/ - $10 million water rights fund, initially. - $ 5 million construction funds.	a. Special funds not anticipated.
	b. Annual:1/ - Federal share: $2.1 million/year - States' share: $200,000/year, total	b. Annual:1/ - Federal share: $1.0 million/year (average) - States' share: $200,000/year, total
	c. Intermittent: Private developers will contribute a one-time amount of $10/af.2/ Contributions could also be made by conservation groups and private entities.	c. Intermittent: Some funds could be contributed by water developers to fund conservation measures for endangered fish if no other reasonable and prudent alternatives were available. Contributions could also be made by conservation groups and private entities.

1/Federal and State funding are subject to appropriations.
2/Based on average annual depletion and adjusted annually for inflation.

Table II-1-B
Comparison of Recovery Actions That Will be Undertaken Under Each Alternative

Recovery Action	Action will be implemented under Alternative 1: Proposed Action	Action will be implemented under Alternative 2: No Action
A. Habitat management		
1. Determine necessary instream flows	Yes	Yes, but at a slower pace
2. Evaluate alternative means for providing instream flows:		
a. Allocate and release water from Federal storage projects, e.g., Ruedi Reservoir.	Yes	Yes
b. Refine operations at Federal reservoirs, e.g.,		
(1) Ruedi Reservoir	Yes	Yes
(2) Flaming Gorge Reservoir	Yes	Yes
(3) Blue Mesa Reservoir (Aspinall Unit).	Yes	Yes
c. Purchase or lease existing water rights on a willing seller basis, convert to instream flow rights.	Yes	No1/
d. Acquire "excess" water from agricultural water conservation and salinity control projects, convert water into instream flows.	Yes	Yes2/
e. Change point of diversion for senior water rights to downstream locations.	Yes	Yes
f. Acquire nontributary ground water that could be pumped and put into streams.	Yes	No3/
g. Apply for original appropriation of instream flows in surface streams.	Yes	No3/
h. Federal condemnation of water.	No	Unknown
3. Once obtained, instream flows will be appropriated, acquired, and administered under State law.	Yes	Unknown4/
4. Section 7 consultation:		
a. Depletion impacts:	All project sponsors will be allowed to offset depletion impacts by making a monetary contribution toward the Recovery Implementation Program. Funds will be used to finance research and recovery measures.	Each project will be individually evaluated to determine the best mix of measures to offset depletion impacts, e.g., change timing of diversions, provide flows and/or contribute funds for conservation measures.

Table II-1-B (Continued)
Comparison of Recovery Actions That Will be Undertaken Under Each Alternative

Recovery Action	Action will be implemented under Alternative 1: Proposed Action	Alternative 2: No Action
b. Nondepletion impacts: If the Service finds that a project's nondepletion impacts are likely to jeopardize endangered fishes, it will suggest reasonable and prudent alternatives to offset these impacts.	Yes	Yes
B. Habitat development and maintenance		
1. Create backwaters (to enhance young-of-the-year production) by manipulating river flow or physically constructing backwaters.	Yes	Yes, but at a slower pace
2. Increase spawning habitat by improving access to existing unused areas, reintroducing eggs/larvae into suitable unoccupied habitat, modifying in-stream characteristics to create new spawning habitat, or constructing spawning habitat within the natural stream channel or in modified side channels.	Yes	Yes, but at a slower pace
3. Create wintering habitat by building jetties.	Yes	Yes, but at a slower pace
4. Build fish passage facilities to reestablish Colorado squawfish in parts of their historic range, e.g., above Redlands Diversion Dam, Taylor Draw Dam, or Palisades.	Yes	Yes5/
C. Stocking of rare fish species		
1. Use hatcheries as refugia.	Yes	Yes
2. Raise fish in hatcheries and/or grow-out ponds and use them for basic research studies.	Yes	Yes, but at a slower pace
3. Immediately introduce bonytail chub.	Yes	Yes, but at a slower pace6/
4. Augment existing populations of Colorado squawfish, humpback chub, and razorback sucker through stocking only after artificial propagation techniques have been thoroughly investigated.	Yes	Yes, but at a slower pace6/

Table II-1-B (Continued)
Comparison of Recovery Actions That Will be Undertaken Under Each Alternative

Recovery Action	Action will be implemented under Alternative 1: Proposed Action	Alternative 2: No Action
D. Nonnative fish species and sportfishing		
1. Confine future stocking of nonnative fish shown to pose a threat to rare fishes to areas off the main stem where absence of potential conflict with rare fish can be demonstrated.	Yes	Yes, but at a slower pace
2. For nonnative fish shown to pose a threat to rare fish, investigate feasibility of selectively removing them from areas considered essential to the latter species.	Yes	Yes, but at a slower pace
3. Review sportfishing practices and regulations to reduce the likelihood of incidental take of rare fishes.	Yes	Yes, but at a slower pace
4. Implement an information and education program.	Yes	Yes, but at a slower pace
E. Research, monitoring, and data management		
1. Implement a comprehensive research program.	Yes	Yes, but at a slower pace
2. Track overall status and trends of rare fish populations with a monitoring program.	Yes	Yes, but at a slower pace
3. Establish a centralized data management system.	Yes	Yes, but at a slower pace

1/ Funds for purchasing or leasing water rights are assumed to be unavailable; States may not support instream flows.
2/ Assumed to be from Federal projects only.
3/ It is assumed that the States would be unwilling to administer instream flow rights from unappropriated waters for rare fish.
4/ The Federal Government would attempt to protect instream flows released from Federal projects under State water rights systems. If States are unwilling to administer instream flow rights, other means for protecting instream flows would be pursued.
5/ At one dam site, at best, due to funding limitations.
6/ Unknown whether States would approve stocking of bonytail chub or other rare fish.

Table II-2
Impact Findings of Environmental Assessment1/

Potentially Affected Resource	Impacts of the Proposed Action	Impacts of the "No Action" Alternative
A. Water Resources		
1. Water management		
a. Federal	Reclamation dams and reservoirs will refine their operation to protect endangered fishes, resulting in altered storage and releases. (See Table IV-A-2.)	Same as Proposed Action, except Aspinall will not be required to meet an interim 2,000 cfs minimum flow requirement prior to completion of consultation.
b. State and private	Proposed State and private projects requiring Federal authorization will not be required to modify their design or operations because of depletion impacts to endangered fishes. Instead, project sponsors can make a monetary contribution to the recovery program to fund management and recovery actions that would address depletion impacts.	Proposed State and private projects requiring Federal authorization could be required to modify their design or operations and/or provide a monetary contribution toward recovery efforts to offset depletion impacts to endangered fishes.
2. Water rights	Water rights will be purchased by the Program to protect instream flows in rivers not controlled by Reclamation dams.	Section 7 consultation and water acquisition by the private sector will provide water for instream flows in rivers not controlled by Reclamation dams.
	Section 7 consultation will not affect the ability of water developers to use their water rights because of depletion impacts to endangered fishes.	Section 7 consultation could affect the ability of water developers to use their water rights because of depletion impacts to endangered fishes.
	The Secretary of the Interior will not condemn water rights to protect rare fishes covered under this program. There will be no impact on water rights holders, other than those encountered under normal water law administration.	Under extreme circumstances, the Secretary of the Interior may condemn water rights to protect rare fishes from jeopardy, impacting water rights holders.

Table II-2 (Continued)
Impact Findings of Environmental Assessment1/

Potentially Affected Resource	Impacts of the Proposed Action	Impacts of the "No Action" Alternative
3. Water quality	No substantial change in water quality is expected.	Same as Proposed Action.
4. Channel maintenance	Assumed flows will have minimal effects on channel erosion and sediment deposition. Slight changes in channel stability may occur.	Same as Proposed Action.
B. Rare and Endangered Fishes	The Colorado squawfish, humpback chub, and bonytail chub will be recovered and taken off the Endangered Species list; the razorback sucker will be managed so that it would not need the protection of the Endangered Species Act. [Note: If the razorback sucker is listed, it will be treated as the other species under the Proposed Action.]	Although the Colorado squawfish, humpback chub, and bonytail chub will be protected from extinction, it is not clear that they will be recovered under this alternative. The razorback sucker may need to be federally listed as an endangered species to prevent its extinction.
C. Native Fishes (other than the rare and endangered fishes)	There will be no impacts to coldwater native fishes in headwaters. Exact impacts to warmwater native fishes are uncertain, though flow changes, habitat development, and control of nonnative fishes may result in minor shifts in species composition and benefits to warmwater native fishes, overall.	There will be no impacts to coldwater native fishes in headwaters. Warmwater native species may decline in abundance as nonnatives continue to proliferate, competing with or preying on native species.

Table II-2 (Continued)
Impact Findings of Environmental Assessment1/

Potentially Affected Resource	Impacts of the Proposed Action	Impacts of the "No Action" Alternative
D. Nonnative Fishes (with emphasis on sport fish)	Coldwater fish: The Proposed Action has the potential to benefit or adversely impact coldwater fishes in tailwaters as a result of changes in dam releases. Ruedi releases are expected to cause some loss of brown trout spawning habitat, but the remaining habitat is still greater than the amount necessary to sustain a quality trout population. Flaming Gorge summer releases should benefit the tailwater trout fishery, but enhanced autumn/winter releases might result in a negative impact. Aspinall August-September releases in dry years should benefit the trout fishery downstream.	Coldwater fish: Same as Proposed Action.
	Warmwater fish: The program could have an adverse impact on nonnative fishes identified as "problem" species, i.e., nonnative species known to prey on or compete with the rare and endangered fishes. The degree of impact would depend on the control method used, the species involved, and the intensity of the control effort. However, impacts are not expected to be major.	Warmwater fish: Similar to Proposed Action, i.e., this alternative could adversely impact problem warmwater nonnative fish. However, adverse impacts to problem warmwater fish would occur more gradually than under the Proposed Action.
E. Terrestrial Biological Resources 1. Waterfowl habitat	The assumed flow releases from Flaming Gorge will not affect waterfowl nesting in the spring. Increased autumn flows will benefit migrating waterfowl. Reduced summer flows from Flaming Gorge will likely result in increased pumping costs at waterfowl management areas in average to wet years.	Same as Proposed Action.

Table II-2 (Continued)
Impact Findings of Environmental Assessment1/

Potentially Affected Resource	Impacts of the Proposed Action	Impacts of the "No Action" Alternative
2. Natural riparian-wetland habitat	The assumed flow changes are expected to have only minor, redistributional effects on existing riparian-wetland habitat.	Similar to Proposed Action.
3. Irrigation-associated riparian habitat	There is a possibility that some agricultural wetlands might be lost if water for instream flows is purchased from farmers. However, these potential losses could be offset by downstream benefits from water purchases or improvement of other wetlands.	Agricultural wetlands may not be lost as a result of rare fish conservation efforts, but could be lost anyway if farmers decide to sell water for municipal and irrigation uses.
4. Terrestrial wildlife	No significant impacts to stream-associated wildlife species are anticipated from assumed flow changes.	Similar to Proposed Action.
F. Other Endangered and Threatened Species	No significant impacts are anticipated to other listed species (Table III-F-1) from the assumed flow changes. Site-specific actions which might adversely impact other listed species would be preceded by Section 7 consultation to avoid or minimize any adverse impacts.	Same as Proposed Action.
G. Candidate Species	No significant impacts are anticipated.	Same as Proposed Action.
H. Recreational Boating	Ruedi: Increased probability that two reservoir boat ramps will be unusable in July (2 percent) and August (8 percent).	Ruedi: Same as Proposed Action.

Table II-1 (Continued)
Impact Findings of Environmental Assessment1/

Potentially Affected Resource	Impacts of the Proposed Action	Impacts of the "No Action" Alternative
	Flaming Gorge: Downstream, whitewater rafters would experience flows 0-100 cfs below the minimal level of acceptable flows (1,500 cfs) 11 percent of the time between Jones Hole and Rainbow Park in August and September in an average year. However, this would be less of a problem in wetter years.	Flaming Gorge: Same as Proposed Action.
	Aspinall: Under worst-case conditions, releases could cause problems in providing recreation-related services in the reservoir, but could make possible some rafting experience in dry years in the Gunnison and Colorado Rivers.	Aspinall: Same as Proposed Action.
	Acquisition of water rights on the Yampa and White Rivers could benefit rafters.	Section 7 consultation may preserve some instream flows.
I. Sportfishing	Coldwater: Impacts to sportfishing would depend on impacts to sport fish populations and fisherman access. As noted in the section on nonnative fishes, impacts to coldwater trout fisheries could range from beneficial to adverse. Therefore, impacts on sportfishing would range similarly. Modified dam releases may also enhance or diminish angler access.	Coldwater: Same as the Proposed Action.
	Warmwater: Warmwater sportfishing opportunities may be reduced. Impacts depend on which species are identified as problem species, the degree to which problem sport fish must or can be controlled, and what specific sportfishing management measures need to be implemented. Impacts are not expected to be significant to important sportfishing opportunities.	Warmwater: Similar to Proposed Action. Impacts to warmwater sport fish may occur more slowly. However, there may be increased control of sportfishing in areas of high incidental take of rare fishes by fishermen.

Table II-2 (Continued)
Impact Findings of Environmental Assessment1/

Potentially Affected Resource	Impacts of the Proposed Action	Impacts of the "No Action" Alternative
J. Electrical Power Generation	The assumed flow regimes would result in unavailable generating capacity and/or rescheduled generation at Flaming Gorge and Aspinall, causing a short-term financial loss to Western of $858,451/year. Western would respond by increasing the SLCA-IP rate by 1.1 percent after 1999.	Same as the Proposed Action.
	Since the region is presently experiencing excess capacity, there will be no need to replace the unavailable generating capability until after the turn of the century. If a thermal facility were built as a replacement measure, its annual cost is estimated as $5.8 million, and could cause retail rates to increase as much as 4 percent. However, there may be less costly means to replace the unavailable capacity.	Same as the Proposed Action.
	In addition, if sufficient operational flexibility can be accommodated in the flow regime for Flaming Gorge without causing significant adverse impacts elsewhere, capacity impacts would be eliminated, causing the future retail rate impact to drop below 0.2 percent.	Same as the Proposed Action.
K. Social Concerns	The Recovery Implementation Program would reduce conflict and litigation between endangered species preservation and water development.	There would be increasing conflict and litigation over endangered species preservation and water development.

Table II-2 (Continued)
Impact Findings of Environmental Assessment1/

Potentially Affected Resource	Impacts of the Proposed Action	Impacts of the "No Action" Alternative
	Future water development will be facilitated by a Section 7 approach which permits water developers to offset depletion impacts with a monetary contribution toward the recovery program.	Future water development could be hindered by Section 7 consultation which could require a developer to modify project design or operations to avoid depletion impacts to endangered fish.
	The construction planned within the program ($5 million fund for capital expenditures) will have minor, positive impacts on population, employment, and income within the Upper Basin.	Similar to the Proposed Action, though the positive impacts from planned construction would be less.
L. Archeological/Cultural Resources	The assumed flow releases are unlikely to adversely affect archeological/cultural resources.	Same as the Proposed Action.

1/Future actions may be different from those assumed in the environmental assessment. If so, appropriate site-specific National Environmental Policy Act review will be conducted.

that any action authorized, funded, or carried out by that agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat. In addition, the Federal government must enforce the provisions of Section 9 of the Act which makes taking of listed species illegal unless permitted. If the Service or Reclamation suspended current efforts to protect the endangered fishes, it is expected that conservationists would sue the Secretary under Section 11(g) of the Endangered Species Act and compel resumption of nondiscretionary protective responsibilities.

2. Alternatives Which Will Not Accomplish the Recovery Goal:

Recovery is defined in the endangered fish recovery plans and in the Recovery Implementation Program as maintaining and protecting self-sustaining populations of these species and their natural habitat. Loss and deterioration of habitat, low population numbers, and threats from water development, nonnative species, and incidental take by anglers are all impediments to species recovery.

a. Single-strategy alternatives. Alternatives which address only a single facet of this multi-faceted problem will improve survival prospects but are unlikely to accomplish recovery. At this point in our knowledge of these species, recovery will require research into and actions counteracting all threats, i.e., secure habitat of adequate quality and quantity, enhance population numbers, and reduce threats from water development, nonnative species, and angling. The component strategies within the Recovery Implementation Program were evaluated, and determined incapable of accomplishing recovery when conducted alone. Strategies which enhanced species population numbers would not accomplish recovery as long as sufficient habitat was not secured, or strategies which concentrated on securing sufficient habitat would not accomplish recovery as long as populations were being decimated by factors unrelated to habitat. Appendix C discusses single-strategy alternatives further and explains why they will not accomplish recovery.

b. Federal action only. Under this alternative, the Federal government would attempt to recover the endangered fishes and manage the rare fish using Federal authorities and resources only. It is assumed that the States would not assist in obtaining instream flow rights and that Colorado and Utah law would be interpreted by the States that instream flow rights could be acquired only by the States (Colorado Water Conservation Board, Utah Division of Wildlife Resources). It is also assumed that States would not be motivated to undertake a strong program to control incidental take or problem nonnative fishes. Two scenarios were examined:

(1) Moderate Federal Action. Federal authorities are assumed to be exercised up to, but not exceeding the point, that State authorities conflict with Federal authorities. There is assumed to be the same level of Federal funding as in Proposed Action, except for the $10 million water rights fund.

Under this scenario, Section 7 consultation would preserve fish and habitat to avoid jeopardy from Federal actions, but no more than that. Instream flow rights would not be obtained and future water development projects would run a greater risk of being modified or turned down due to uncompensated depletion impacts to endangered fishes. Section 5 of the Endangered Species Act allows acquisition of water rights, but this authority would not be exercised under this scenario and States are assumed not to cooperate in acquiring instream flow rights. Without the States' cooperation, there would be no permanent protection of instream flows. Section 9 of the Endangered Species Act would allow the Federal government to enforce against take by anglers, but this would be an inefficient, labor-intensive technique compared to preventative measures such as State sportfishing regulations (restrict use of live bait, stipulate temporary or permanent closures at trouble spots, etc.). Threats from nonnative fishes would continue, since Federal actions would be limited by the need for State cooperation or by the constraint of not conflicting with State authorities in order to reduce stocking of problem nonnative fish or to eliminate problem nonnative fish from specific reaches.

In summary, Federal efforts would be insufficient to recover the fishes and future water development may be stymied by the inability to use flow alternatives because there is no assurance of permanent legal protection of instream flows. Threats from angling and nonnative fishes would not be reduced sufficiently. Therefore, this scenario was rejected.

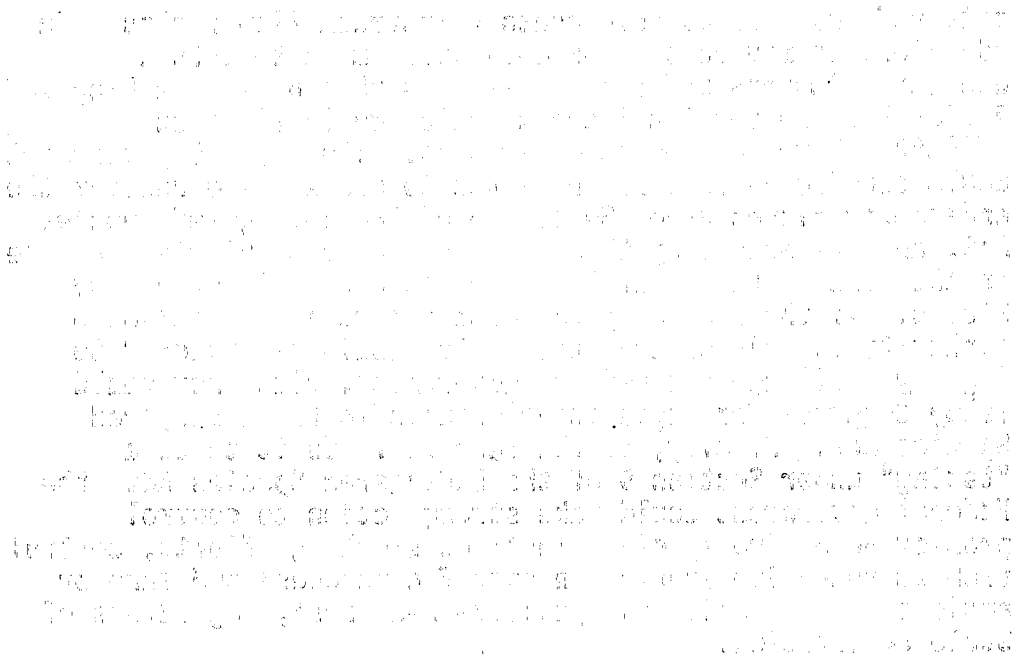
(2) Strong Federal Action. Federal authorities are assumed to be exerted to the maximum extent to protect and recover the fishes, even if this results in State authorities conflicting with the assertion of Federal supremacy powers. The Federal funding level is assumed to be the same as that in the Proposed Action, including the $10 million water rights fund.

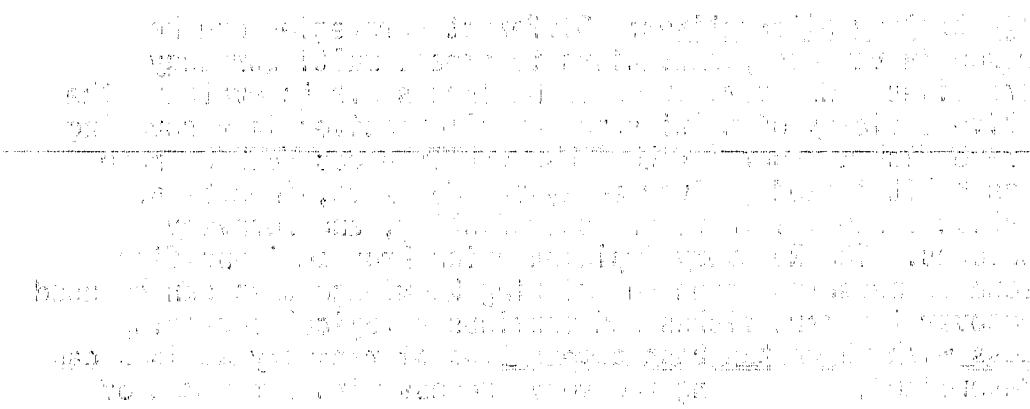
Under this scenario, Section 7 consultation would continue to avert jeopardy to the fish. Although future water development projects would be able to use flow alternatives when there are jeopardy opinions to offset depletion impacts, some projects may be delayed. Delay would result because a project could not make an irreversible or irretrievable commitment of resources before the Federal government

obtained and secured compensatory instream flow rights. In addition, it may cost water developers more to offset depletion impacts under this scenario than under the Proposed Action because Section 7 consultation would focus on offsetting project depletion impacts. The Federal government would acquire Federal water rights to protect and recover the endangered fishes under Section 5 of the Endangered Species Act, and the Supremacy Clause. Instream flow rights would be in the name of the Federal government and administered by States. If the Federal government asserted its Section 5 authority in this manner, the States could be expected to legally challenge the Federal government, plus they could lobby Congress for legislative changes in the Endangered Species Act. Finally, if the Service finds it to be a "taking" under Section 9 of the Endangered Species Act, the Federal government could take strong action to control problem nonnative species (restrict stocking efforts, control problem nonnative species in specific reaches) and take by anglers (preventative and punitive measures), regardless of State cooperation.

Asserting and implementing Federal authority as described above would severely strain certain State-Federal relationships. It would result in major confrontations between the affected States and the Federal government over their respective water management and fish and wildlife management authorities. Finally, this alternative would not be in accord with Congressional policy, stated in the Endangered Species Act, for Federal cooperation with State and local agencies to resolve water resource issues in concert with conservation of endangered species (Section 2(c)(2)). Therefore, this scenario was rejected.

c. Multi-strategy alternatives: Different strategies can be combined in various permutations to create multi-strategy alternatives. However, it would be impossible to evaluate the relative efficacy of multi-strategy alternatives in recovering the rare fish without further research in areas such as rare fishes habitat needs, river ecosystem dynamics, impacts of nonnative fishes, impacts of sportfishing, and recovery techniques. The Recovery Implementation Program identifies reasonable measures based on existing knowledge that can be used to recover the rare fishes and provides a logical screening process with which the best combination of recovery actions can be determined, maximizing recovery success with a minimum of impacts on other resources.





III. AFFECTED ENVIRONMENT

A. Water Resources
   1. Water Management
   2. Water Rights
   3. Water Quality
   4. Channel Maintenance
B. Rare and Endangered Fishes
C. Native Fishes (Other Than the Rare and Endangered Fishes)
D. Nonnative Fishes (With Emphasis on Sport Fishes)
E. Terrestrial Biological Resources
   1. Riparian Habitat, Wetlands, Waterfowl Habitat
   2. Species of Special Concern--Vegetation
   3. Species of Special Concern--Terrestrial Wildlife
F. Other Endangered and Threatened Species
G. Candidate Species
H. Recreational Boating
I. Sportfishing
   1. Coldwater Sportfishing
   2. Warmwater Sportfishing
J. Electrical Power Generation
K. Social Considerations
L. Archaeological/Cultural Resources

CHAPTER III

AFFECTED ENVIRONMENT

The Upper Colorado River Basin is on the west side of the Continental Divide and includes parts of Arizona, Colorado, New Mexico, Utah, and Wyoming. It encompasses an area of 109,580 square miles in the Upper Colorado River drainage. The Proposed Action will affect the Upper Basin above Glen Canyon Dam, but excludes the San Juan River and its tributaries (see Figure III-1).

Following is a detailed discussion of resources within the Upper Basin that potentially could be affected by the Recovery Implementation Program and the "No Action" alternative.

A. Water Resources

The Upper Basin is naturally divided into three major drainage systems: the upper mainstem of the Colorado, the Green, and the San Juan Rivers. Average annual precipitation ranges from over 50 inches in the high elevation headwaters to less than 6 inches in desert areas. Large variations in annual discharge occur due to variations in precipitation and long-term climatic trends. The average natural flow (undepleted) of the Colorado River at Lee's Ferry was 15,328,000 acre-feet for the period 1906 to 1986, with extremes of 24,511,000 acre-feet in 1984 and 5,014,000 acre-feet in 1977. Water storage facilities conserve limited precipitation and release it when needed for agricultural, municipal, and industrial uses. In addition, water storage facilities are managed to provide flood control, hydropower, recreation, and fish and wildlife benefits.

1. Water Management

Water management efforts contemplated in the Proposed Action and "No Action" alternative will affect the hydrologic regime of the Upper Basin.

a. Federal Water Management

Three major Federal water projects represent most of the Federal water management activity in the basin: the Colorado-Big Thompson Project, the Fryingpan-Arkansas project, and the Colorado River Storage Project. These Federal projects have changed riverine conditions, affecting endangered fish. Reclamation has agreed to consult on all existing Reclamation projects in the Upper Basin. Consultation was recently completed for Ruedi Round II/Green Mountain water sales and will be completed in the future for Flaming Gorge Reservoir and the Aspinall Unit.

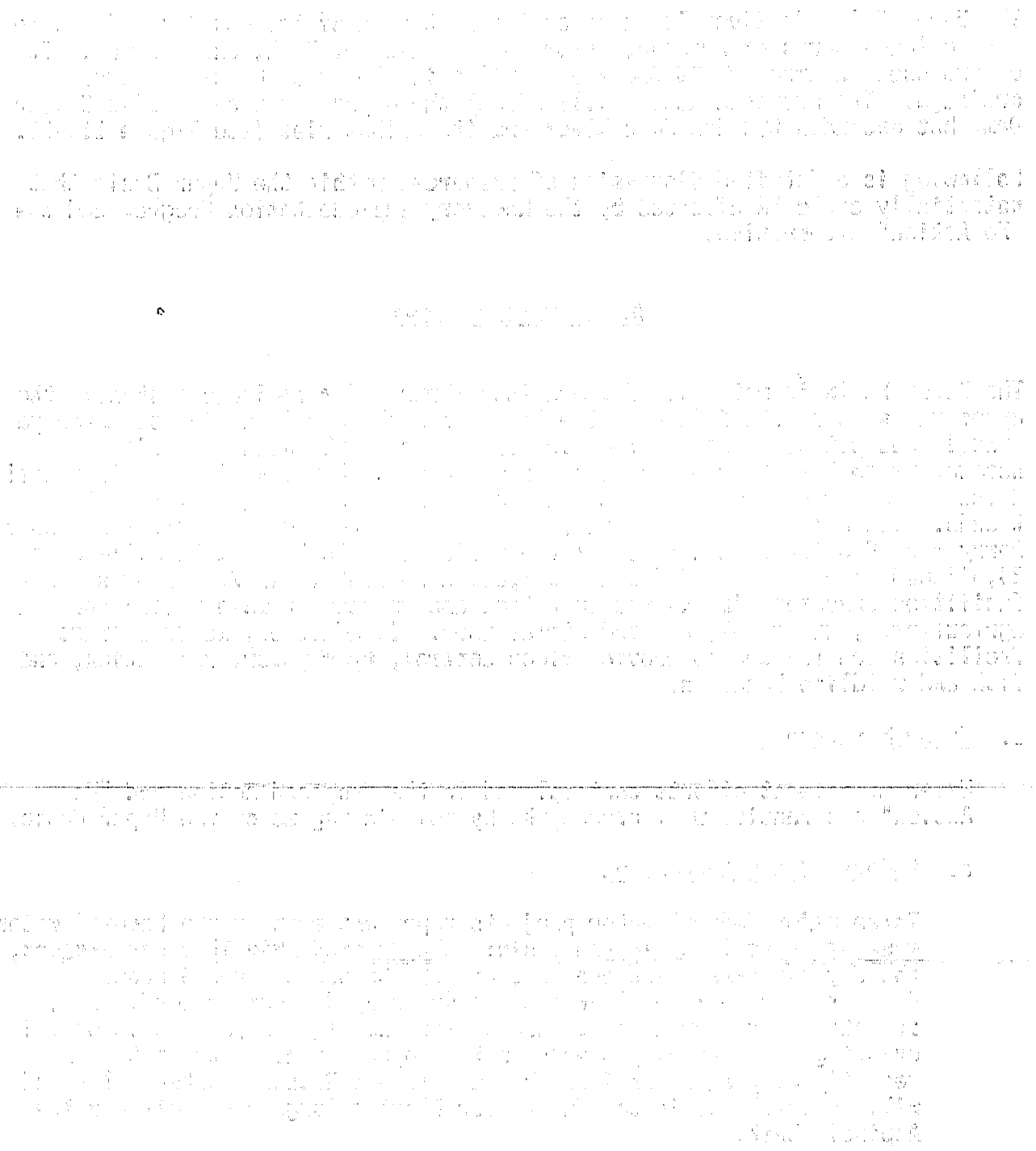
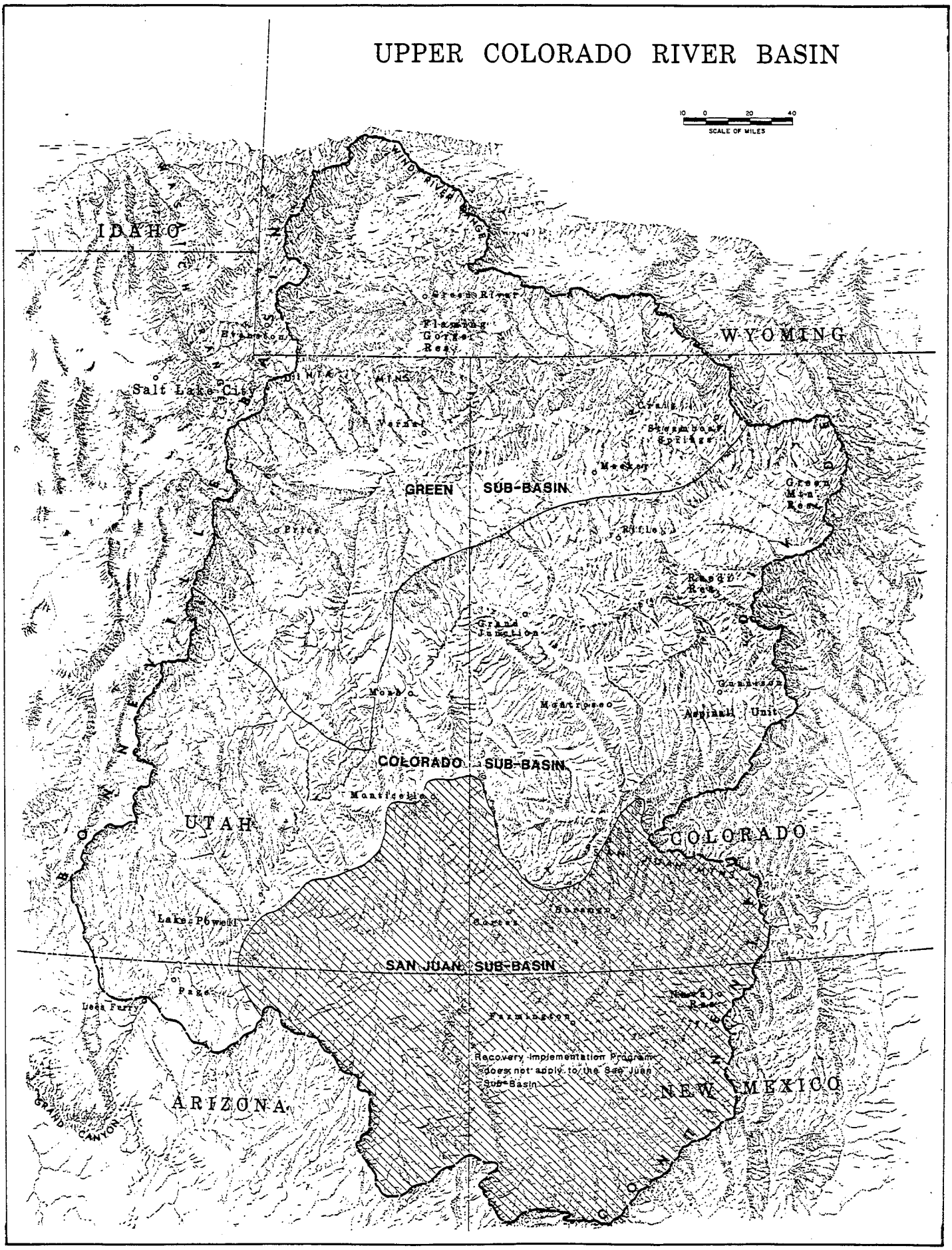
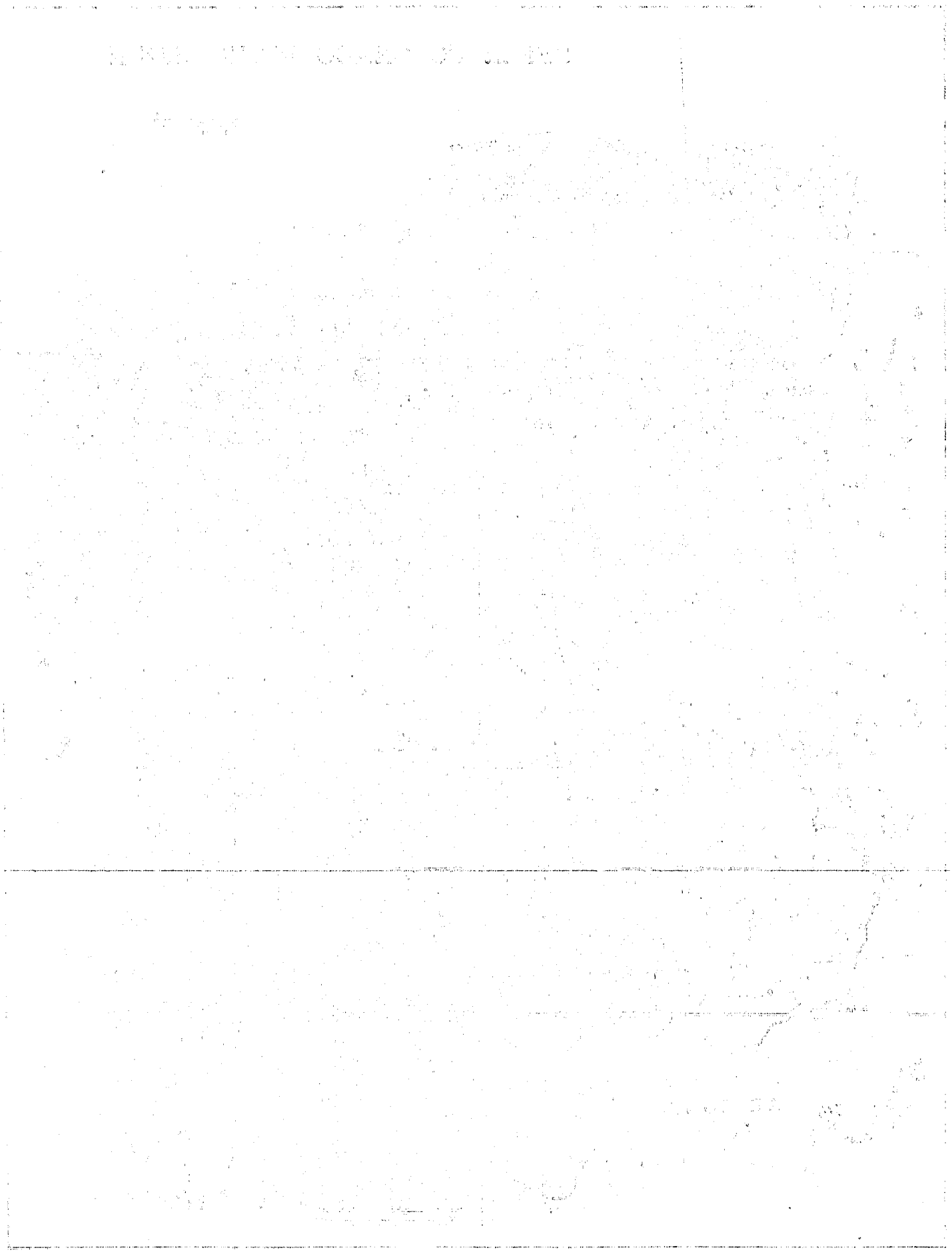


FIGURE III-1


UPPER COLORADO RIVER BASIN
SCALE OF MILES
10 0 20 40
IDAHO
WYOMING
UTAH
COLORADO
ARIZONA
NEW MEXICO
WIND RIVER RANGE
Green River
Flaming Gorge Res.
Evanston
Salt Lake City
Uinta Mts.
Vernal
Rock Springs
Green Mtn. Res.
GREEN SUB-BASIN
Price
Rifle
Grand Junction
Ruedo Res.
Montrose
Gunnison
Aspinall Unit
COLORADO SUB-BASIN
Monticello
Durango
Lake Powell
Cortez
Bluff
SAN JUAN SUB-BASIN
Page
Lees Ferry
Farmington
Navajo Res.
Recovery Implementation Program does not apply to the San Juan Sub-Basin
GRAND CANYON



Ruedi Reservoir is part of the Fryingpan-Arkansas Project and is on the Fryingpan River about 15 miles east of Basalt, Colorado. A second round of water sales planned from Ruedi Reservoir necessitated Section 7 consultation. This consultation was combined with the Green Mountain Reservoir Water Marketing Program consultation. The biological opinion has determined that these water sales would have an adverse impact on endangered fish habitat below Palisade, Colorado, but that it could be offset by releasing 10,000 acre-feet of water from Ruedi Reservoir and/or Green Mountain Reservoir for endangered fish.

Flaming Gorge Reservoir is part of the Colorado River Storage Project. Flaming Gorge Dam is located on the Green River in northeastern Utah about 32 miles from the Utah-Wyoming border. Though the primary purpose of Flaming Gorge Reservoir is to provide water storage to meet compact requirements, releases are made in response to hydropower generation, recreation, and fish and wildlife needs. Historically, once reservoir operating criteria are met, Flaming Gorge releases have been driven by power production, and have ranged from 800 cfs (400 cfs is the legal minimum) to about 4,200 cfs. Since 1985, Reclamation has agreed to an interim flow regime from late July-early October to conserve endangered fish and to allow research on their habitat needs. Each year, specific release patterns are determined during April and May and are based upon runoff forecasts.

Since 1967, August release volumes have ranged from 95,000 to 311,000 acre-feet with an average of 160,000 acre-feet (2,600 cfs daily average) and September release volumes have ranged from 84,000 to 222,000 acre-feet with an average of 135,000 acre-feet (2,270 cfs daily average). During 1985 and 1986, Reclamation agreed to operate Flaming Gorge Reservoir to mimic 1979 and 1980 flow regimes, which were good years for Colorado squawfish recruitment. Between the third week in July and the first week in October, flow releases were held between 800 cfs and 2,600 cfs, with monthly releases not to exceed 100,000 acre-feet. Preliminary data indicate these releases have appeared to benefit Colorado squawfish reproduction.

The Aspinall Unit, formerly known as the Curecanti Unit, is also part of the Colorado River Storage Project and is located on the Gunnison River about 30 miles below Gunnison, Colorado. The Aspinall Unit includes Blue Mesa, Morrow Point, and Crystal Reservoirs. Like Flaming Gorge Reservoir, Blue Mesa Reservoir acts principally as a storage unit, but releases are made to accommodate hydropower, recreation, and fish and wildlife needs. The Service and Reclamation will enter into consultation on the Aspinall Unit when consultation on Flaming Gorge Reservoir is completed, or at an earlier date. As yet, an interim flow regime with conservation flows has not been established, except for the interim regime in the Proposed Action.

b. State and Private Water Management

State and private water projects have been and are being undertaken to develop and use Upper Basin water under the Colorado River Compact. Typically smaller than Federal projects, State and private projects are developed by a number of cooperative agencies. The capacity of these reservoirs rarely exceeds 50,000 acre-feet and average annual depletions range between 25,000 and 35,000 acre-feet. These projects are located on lesser tributaries and are required to undergo Section 7 consultation because of the need for Section 404 permits or because they are to be built totally or partially on Federal lands. Private water management generally involves the construction of small intake structures which divert directly out of the river at a constant rate. There have been a number of these type projects proposed on the mainstem Colorado above Grand Junction which have undergone Section 7 consultation. Typical of these are the oil shale projects which the Service consulted upon in the early 1980's. These projects were evaluated by the Service and depletion impacts were offset by using the "Windy Gap" process described in Appendix A.

c. Future Actions

Over the past 2 years, the Service has developed a computer model of the Upper Basin (excluding the San Juan River). The model was developed to calculate the additive effect of proposed projects on stream flow at various locations in the basin to facilitate Section 7 consultations. The model allows the Service to compare different development scenarios and calculate changes between historic conditions, existing conditions, environmental baseline, and post-Section 7 project conditions. To aid impact analysis in the environmental assessment, the Service has compiled a list of projects which may complete Section 7 consultation by the year 2000. The list of projects for the year 2000 scenario was developed by Reclamation and the Service in cooperation with the Hydrology Subcommittee of the Upper Colorado River Basin Coordinating Committee.

The year 2000 analysis simulates the flow level which would be present in the various rivers after all projects which may complete Section 7 consultation prior to the year 2000 have been completed. Appendix D contains a detailed list of the projects included in the year 2000 scenario and shows monthly flows at selected Upper Basin river locations under different scenarios.

2. Water Rights

Water management in the Upper Basin is governed by interstate compacts, treaties, agreements, and the water rights laws of the several States. The relative scarcity of the resource and its overwhelming importance to the existence of the States, both economically and environmentally, results in an intense interest expressed by the States in the adjudication and regulation of the water resources of the Colorado River.

Though each State has different water laws, all Western States adhere to the doctrine of appropriation. A water right is acquired by the taking of water from the natural streams and the application of the water to a beneficial use. The order of such taking creates a preference which, together with the continued right of use, constitutes the water right. In the past, water rights were acquired through diversions for consumptive uses such as irrigation. Only recently are some States beginning to accept the concept of allowing water rights to be established for instream flows.

Preservation of instream flows to avoid jeopardy to species under Section 7 of the Endangered Species Act could affect the ability of water developers to use their State-created water rights. This potential for conflict between Federal and State law was of sufficient concern as to be one of the reasons for developing the Recovery Implementation Program.

3. Water Quality

The principal water quality issue in the Upper Basin is control of salinity. The Colorado River Basin Salinity Control Act of 1974 established maximum allowable concentrations of dissolved solids in the Colorado River as it enters Mexico. Irrigation return flows, natural discharges of saline water, coal mining operations, and reservoir storage can all contribute to dissolved solids concentrations.

The Service has identified water temperature as a potential problem in some river reaches, such as below reservoirs and in areas with irrigation diversions and return flows. Temperature changes in these areas may affect Colorado squawfish reproduction. This potential problem is being studied by the Service and Reclamation under a research and monitoring agreement.

4. Channel Maintenance

The endangered fishes adapted to a riverbed with areas of silt, sand, gravel, and cobble. Gravel and cobble bed parts of the channel, especially riffles, are essential for spawning. Sand and silt bed parts of the channel, especially backwaters, are utilized extensively by larval and juvenile fishes. Aggregation that results in an all sand bed channel or degradation that results in an all gravel bed channel would eliminate essential habitat for the endangered fish.

Scouring flows prepare river beds for spawning by removing sand and silt and may be requested to maintain the present character of the streambed in areas of concern. Little information exists on scouring and subsequent flows required to transport sediments. Flow requirements for these purposes have not yet been established, but current thinking is that these flows may resemble historic peak flow patterns, though they will likely be of lesser magnitude and shorter duration. Since reservoir storage projects remove peak flows, they may adversely affect channel flushing requirements.

B. Rare and Endangered Fishes

Six endemic fishes are endangered or rare in the Upper Colorado River Basin. The Colorado squawfish, bonytail chub, humpback chub, and Kendall Warm Springs dace are federally listed as endangered (Table III-B-1). Two other fishes not listed, but identified by the Secretary of the Interior as candidates for listing, are the razorback sucker and the Colorado River cutthroat trout. As noted earlier the term "rare" will be applied to encompass both rare and endangered species.

Two rare fishes are confined to restricted geographic areas: the Kendall Warm Springs dace and the Colorado River cutthroat trout. The Proposed Action is not directed toward these species. They are discussed in Sections III.F and IV.F, "Other Endangered and Threatened Species."

The Proposed Action is directed toward the remaining four fish: Colorado squawfish, humpback chub, bonytail chub, and razorback sucker. These warmwater fish inhabit the mainstream and major tributaries of the Green and Colorado Rivers and are considered large river species. The remainder of this discussion describes these species.

The past and present distribution and sensitive areas, geographic areas that are important for various life stages of the Colorado squawfish, humpback chub, bonytail chub, and razorback sucker in the Upper Basin, are illustrated in Figures III-B-1 through III-B-4, respectively. These illustrations, based on the Sensitive Areas Report by the Biological Subcommittee (1984) of the Coordinating Committee and more recent preliminary information and analyses, show the drastic reduction in the range of these fishes. An update to the 1984 Sensitive Areas Report is planned for 1988. The following is a review of present habitats used by these fishes in the Upper Basin (excluding the San Juan River).

Colorado Squawfish

Adult Colorado squawfish use a variety of habitat types, which vary depending on time of year. They use shoreline run, eddy, and backwater habitats during pre- and post-runoff periods. They utilize seasonally flooded bottoms and side canyons, eddies, runs, and backwaters during high flow periods. Adult Colorado squawfish are most abundant in the upper Green River (between the mouth of the Yampa River and head of Desolation Canyon) and lower Green River (between the Price and San Rafael Rivers) (Figure III-B-1). Other concentration areas include the Yampa River, the lower 21 miles of the White River, and the Ruby and Horsethief Canyon area between Westwater, Utah, and Loma, Colorado. Spawning occurs in July-August in the lower 30 miles of the Yampa River and in Gray Canyon in the lower Green River. Suspected spawning sites are shown in Figure III-B-1.

Table III-B-1
Native Fishes of the Upper Colorado River Basin

Family/Common Name	Scientific Name	Status[1]	Abundance[2]
Salmonidae			
Mountain whitefish	Prosopium williamsoni	N	C
Colorado River cutthroat trout	Salmo clarki pleuriticus	E	R
Cyprinidae			
Humpback chub	Gila cypha	E, FE	R
Bonytail chub	Gila elegans	E, FE	R
Roundtail chub	Gila robusta	E	C
Colorado squawfish	Ptychocheilus lucius	E, FE	R
Speckled dace	Rhynichthys osculus	N	A
Kendall Warm Springs dace	Rhynichthys osculus thermalis	E, FE	R
Catostomidae			
Bluehead sucker	Catostomus discobolus	N	A
Flannelmouth sucker	Catostomus latipinnis	E	A
Mountain sucker	Catostomus platyrhynchus	N	C
Razorback sucker	Xyrauchen texanus	E	R
Cottidae			
Mottled sculpin	Cottus bairdi	N	C

1. N = Native, E = Endemic, FE = Federally listed as endangered
2. R = Rare, A = Abundant, C = Common

Young-of-the-year Colorado squawfish are usually captured in shallow backwaters, shoreline habitats with silt and sand substrates and little or no current. High concentrations of juveniles are found in the Green River between Green River, Utah, and the confluence of the Green River with the Colorado River. The highest density of young-of-the-year fish occurs 100-150 miles below the Green and Yampa River spawning areas. A high-density young-of-the-year area also occurs in the upper Professor Valley of the Colorado River.

Humpback Chub

Adult humpback chub occupy canyon habitats over a variety of substrates. Their distribution is primarily restricted to the Colorado River at Black Rocks and Westwater Canyon, Gray Canyon of the Green River, and Yampa Canyon of the Yampa River (Figure III-B-2). Confirmed spawning areas occur at Black Rocks and Yampa Canyon. Spawning occurs between April and July, depending on

FIGURE III-B-1
DISTRIBUTION AND SENSITIVE AREAS OF THE COLORADO SQUAWFISH
IN THE UPPER COLORADO RIVER BASIN, EXCLUDING THE SAN JUAN RIVER SUB-BASIN
(BIOLOGICAL SUBCOMMITTEE, 1984, AND INTERIM REVISIONS)

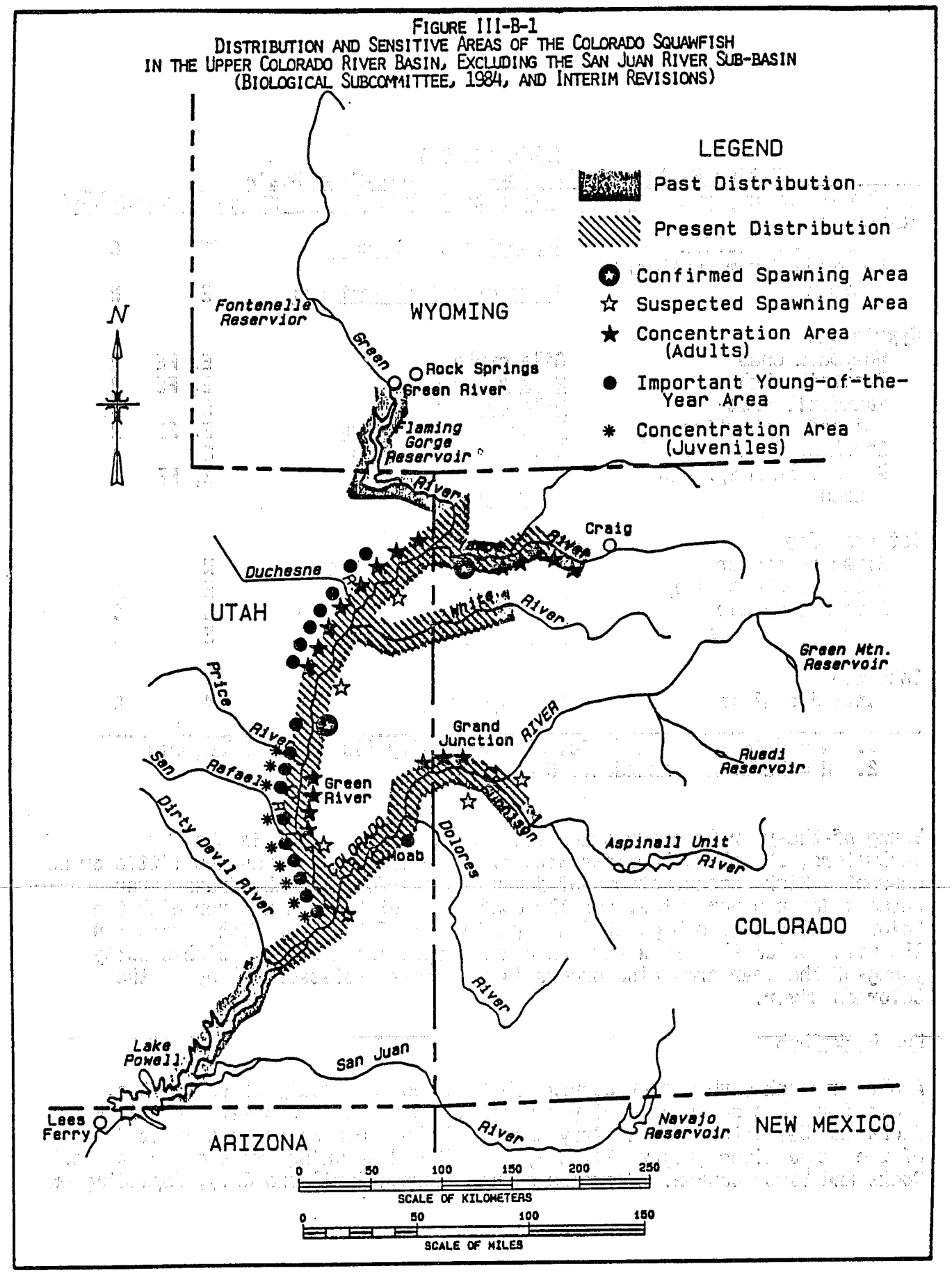


FIGURE III-B-2
DISTRIBUTION AND SENSITIVE AREAS OF THE HUMPBACK CHUB
IN THE UPPER COLORADO RIVER BASIN
(BIOLOGICAL SUBCOMMITTEE, 1984, AND INTERIM REVISIONS)

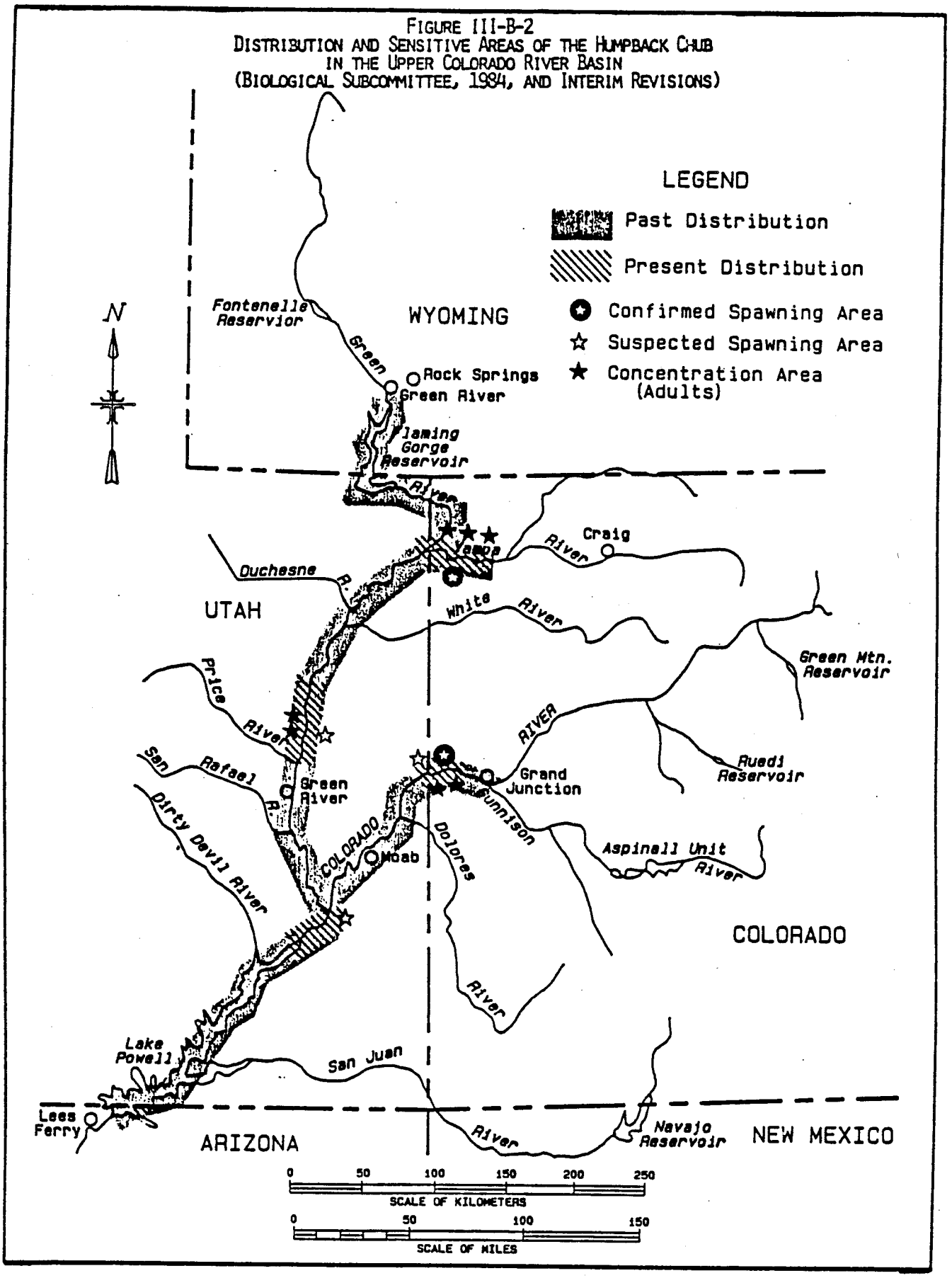


FIGURE III-B-3
DISTRIBUTION OF THE BONYTAIL CHUB
IN THE UPPER COLORADO RIVER BASIN
(BIOLOGICAL SUBCOMMITTEE, 1984)

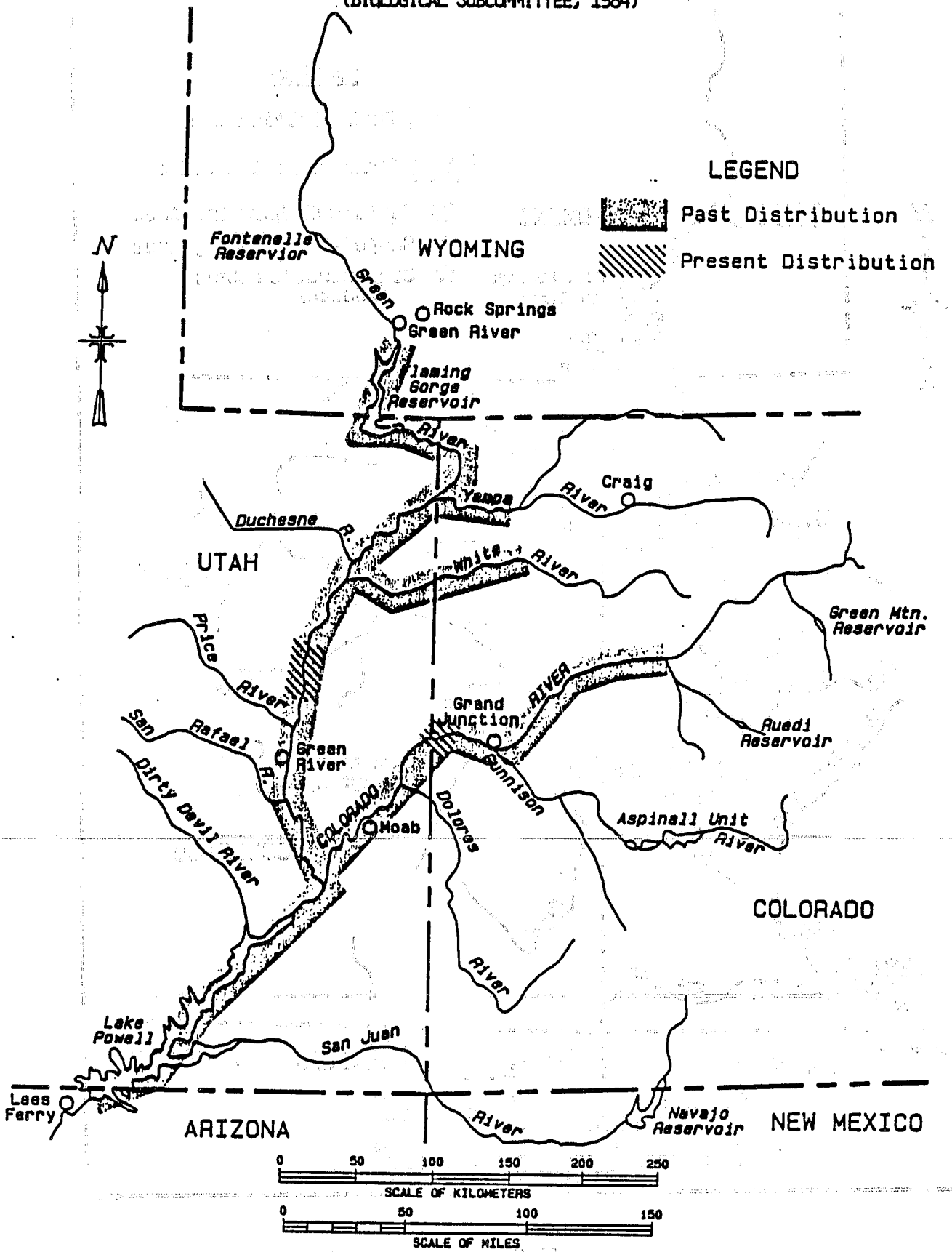
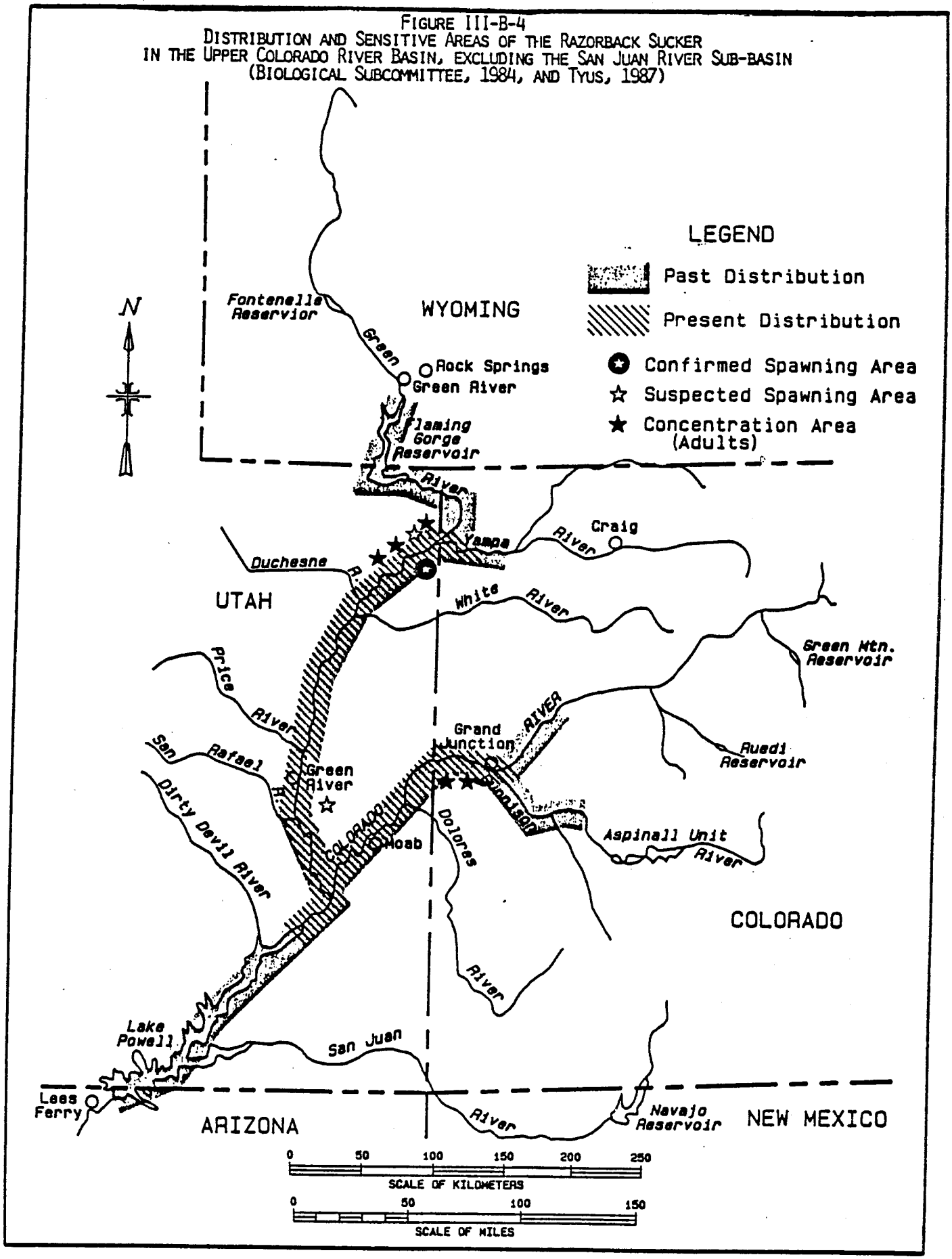


FIGURE III-B-4
DISTRIBUTION AND SENSITIVE AREAS OF THE RAZORBACK SUCKER IN THE UPPER COLORADO RIVER BASIN, EXCLUDING THE SAN JUAN RIVER SUB-BASIN (BIOLOGICAL SUBCOMMITTEE, 1984, AND TYUS, 1987)



water temperature. Because young humpback chub are difficult to distinguish from young roundtail and bonytail chub, the habitat and distribution of young humpback chubs are unknown.

Bonytail Chub

This species is extremely rare; only incidental collections have been made in recent years. Very low numbers may occur in Gray Canyon of the Green River and Black Rocks (Figure III-B-3). The last sightings of fish identified as bonytail chub was a fish captured at Black Rocks on the Colorado River in 1984, a specimen captured from Lake Powell near Page, Arizona, in 1985, and a few observations from the Green River. The habitat requirements of this species are not well known.

Razorback Sucker

Adult razorback suckers are found in a variety of habitats including quiet eddies, pools, and mid-channel runs. They are usually found over a sand or silt substrate but occur over gravel and cobble bars in the spring during spawning. The largest population of razorbacks is in the upper Green River between the confluence of the Yampa River and the confluence of the Duchesne River (Figure III-B-4). Adults also occur in the Colorado River near Grand Junction, Colorado, although numbers there are very low. Spawning is known to occur over sand and gravel bars in the Green River near Dinosaur National Monument and at the mouth of Ashley Creek near Jensen, Utah. Recent collections of several ripe adults from large flooded bottoms in the Green River near Jensen and Ouray, Utah, suggest that fish are either using these sites as staging areas prior to spawning or that they may spawn at these sites. Survival of the young razorback suckers is low. Recruitment is apparently unsuccessful since no young or juveniles have been collected with intensive sampling on the Green and Colorado Rivers since 1979. Several possible explanations for the lack of reports on young razorback suckers include: (1) reproductive failure, (2) predation of eggs and young by nonnative fishes, and (3) competition with nonnative fishes for food and habitat.

C. Native Fishes (Other than the Rare and Endangered Fishes)

Seven species of fish native to the Colorado River are still found in the Upper Basin and are not rare (Table III-B-1). The roundtail chub, flannelmouth sucker, and speckled dace are considered common to abundant. The roundtail chub, present in low numbers in the Green and San Juan Rivers, is present in the Green River above Flaming Gorge Reservoir and the flannelmouth sucker occurs in the reservoir. The mountain whitefish is common in the colder headwater areas of the Green and Colorado Rivers and their major tributaries, and the bluehead sucker is common in the high-gradient warmwater areas. The mottled sculpin and mountain sucker are found in low numbers in most reaches of the Upper Basin, but the sculpin is common only in the Gunnison River. See Tyus et al., (1982: 12-70) for a more thorough coverage of distribution and abundance of native fish.

D. Nonnative Fishes (With Emphasis on Sport Fishes)

Forty-one species from eleven families have been introduced, either intentionally through stocking or accidentally by release of live bait fish, and have become established in the Upper Basin (Table III-D-1) (see Tyus et al. [1982:12-70] for maps showing the distribution of introduced fish in the Upper Basin). Rather than cover all nonnative fish species, this assessment focuses on those nonnative species of greatest interest to the public, i.e., coldwater sport fish found in reservoirs and associated tailwaters, and warmwater sport fish found in the major Upper Basin rivers.

Coldwater Fishes

Three Federal storage projects and their tailwaters could be affected by efforts to manage and protect the endangered fish: Ruedi and Flaming Gorge Reservoirs and the reservoirs that make up the Aspinall Unit. These reservoirs and their tailwaters support rainbow, brown, lake, cutthroat, and brook trout and kokanee salmon. These salmonids occupy coldwater habitats and do not normally coexist with the rare native warmwater fishes. [Note: There may be small "transition zones" with some overlap.]

Flaming Gorge Reservoir provides 42,000 surface acres of habitat for rainbow, brown, lake, cutthroat, and brook trout and kokanee salmon. The Utah "blue-ribbon" tailwater fishery in the 30 miles below Flaming Gorge Dam has rainbow, brown, brook, and cutthroat trout. Ruedi Reservoir (1,000 surface acres) and the Aspinall Unit (10,304 surface acres) both support populations of rainbow, brown, and lake trout and kokanee salmon. The tailwaters of these two reservoirs occur in the Fryingpan River and Gunnison River, respectively, and support good populations of rainbow, brown, and to a lesser degree, brook and cutthroat trout. The Fryingpan River is designated as Resource Category 1 by the Service, being of high value, unique, and irreplaceable on a National basis or in its ecoregion section. The Gunnison River is designated a "Wild Trout Water" by the Colorado Division of Wildlife and supports a naturally reproducing and self-sustaining trout population.

The assumed releases from these reservoirs (see Table IV-A-2) do not go below the minimum streamflows recommended for trout: a flow of 300 cfs in the Gunnison River below Crystal Dam, and 800 cfs in the Green River below Flaming Gorge Dam. Minimum flows vary from 31 cfs from November 1 through April 30 to 110 cfs between May 1 and October 31 in the Fryingpan River.

Warmwater Fishes

Many warmwater sport fish and other nonnative fishes have been introduced into the Upper Basin. Introduced sport fish include channel catfish, bullheads, sunfishes, smallmouth bass, largemouth bass, crappie, striped bass, walleye, yellow perch, and northern pike. Nonnative species (other than sport fishes) established in the Upper Basin include threadfin shad, numerous minnows, suckers, killifishes, darters, and mosquitofish. Many of the nonnative

Table III-D-1
Introduced Fishes of the Upper Colorado River Basin[1/]

Family/Common Name	Scientific Name
Salmonidae	
Coho salmon[2/]	Onchorynchus kisutch
Kokanee[2/]	Onchorynchus nerka
Cutthroat trout[2/]	Salmo clarki
Rainbow trout[2/]	Salmo gairdneri
Brown trout[2/]	Salmo trutta
Brook trout[2/]	Salvelinus fontinalis
Lake trout[2/]	Salvelinus namaycush
Clupeidae	
Threadfin shad	Dorosoma petenense
Esocidae	
Northern pike[2/]	Esox lucius
Cyprinidae	
Carp	Cyprinus carpio
Utah chub	Gila atraria
Leatherside chub	Gila copei
Brassy minnow	Hybognathus hankinsoni
Plains minnow	Hybognathus placitus
Red shiner	Notropis lutrensis
Sand shiner	Notropis stramineus
Fathead minnow	Pimephales promelas
Longnose dace	Rhinichthys cataractae
Redside shiner	Richardsonius balteatus
Creek chub	Semotilus atromaculatus
Catostomidae	
Utah sucker	Catostomus ardens
Longnose sucker	Catostomus catostomus
White sucker	Catostomus commersoni
Cyprinodontidae	
Plains killifish	Fundulus sciadicus
Rio Grande killifish	Fundulus zebrinus

Table III-D-1 (continued)
Introduced Fishes of the Upper Colorado River Basin[1/]

Family/Common Name	Scientific Name
Ictaluridae	
Black bullhead[2/]	Ictalurus melas
Yellow bullhead[2/]	Ictalurus natalis
Channel catfish[2/]	Ictalurus punctatus
Centrarchidae	
Green sunfish[2/]	Lepomis cyanellus
Bluegill[2/]	Lepomis macrochirus
Smallmouth bass[2/]	Micropterus dolomieui
Largemouth bass[2/]	Micropterus salmoides
White crappie[2/]	Pomoxis annularis
Black crappie[2/]	Pomoxis nigromaculatus
Percidae	
Iowa darter	Etheostoma exile
Johnny darter	Etheostoma nigrum
Yellow perch[1/]	Perca flavescens
Walleye[2/]	Stizostedion vitreum
Poeciliidae	
Mosquitofish	Gambusia affinis
Percichthyidae	
Striped bass[2/]	Morone saxatilis
White bass[2/]	Morone chrysops[3/]

1/ The Bonneville cisco (Prosopium gemmiferum) and Bear Lake sculpin (Cottus extensus) were introduced into Flaming Gorge Reservoir (1980-1983) but it is not certain if they will become established.
2/ Denotes sport fish.
3/ Located at the head of the San Juan River in the Animas, LaPlata, and Mancos River drainages (in small reservoirs).

warmwater species, particularly the channel catfish, walleye, northern pike, sunfishes, minnows, and suckers occupy the same areas and are suspected to prey on or compete with the four rare fishes and other native species (see Tyus, et al., 1982:12-70).

For the past few years, the Service has attempted to limit the encroachment of nonnative fish species into the Upper Basin. The Service cannot support stocking of nonnative fish species unless stocking is confined to areas where absence of potential conflict with rare fishes can be demonstrated. For example, the Service will not supply nonnative fish from Service hatcheries for stocking purposes if it is suspected that such action will result in nonnative fish predation on or competition with rare fishes.

E. Terrestrial Biological Resources

1. Riparian Habitat, Wetlands, Waterfowl Habitat

Waterfowl habitat, wetlands, riparian (streamside) and bottomland vegetation and associated wildlife are all closely interrelated components of the terrestrial ecosystem occurring along major rivers of the affected area. Therefore, they are discussed collectively rather than as separate topics.

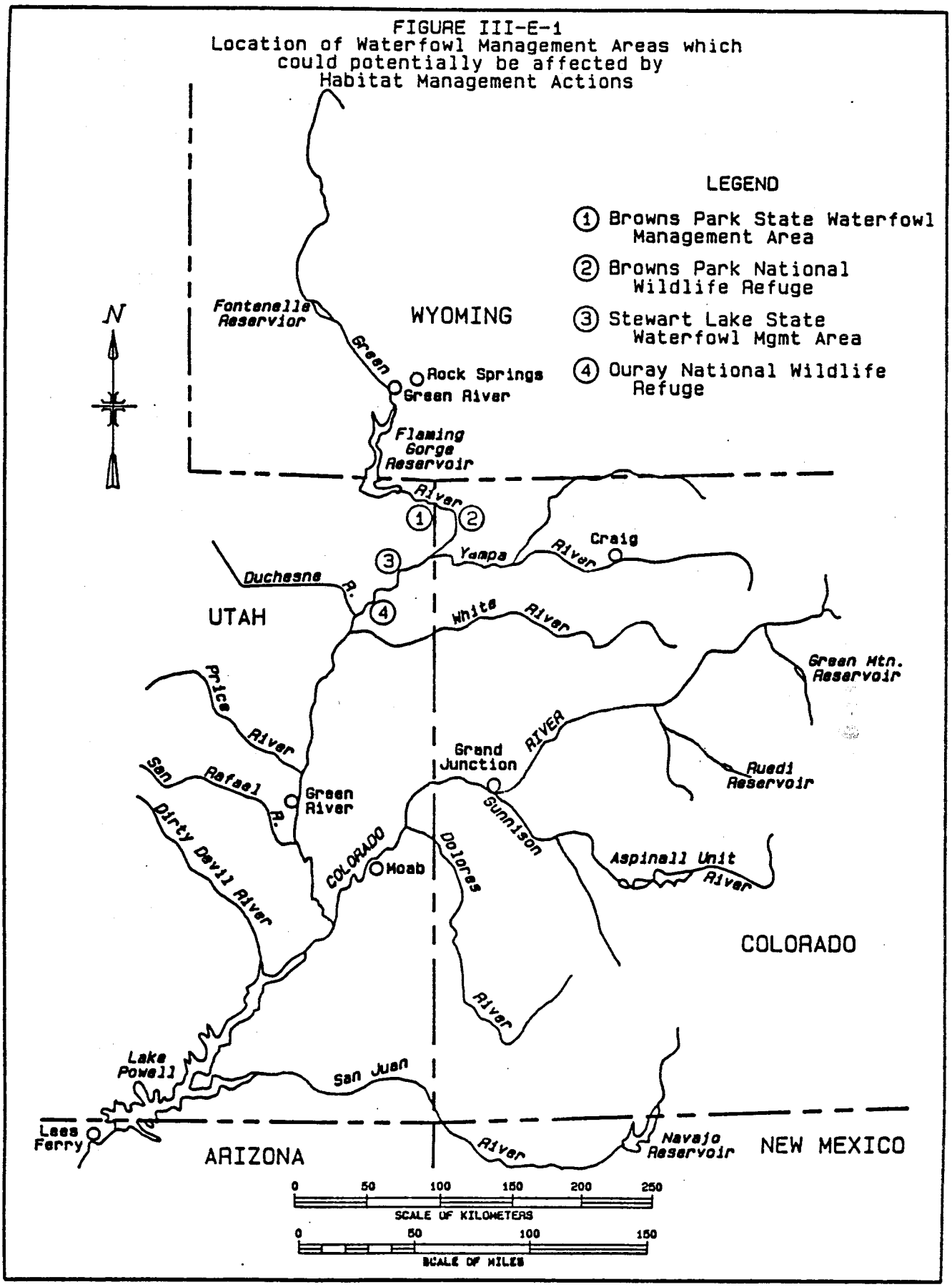
The riparian-wetland vegetation complex is one of the most limited and valuable wildlife habitat types in the Upper Basin. As a narrow belt of relatively lush habitat within an otherwise arid terrain, it is vital to many wildlife species. Cottonwoods provide nesting roosting and perching habitat for raptors, herons, and passerine birds. Numerous mammals use the understory.

Waterfowl nesting habitat occurs naturally on the banks, islands, and flood plains of the major streams and tributaries. In addition, four State and Federal developed waterfowl areas are located on the Green River below Flaming Gorge Reservoir (Figure III-E-1):

1. Browns Park State Waterfowl Management Area consists of two areas totaling 1,800 acres located along the Green River 16 and 23 miles below Flaming Gorge Dam. Waterfowl use the area for nesting, spring and fall migration, and as limited wintering habitat. The area typically has about 250 geese and 2,500 ducks during the winter. The area hosts about 25 to 30 migrating bald eagles, and a few bald eagles winter here. Water sources are the Green River and Crouse Creek. Most water is pumped, but some water is obtained by gravity flow when river flows are high.

2. Browns Park National Wildlife Refuge is located on the Green River 25 miles below Flaming Gorge Dam and occupies 13,375 acres. High quality nesting and migration habitat is provided for Canada geese,

FIGURE III-E-1
Location of Waterfowl Management Areas which could potentially be affected by Habitat Management Actions



ducks, and other migratory birds. Total use by all species exceeds 2 million use-days annually. Peak waterfowl numbers reach 12,000 in the fall and over 10,000 in the spring. About 25 to 30 bald eagles stop over during spring migration, probably the same eagles that also use nearby Browns Park State Waterfowl Management Area. One great blue heron rookery is present. Water sources are the Green River and Beaver Creek.

3. Stewart Lake State Waterfowl Management Area is located adjacent to the Green River near Jensen, Utah, about 80 miles below Flaming Gorge Dam. It occupies about 600 acres, of which 250 acres are covered by Stewart Lake. Marshes on adjacent private lands add to the productivity of the wetland complex. An estimated 700 to 800 ducks, geese, and coots use the lake during spring and summer for breeding activities. Considerably greater numbers of waterfowl use the area during migration. Water is supplied primarily from irrigation drains and Ashley Creek. Occasionally, the lake is flushed by Green River water when flows are exceptionally high.

4. Ouray National Wildlife Refuge is located on the Green River 20 miles south of Vernal, Utah (about 110 miles below Flaming Gorge Dam). It has an area of 11,483 acres along 12 miles of the Green River, including 3,500 acres leased from the Uintah and Ouray Indian Reservation. Fourteen species of ducks and 80 to 100 pairs of Canada geese nest in the area. Larger numbers of migrant waterfowl use the area in spring and fall. The primary source of water is the Green River. The refuge was originally designed to obtain water by pumping, however, subsequent modifications allow some impoundments to be filled by gravity flow during high flow periods.

The two Browns Park waterfowl areas are almost completely dependent on Green River flows released from Flaming Gorge Reservoir. Due to its location, Ouray National Wildlife Refuge is influenced both by Flaming Gorge releases and Yampa River flows. The Yampa River is a relatively unregulated river, and during high runoff periods, its flows may exceed those of the Green River, which is almost completely controlled by Flaming Gorge Reservoir. Stewart Lake Wildlife Management Area normally gets most of its water from irrigation drains and Ashley Creek, so Green and Yampa River flows are not influential except when extreme high flows cause natural flushing of the impoundments, and sometimes physical damage to facilities.

A third category of wetland-riparian habitat has developed incidental to irrigated agriculture. Diversion of water from streams for irrigation, along with other land use practices, eliminated large areas of natural riparian-wetlands habitat. Over a long period of time, however, irrigation drainage and canal seepage have created new wetlands which partially compensate for the historic loss of natural wetlands. These areas are sometimes a considerable distance from the major streams.

Agriculture-associated wetlands have been enhanced by the prevalent practice of overirrigating and the often relatively crude water conveyance

systems. Some of these areas have enough open water to provide waterfowl habitat. Others support trees and dense stands of cattails, rushes, or shrubs and are more valuable as cover and shelter for upland wildlife than for waterfowl. Agriculture-induced wetlands are not influenced significantly by river flows but could be affected by changes in water use.

2. Species of Special Concern--Vegetation

Riparian vegetation is important because of its limited occurrence and high value to wildlife. A conspicuous and especially important element of the riparian ecosystem is the cottonwood tree. Cottonwood trees, especially when occurring in groves, provide important habitat for numerous species of wildlife, e.g., communal roost sites for wintering bald eagles and nesting habitat for great blue herons, raptors, and passerine birds. Many cavity nesting birds nest in cottonwoods. Cottonwoods also provide food for beavers, shade concealment, and thermal protection for mule deer and other mammals.

Stands of cottonwoods have declined in recent years and the trend is still downward. It is generally believed that a major cause behind their decline is dam construction and operation which inhibited cottonwood regeneration by reducing historic high flows and sediment deposition. Preservation of remaining cottonwoods is important because of their high value to wildlife and the long time required for regeneration in the event they are lost. While herbaceous or shrubby vegetation can often recover in a few years, a cottonwood tree requires 50 years or longer to reach the size and maturity needed for some important habitat functions.

3. Species of Special Concern--Terrestrial Wildlife

Cottonwood groves along rivers are used as communal roosts by bald eagles and as nesting and perching habitat by other raptors. Egrets, great blue herons, and night herons nest in cottonwoods. Waterfowl use the riparian zone as nesting and migration habitat. Greater sandhill cranes migrate along portions of the Green and Yampa Rivers and are accompanied by a few endangered whooping cranes from the Grays Lake population. Long, narrow belts of riparian habitat within the otherwise arid environment provide important travel lanes, as well as nesting habitat, for migratory passerine birds.

The river otter once inhabited many streams and lakes of the Upper Basin. Though probably never abundant, the original otters are believed to have been completely extirpated from the State of Colorado many years ago. The river otter is now on the Colorado State list of threatened or endangered wildlife. The Colorado Division of Wildlife has a program for reintroducing otters from the Pacific Northwest and Wisconsin into the otter's historic range in the State. All but one of the stream segments listed as essential habitat for the otter are east of the Continental Divide and will not be affected by the recovery program. The one exception is the Gunnison River from Black Canyon of the Gunnison National Monument downstream to Colorado State Highway 92, and 5 miles upstream on all tributaries within this reach.

F. Other Endangered and Threatened Species

The Service has determined that the listed and proposed species identified in Table III-F-1 may occur within the Upper Basin.

Table III-F-1
Listed and Proposed Species
Which May Occur in the Upper Colorado River Basin

	Occurrence
Listed species	
Black-footed ferret (*Mustela nigripes*)	CO, UT, WY
Utah prairie dog (T)[1/] (*Cynomys parvidens*)	UT
American peregrine falcon (*Falco peregrinus anatum*)	CO, UT, WY
Arctic peregrine falcon (T)[1/] (*Falco peregrinus tundrius*)	CO, UT, WY
Bald eagle (*Haliaeetus leucocephalus*)	CO, UT, WY
Whooping crane (*Grus americana*)	CO, UT, WY
Kendall Warm Springs dace (*Rhinichthys osculus thermalis*)	WY
Colorado squawfish (*Ptychocheilus lucius*)	CO, UT
Humpback chub (*Gila cypha*)	CO, UT
Bonytail chub (*Gila elegans*)	CO, UT
Clay-loving wild-buckwheat (*Eriogonum pelinophilum*)	CO
Jones cycladenia (T)[1/] (*Cycladenia humilis* var. *jonesii*)	UT
Knowlton's hedgehog cactus (*Pediocactus knowltonii*)	CO
Last Chance townsendia (T)[1/] (*Townsendia aprica*)	UT
Maguire daisy (*Erigeron maguirei* var. *maguirei*)	UT
Mancos milk-vetch (*Astragalus humillimus*)	CO
Mesa-verde cactus (T)[1/] (*Sclerocactus mesae-verdae*)	CO
Spineless hedgehog cactus (*Echinocereus triglochidiatus* var. *inermis*)	CO, UT
Uinta Basin hookless cactus (T)[1/] (*Sclerocactus glaucus*)	CO, UT
Wright fishhook cactus (*Sclerocactus wrightiae*)	UT
Proposed species	
Heliotrope milk-vetch (*Astragalus limnocharis* var. *montii*)	UT
San Rafael cactus (*Pediocactus despainii*)	UT
Spreading wild-buckwheat (*Eriogonum humivagans*)	UT
Toad-flax cress (*Glaucocarpum suffrutescens*)	UT

[1/] (T) denotes threatened status for the species. All others are listed or proposed as endangered.

However, with the exception of the avian and fish species, and the Uinta Basin hookless cactus, these species are associated with upland habitat only and would not occur in close association with the major waterways of the Upper Basin. None of the identified components of the Proposed Action or the "No Action" alternative are likely to involve disturbance of upland areas. Therefore, no impacts are likely to the black-footed ferret, Utah prairie dog, clay-loving wild-buckwheat, Jones cycladenia, Knowlton's hedgehog cactus, Last Chance townsendia, Maguire daisy, Mancos milk-vetch, Mesa-verde cactus, spineless hedgehog cactus, Wright fishhook cactus, Heliotrope milk-vetch, San Rafael cactus, spreading wild-buckwheat, and toad-flax cress from either alternative.

Impacts to the three listed fish species (Colorado squawfish, humpback chub, and bonytail chub) are discussed in Section IV.B, "Rare and Endangered Fishes." The following listed species are closely associated with riverine areas and require further discussion regarding the potential for impact from the Proposed Action and the "No Action" alternative: Uinta Basin hookless cactus, Kendall Warm Springs dace, whooping crane, peregrine falcon, and bald eagle.

Uinta Basin hookless cactus. The Uinta Basin hookless cactus occurs in eastern Utah and western Colorado. It currently consists of five populations located along the Green River and its tributaries in Utah, and three populations along the Colorado and Gunnison Rivers in Colorado. The plant occurs at an elevational range of 1,400 to 2,100 meters (4,600 to 6,900 feet) on stony or cobbly, old, alluvial terraces of the Colorado Plateau. The species is not found within the flood plain proper and it is not known to be associated with or be dependent upon any specific characteristics of the river system other than substrate.

Kendall Warm Springs dace. The Kendall Warm Springs dace is restricted to the Kendall Warm Springs area and a short stream segment 300 meters (984 feet) long in the Bridger-Teton National Forest in western Wyoming. The southwest edge of its habitat is a travertine embankment, which appears to represent an effective barrier isolating the dace from the remainder of the Green River basin (Service 1982).

Whooping crane. The Grays Lake flock of whooping cranes migrates each year to wintering grounds in New Mexico (Drewien, 1986). The migrational route of this population involves northeastern Utah, southwestern Wyoming, western and southcentral Colorado, and western and central New Mexico. Individuals of this population may occur within the Upper Basin during the spring and fall as migrants. In addition, a few have begun summering within the Green River Basin in southwestern Wyoming above Flaming Gorge Reservoir and northeastern Utah. Most sightings of whoopers within the Upper Basin involve agricultural land and nonriverine wetlands, and feeding areas primarily involve corn, alfalfa, and barley fields. Some sightings have occurred at Ouray National Wildlife Refuge.

Peregrine falcon. Peregrine falcon habitat may be divided into nesting sites, hunting sites, and migrational and wintering areas (Service 1984). Nesting sites are generally below 2,900 meters (9,500 feet) and are characterized by a

cliff or series of cliffs 60 to 90 meters (200 to 300 feet) in height. While peregrines may forage up to 27 kilometers (17 miles) from their nesting cliffs, hunting habitat is generally found within 16 kilometers (10 miles) of the nest.

Preferred hunting habitat appears to be wetlands, riverbottoms, meadows, croplands such as hayfields, grainfields, orchards, and areas such as gorges, mountain valleys, and lakes over which prey are vulnerable. Open meadows and riparian areas appear to have particular importance to peregrines during the early part of the nesting season. As these areas may become snow-free sooner than other vegetative types, prey species may concentrate in these habitats, providing a more readily available food supply (Service 1984).

Little is known of postbreeding movement of adults or immature peregrines, but individuals are occasionally reported in this region during the winter season. Although they are frequently associated with large rivers and wetland areas during this period, preferred wintering areas are largely undocumented.

A number of peregrine falcon eyries are currently located throughout the Upper Basin. At least three eyries occur on the Yampa River. Two others occur on the Dolores River. Along the Colorado River, at least eight eyries are located above the Green River confluence, approximately seven near or below the Green River confluence, and eight within the Lake Powell area.

Bald eagle. Nesting bald eagles are associated almost exclusively with lakes, rivers, or seacoasts. Fish are generally the major item in their diet, but they will also feed on waterfowl, small mammals, and carrion. Adults tend to use the same breeding area and often the same nest each year. The nests are primarily in trees and, to a lesser extent, on cliffs or (rarely) on the ground.

A number of bald eagle nests are currently located within the Upper Basin, although not all of them have been reproductively successful in recent years. One successful nest occurs on the Yampa River, and at least two nests are located on the White River. Another nest occurs on the Little Snake River. An additional eagle nest occurs on the main Elk Creek and one other on the Roaring Fork River. Along the Colorado River the only currently active bald eagle nest in Utah is located near Westwater. This nest has successfully fledged young during the past 3 years. In Colorado, approximately four nests are located near Rifle, and one nest occurs near Grand Junction. These sites have not been successful in recent years, although eagle pairs appear and breeding activity has occurred each year. In addition to these sites, there are a number of areas along the Colorado River at which prenuptial activity has been noted, but no successful breeding has been documented so far.

Wintering bald eagles occur throughout the country but are most abundant in the west and mid-west, usually near open water where they feed on fish and waterfowl. The major rivers of the Upper Basin provide winter roosting areas for bald eagles. Winter concentrations occur on the Colorado River below Grand Junction, near the Colorado-Utah State line, near the town of Westwater, and along various parts of Lake Powell. On the Green River, winter roosts are located below Flaming Gorge Dam, near the Colorado-Utah State line, and near the communities of Ouray and Green River.

G. Candidate Species

A number of species that are being considered for listing status (candidate species) occur within the Upper Basin. Most of these species are associated with upland habitat and therefore would not be affected by the alternatives considered here. The exceptions are:

The southwestern otter (Lutra canadensis sonorae) is primarily associated with the Lower Colorado River Basin. Southern Utah apparently represented the northern limit of its range. There appear to be no recent records of this subspecies within the Upper Basin.

The long-billed curlew (Numenius americanus) utilizes open grazing lands, cultivated fields and irrigated pastures. The limiting factor for this species appears to be the loss of short-grass prairie.

The western snowy plover (Charadrius alexandrinus nivosus) is primarily associated with wetlands, alkali ponds, and riverine sandflats. In Colorado, populations apparently occurred in the San Luis Valley, on the South Platte, Republican, and Arikaree Rivers. Extant populations may remain along the Arkansas River west of the Kansas border. There is no current information of its occurrence in Utah, although it is considered a possible summer resident and spring/fall migrant.

The western yellow-billed cuckoo (Coccyzus americanus occidentalis) is associated with deciduous woodland habitat along riparian corridors; however, there have been only sporadic reports of the subspecies in Colorado and Utah. Two breeding areas are known from eastern Utah, but no birds have been seen in these areas in over 6 years. It is not known whether the subspecies currently occurs in Colorado.

A member of the orchid family, the plant Spiranthes diluvialis exhibits a discontinuous distribution. Populations are limited to relatively low elevations in mesic or wet meadows along permanent streams and around springs and major desert lakes. These sites are commonly subject to intermittent and unpredictable inundation and the plants often emerge from shallow water. The species has been collected from only about 10 sites. Three occur within the Upper Basin; however, two of these are located along small tributaries which eventually drain into Lake Powell near the most downstream portions of the Upper Basin. A third population is known to occur in Daggett County in the Browns Park area. It is associated with moist alluvial meadows adjacent to the Green River.

The Colorado River cutthroat trout (Salmo clarki pleuriticus) is found within the Upper Basin drainage, but is currently limited to a few small headwater streams and lakes in northwestern Colorado and southwestern Wyoming. In 1981, approximately seven streams and a lake in Wyoming contained pure populations (Hickman and Benton 1981). In Colorado, approximately six streams and two lakes are believed to maintain pure populations. Most of these populations are located in headwater streams.

H. Recreational Boating

The distinctive geography and diverse nature of the riverine area, with its high mountain streams and meadows, steep canyon walls, placid river reaches and reservoirs, turbulent rapids, and desert scenery make the Upper Basin a popular boating area. Aside from reservoir boating, canoeing, kayaking, and jet boating, this area includes some excellent whitewater rafting areas. The Lodore/Split Mountain area on the Green River below Flaming Gorge Dam, the Yampa River from Deer Lodge Park to its confluence with the Green River, Desolation/Gray Canyons on the Green River, Westwater and Cataract Canyons on the Colorado River, and the Gunnison River from Crystal Dam to its confluence with the North Fork of the Gunnison are some of the more popular whitewater areas (see Figure III-H-1 and Table III-H-1).

Hydropower production at Federal dams can affect recreational boaters on the river, particularly when a facility is used to produce peaking power, e.g., Flaming Gorge. Consumers' power needs typically fluctuate during the course of a day, week, or year. Hydroelectric facilities meet these changing power needs by altering the amount of water passing through turbines, sometimes creating severe flow changes in the river environment immediately below the dam. Recreationists, especially those involved in river running, can be affected by these flow fluctuations. River runners prefer steady, moderate to high flows, especially through whitewater areas, to achieve the most rewarding river running experience. At times (e.g., weekends), recreationists' needs for high water are not compatible with efficient hydropower production.

In addition, reservoir boaters can be affected by changes in reservoir operations. Drastic drops in reservoir levels could reduce the amount of surface area available for boating or reduce access at boat ramps.

The three Federal facilities studied in this assessment have varying degrees of recreational boating associated with them. Following is a brief discussion of the recreational boating opportunities associated with Ruedi, Flaming Gorge, and Aspinall reservoirs.

Ruedi

Ruedi Reservoir is situated in a scenic mountain valley. Second to camping, boating is the most popular recreational activity at the reservoir. Popular boating activities include motorboating, sailing, waterskiing, and windsurfing. The Fryingpan River, immediately below Ruedi Reservoir, is primarily a fishing area, little used by floaters. It runs into the Roaring Fork River, a popular boating and fishing stream.

Flaming Gorge

Flaming Gorge Reservoir is one of the most popular recreation areas in the west and receives considerable recreational use, especially during the summer months. Boating comes third in popularity after sightseeing and fishing.

FIGURE III-H-1
Major Recreational Boating Areas
in the Upper Colorado River Basin

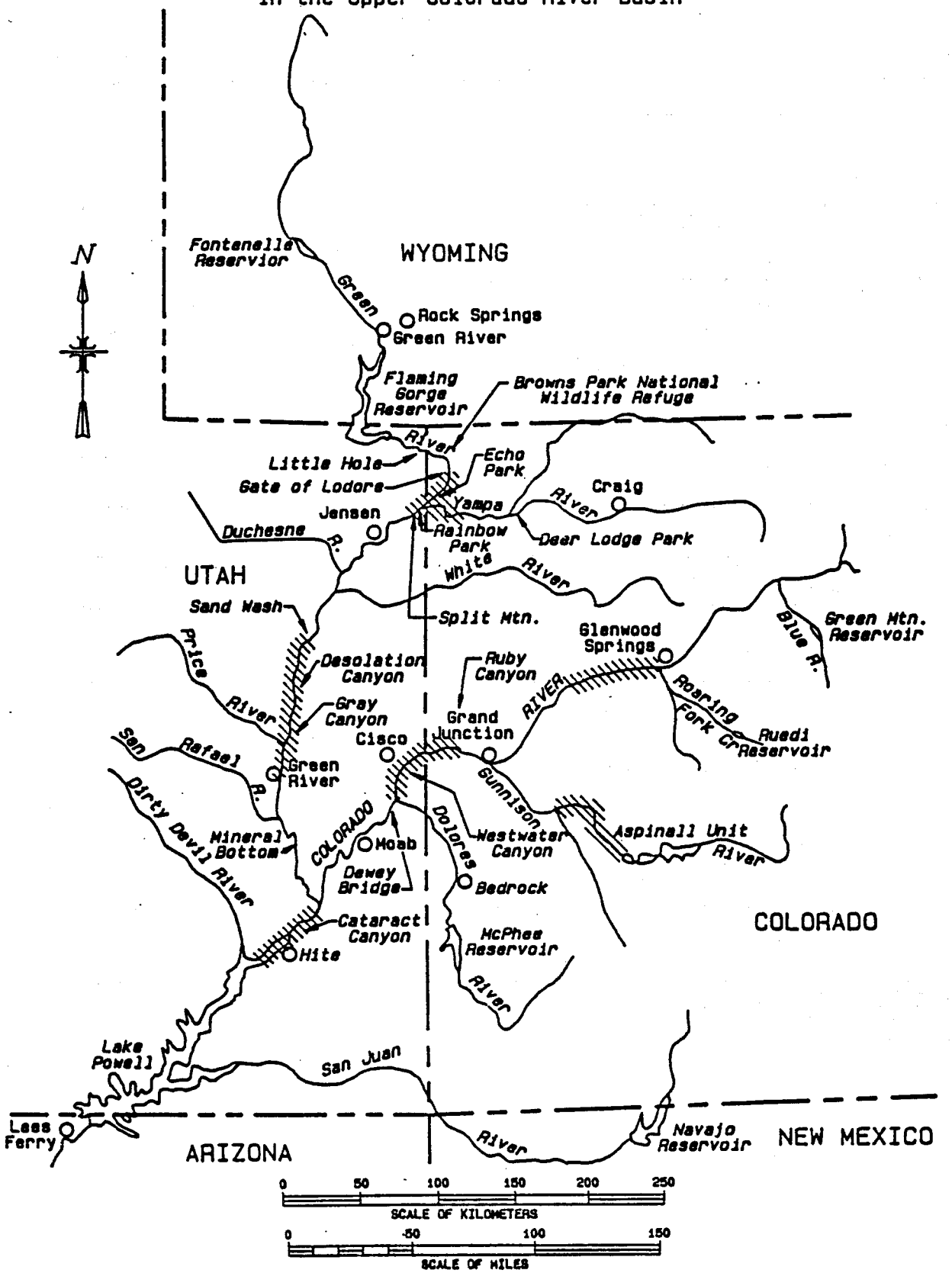


Table III-H-1
Recreational Boating Activities on the Rivers
of the Upper Colorado River Basin

Area	Activity
Green River tributaries	
Yampa River above Deer Lodge Park	Canoeing Kayaking
Yampa River, Deer Lodge Park to confluence	Whitewater rafting Kayaking Canoeing
Duchesne River	Day rafting
Price River	Canoeing
Colorado River Tributaries	
Blue River from Green Mountain Reservoir to confluence with Colorado River	Limited kayaking Canoeing
Green Mountain Reservoir	Motorboating Sailing
Roaring Fork River to confluence with Colorado River	Kayaking Canoeing
Gunnison River to confluence with North Fork	Whitewater rafting
Gunnison River from confluence of North Fork to confluence of the Colorado River	Canoeing
Colorado River	
Colorado River above Glenwood Springs	Some kayaking Canoeing Whitewater rafting
Glenwood Springs to Ruby Canyon	Whitewater rafting Canoeing Boating
Ruby Canyon to Westwater	Canoeing Boating Rafting
Westwater to Cisco, Utah	Whitewater rafting
Cisco to Dewey Bridge	Canoeing
Moab to confluence with Green River	Floating Jet boating Canoeing
Colorado River to Hite (Cataract Canyon)	Whitewater rafting
Lake Powell	Motorboating

Table III-H-1 (Continued)
Recreational Boating Activities on the Rivers
of the Upper Colorado River Basin

Area	Activity
Green River	
Spillway boat ramp (Flaming Gorge Dam) to Little Hole	Day rafting
Little Hole to Browns Park	First 7 miles--day rafting
Lodore Ranger Station to Echo Park	Whitewater rafting Kayaking
Echo Park through Whirlpool Canyon to Rainbow Park	Whitewater rafting Kayaking Canoeing
Rainbow Park to Split Mountain	Whitewater rafting Day rafting Kayaking Canoeing
Split Mountain to Jensen	Day rafting Canoeing Kayaking
Jensen to Sand Wash	Canoeing Kayaking Day rafting
Sand Wash to Green River, Utah (Desolation Canyon)	Whitewater rafting Canoeing Kayaking
Green River to Mineral Bottom	Canoeing Jet boating
Mineral Bottom to confluence (Green and Colorado Rivers)	Canoeing Jet boating Kayaking Rafting

Boating is primarily motorboating for fishing and recreation purposes, with some sailboating and canoeing.

Despite the challenges created for boaters by the peaking power releases from Flaming Gorge Dam, the Green River below Flaming Gorge remains a heavily used recreational resource, particularly in the late summer when unregulated rivers such as the Yampa have low flows. Historic releases usually have supported the float trips immediately below the dam where the river is less turbulent and technically demanding but have on occasion created difficulties for whitewater enthusiasts because of low flows in the section of river between Lodore Canyon and Split Mountain. The area of the Green River within Dinosaur National Monument is an especially popular whitewater rafting area. Both commercial and private rafters use this section of the river under a permit system administered by the National Park Service.

Below the confluence with the Yampa River, the Green River becomes more boatable due to the additional 200 to 800 cfs that the Yampa usually contributes during the floating season. Downstream, the influence of fluctuating Flaming Gorge releases is further minimized by inflows from the White and Duchesne Rivers.

Aspinall Unit

The Crystal, Morrow Point, and Blue Mesa Reservoirs and the area adjacent to them are designated as a national recreation area (Curecanti National Recreation Area). Blue Mesa Reservoir, when filled, is the largest reservoir in Colorado (20 miles long) and is a very popular area for motorboating, sailboating, windsurfing, and canoeing. A popular commercial tour boat is available at Morrow Point Reservoir, and some additional carry-on type boating also exists. Crystal Reservoir receives very little use due to its inaccessibility.

The Gunnison River below the Aspinall Unit is becoming an increasingly popular whitewater rafting area. The number of commercial rafters in this area has grown from 2 in 1985 to 17 at present. Though not a classic whitewater rafting experience, its appeal derives from pristine wilderness values and excellent fishing. This stretch of river is most popular in August and September when Aspinall flows provide a late-season rafting opportunity after flows have gone down in other rivers such as the Yampa, Dolores, or Arkansas. The rapid increase in rafting use has caused the Bureau of Land Management to consider developing a recreational use plan to manage rafting to ensure a satisfying rafting experience for users, yet preserve the unique qualities of the Gunnison River.

I. Sportfishing

Sportfishing is an important recreational activity in the Upper Basin. Approximately 5 million coldwater and warmwater angler-days of recreation generate about $72.5 million to the economy (Table III-I-1). The Proposed

Action and "No Action" alternative could affect coldwater sportfishing in Flaming Gorge, Ruedi, and the Aspinall Unit reservoirs and their tailwaters as well as warmwater sportfishing within the Upper Basin (Figure III-I-1).

Table III-I-1
Projected Demand for Fishing
in the Upper Colorado River Basin,
1965-2020[1/]

Year	Thousands of Angler-days
1965	3,549
1980	4,522
2000	6,505
2020	8,666

1/Adapted from U.S. Water Resources Council, Upper Colorado Region State-Federal Inter-Agency Group/Pacific Southwest Inter-Agency Committee, 1971 Upper Colorado Region Comprehensive Framework Study Main Report, Washington, D.C.

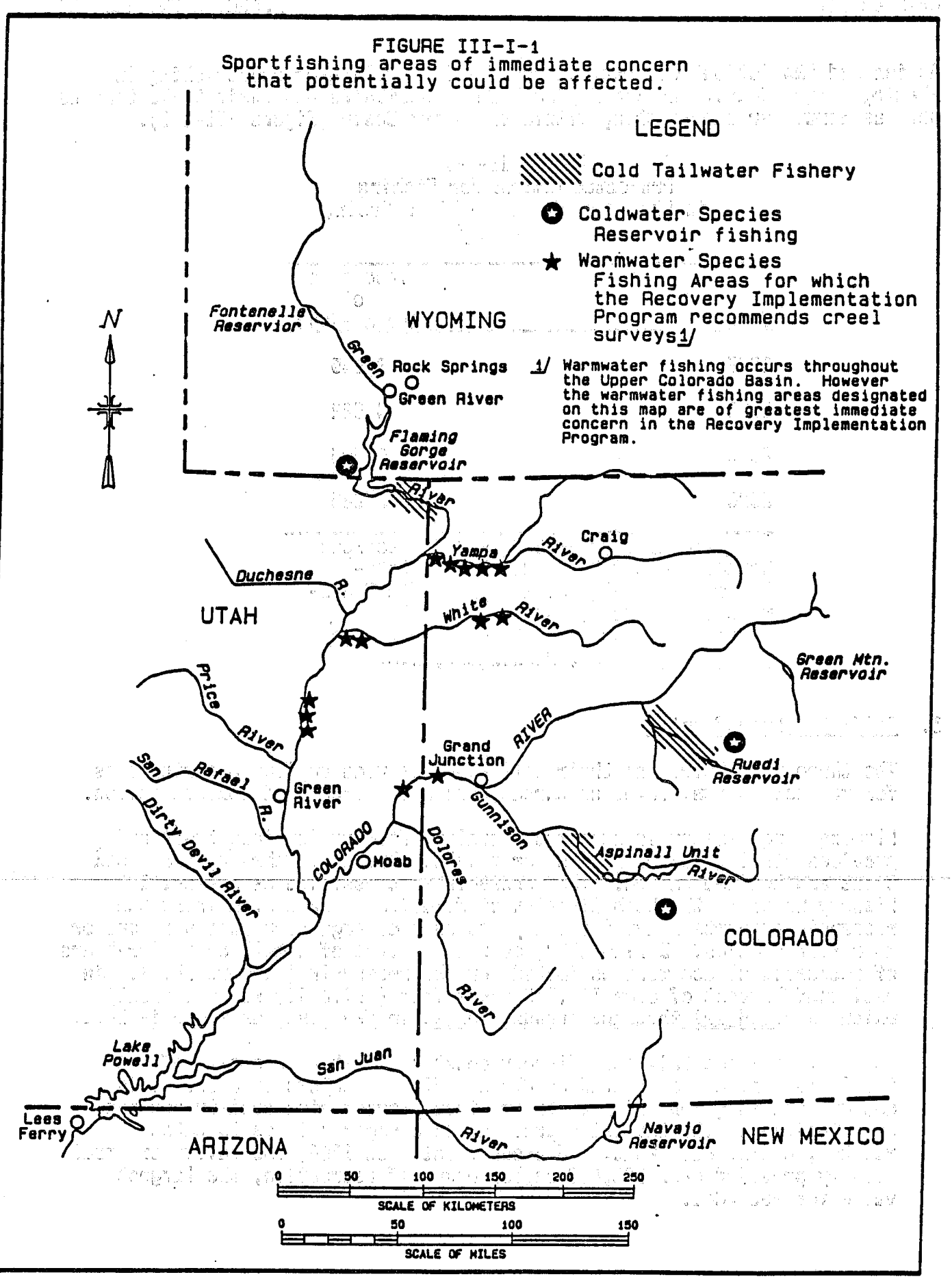
1. Coldwater Sportfishing

The three reservoirs and their tailwaters provide angling opportunities for rainbow, brown, lake, cutthroat, and brook trout and kokanee salmon.

Flaming Gorge Reservoir supports a quality fishery for lake trout and provides fishing opportunities for rainbow, brown, cutthroat, and brook trout and kokanee salmon. The reservoir is classified as a Class 1 Fishery Water by the Utah Division of Wildlife Resources, meaning the reservoir supports heavy fishing pressure and large populations of one or more fish species. During 1982, over two-thirds of a million angler-hours of recreational use were estimated for the reservoir (Wengert 1985). An estimated harvest of over 161,500 sport fish (primarily rainbow trout), which totalled 193 thousand pounds, was taken from the reservoir in 1982.

The Flaming Gorge tailwater fishery constitutes about one-half of the total river miles designated as Class 1 Fishery Waters in Utah. This designation is given only to streams that provide high quality angling opportunities. The tailwater provides good opportunities to catch rainbow, brown, cutthroat, and brook trout. In 1984, the tailwater trout fishery provided over 128,800 angler-hours of recreation, the largest value yet recorded.

FIGURE III-I-1
Sportfishing areas of immediate concern that potentially could be affected.



Ruedi Reservoir provides sportfishing opportunities for rainbow, brown, and lake trout and kokanee salmon. The Fryingpan River from Ruedi Dam downstream to the confluence with the Roaring Fork River (14 miles) and the Roaring Fork River from the confluence with the Crystal River to the confluence with the Colorado River (12 miles) are considered "Gold Medal Waters" by the Colorado Division of Wildlife. This designation is given to streams that offer the greatest potential for trophy trout fishing and angling success.

Sportfishing in the catch-and-release area of the Fryingpan River (the first 2 miles below the dam) during 1983 provided over 10,800 hours of angling recreation. Rainbow trout comprised the majority of the catch, followed in order by brown, brook, and cutthroat trout. In another reach of the Fryingpan River (where one rainbow and one brown trout are allowed to be kept), sportfishing provided over 15,600 hours of angling recreation during 1983. Rainbow trout were again predominant in the catch, followed by brown trout and incidental catches of brook and cutthroat trout. Reclamation has agreed with the State of Colorado to maintain a minimum of 110 cfs in the Fryingpan River for the trout fishery during the fishing season.

The reservoirs and tailwater of the Aspinall Unit provide fishing opportunities for rainbow, brown, and lake trout and kokanee salmon. The Gunnison River from the upper boundary of the Black Canyon of the Gunnison National Monument downstream to the confluence with the North Fork of the Gunnison is considered "Gold Medal Waters" by the Colorado Division of Wildlife. It was estimated that the area provided 37,000 angler-hours of recreation in 1984 (Chip Marlow, U.S. Bureau of Land Management, personal communication). Brown trout were predominant in the catch, followed by rainbow trout.

2. Warmwater Sportfishing

The Yampa, Green, White, and Colorado Rivers provide hundreds of miles of warmwater fishing opportunity for Colorado and Utah residents. Fishing, primarily from towns along these warmwater streams, allows local citizens the opportunity to catch common introduced fishes such as catfish, walleye, and bass, as well as incidental endemic fishes, such as Colorado squawfish and roundtail and humpback chubs.

On the Yampa River, a growing northern pike fishery has been highly touted by citizens of Craig as well as Colorado fishermen along the East slope. Unfortunately, the northern pike populations coexist and occupy similar habitat to Colorado squawfish in the Yampa. Fishermen often take incidental Colorado squawfish in their pursuit of northern pike.

Releases of lip-hooked Colorado squawfish or humpback chub do not normally present a problem to the species; however, bait fishing for catfish can result in a deep ingestion of the hook and mortality. Much of the fishing for catfish or other warmwater fish involves the use of bait rather than lures.

Although the Service and the States of Colorado and Utah have documented Colorado squawfish and humpback chub captures since 1979, the extent to which incidental take contributes to these fishes' endangered status remains subject to debate. To address this question, the Proposed Action recommends that a 2-year to 4-year creel survey be conducted by the States to document the extent of incidental taking and to aid in determining where permanent or seasonal closures or other restrictions may be needed to prevent or reduce incidental mortalities. Among the areas that have been recommended for study, the following deserve immediate attention:

(a) Black Rocks (river miles 135-136) on Colorado River;
(b) Westwater (river miles 116-124) on Colorado River;
(c) Grays Canyon/Three Fords (river miles 148-157) on Green River;
(d) Yampa Canyon (river miles 0-56) on Yampa River; and
(e) White River (river miles 0-21, 104-109).

These areas are depicted in Figure III-I-1. In addition to these areas, specific areas of concern include the Yampa River (near Craig, Colorado); Green River (Browns Park, Ashley Valley, near Green River, Utah); Colorado River (near Moab, Utah, and Grand Junction, Colorado).

J. Electrical Power Generation

The Electrical Energy Market in the Upper Basin - Present and Future

The Rocky Mountain Power Pool Area (RMPA) is most analogous to the portion of the Upper Basin affected by the Proposed Action.1/ The RMPA is a region of the Western Systems Coordinating Council (WSSC) and consists of the states of Colorado, Wyoming, and parts of Utah, Montana, and South Dakota. Combined public and private sales of electricity in the RMPA were 35,404 gigawatthours (GWh) in 1985. Peak summer electrical capacity demand in 1985 was 5,739 megawatts (MW) [NERC 1986].

The Upper Basin is presently experiencing excess capacity. According to data compiled by WSCC, the RMPA will likely be experiencing excess capacity into 1995 and beyond. During peak summer months, the available capacity over peak load averaged 36 percent in 1984. This figure is estimated to fall to 24 percent by 1994 [WSCC 1985]. Assuming 20 percent as the percentage of capacity overload required to provide reliable service and meet regulatory requirements, and extrapolating from the data above, capacity should equal 120 percent of demand by 1997. In other words, there should be no excess capacity in the RMPA in 1997, other than that required to provide reliable service and meet regulatory requirements.

1/ The Upper Colorado River Basin includes States besides those in the RMPA. However, the other WSCC regions which include Basin States--the Northwest Power Area and the Arizona-New Mexico Power Area--represent either distant or anomalous conditions.

The Federal Electric System in the Upper Basin

Western Area Power Administration (Western) is responsible for the Federal electric power marketing and transmission functions in 15 Central and Western States. Western sells power to cooperatives, municipalities, public utility districts, private utilities and Federal and State agencies, irrigation districts, and project use customers. The wholesale power customers, in turn, provide service to retail customers in the market area. Electric power marketed by Western is generated by Reclamation, the U.S. Army Corps of Engineers and the International Boundary and Water Commission, U.S. Section.

Western's Salt Lake City Area Office (SLCAO) markets power generated from four Reclamation projects in the Upper Colorado River Basin: the Colorado River Storage Project (CRSP), the Collbran Project, the Provo River Project, and the Rio Grande Project. The largest of these, the CRSP, has generation facilities at Glen Canyon on the Colorado River; Crystal, Blue Mesa, and Morrow Point on the Gunnison River; and Flaming Gorge and Fontenelle on the Green River. Western's Loveland Area Office and its Boulder City Area Office also market power and energy from the CRSP. In 1986, the CRSP generated 10,700 GWhs of electricity and earned revenues totaling $134 million. In 1987, Western will market the Rio Grande Project, the CRSP, and the Collbran Projects as an integrated system with a single rate. This will be the Salt Lake City Area Office Integrated Project (SLCA-IP).

The Colorado River Storage Project

The CRSP units are undergoing or will undergo Section 7 consultation in the near future. If flow refinements are implemented to avoid jeopardy to endangered fishes, this could affect electrical power generation. Following is a brief characterization of CRSP dams in the Upper Basin that could be affected:

Flaming Gorge--The Flaming Gorge generating facility consists of three generators with a summer season maximum operating capacity of 42 MW each and a winter season maximum operating capacity of 44 MW each. Each unit at Flaming Gorge is planned to be uprated to 50 MW within the next 3 years, though usable capacity will depend on hydrologic conditions.

Aspinall--The dams and associated generating units of the CRSP on the Gunnison River are collectively called the Aspinall Unit. Crystal, the furthest downstream of these facilities, has a maximum discharge through the powerplant of 1,700 cfs or about 100,000 af per month. Morrow Point and Blue Mesa have maximum discharges through their powerplants of 4,500 cfs and 2,600 cfs, respectively. Reclamation has agreed with the State of Colorado that, when hydrologic conditions permit, a minimum of 300 cfs will be maintained on the Gunnison River beyond the Gunnison tunnel for the trout fishery downstream.

K. Social Considerations

The Basin was the site of high rates of growth in the 1970's due to national energy shortages. Energy development opportunities brought jobs, people, and an increasing demand for water into the area. In 1982, most development and proposed development came to an abrupt halt or was scaled back dramatically. Though the resources remain, changes in the energy market altered the timing and scale of potential developments. The greater supply and lower demand for energy and the scarcity of investment capital tend to constrain project size and lengthen the development period of proposals today. Today, most development proposals are assigned a high degree of uncertainty and viewed skeptically.

Other changes are evident. Although the job market has been reduced drastically, many people who came for jobs have remained due to lifestyle considerations. The infrastructure base built up in the boom years is basically still in place. Housing, education, and other infrastructure facilities are sufficient and, in many areas, greater than demand. Energy-related growth has abated, but other factors contribute to the area's growth on a much lower scale.

The population and economy of the Upper Basin are now stabilizing. Employment and income appear to have bottomed out based on most indicators. Based on demographic and economic patterns evident within the Upper Basin prior to the surge in energy development, those factors which contributed to nonenergy-related growth will again assert themselves, and growth will continue at a much lower rate than during the recent boom/bust cycle. Factors outside of the Upper Basin still heavily influence the economy of the area. Since the energy resource is largely still in place, any drastic change in the availability or price of oil could trigger another energy development surge.

Current water utilization within the Upper Basin is directly influenced by development and conservation trends. Senior agricultural water rights are in place, but the number of acres being irrigated is slowly declining. In some areas, irrigation water development continues on a small scale. Municipal water appears to be in place for the projected growth in almost all Upper Basin communities. Industrial water demands during the boom were being developed through private projects. While the water rights are still in effect, a demonstrated demand for all of the water is not always present. Water-based recreation still has a high social and economic value, but there are few remaining development and utilization opportunities. As the increasing population base and commercial development of the recreation resource bring in more people to utilize the area, the carrying capacity will be reached and the relative attractiveness of the area for recreational use will decline. Hydropower generation is mostly limited to existing sites with few proposals for upgrades or new smaller sites. The manner and degree to which water-based development opportunities can be realized will be conditioned by the need to avoid jeopardy to endangered fishes. Developers are concerned about the economic feasibility of future project proposals as well as the potential need to alter projects requiring Federal authorization or funding to comply with Section 7 of the Endangered Species Act to offset project impacts to endangered fishes.

The attitude toward growth is still generally positive, but the limitations and impacts of growth are of greater concern than in the past. Laws governing water development are now more specific in interpretation and application than in the past. During the recent escalation of development and water demands, concern was heightened over the need for a way to develop water resources while avoiding jeopardy to endangered fishes in the Colorado River. Each State has evolved its own definition of acceptable uses of water and prioritization of use, but the trend is clearly toward a comprehensive consideration of the consequences of development for the benefit of each State. This, and all of the above statements, are made on a basinwide level and do not propose to cope with the values and conditions within a specific community or county. There are extremes of all types, but the general experience and values are as characterized above.

Outside of the San Juan River drainage (which is not considered in this study), the only Indian reservation directly affected by the Colorado River or its tributaries is the Uinta-Ouray Ute Indian Reservation in Utah. While the tribe maintains direct involvement in all land use and other issues affecting their reservation, the portion of the reservation which would be potentially impacted, an area known as the Hill Creek extension, has been set aside as a reserve with no commercial development. The tribe is concerned about its water right and control over any influence on the reservation.

L. Archaeological/Cultural Resources

Historically, the affected area was the home of many Indian tribes. This included the Shoshone in southwestern Wyoming, the Utes in western Colorado and eastern Utah, and the Navajo, southern Paiute, and Mohave tribes in southern Utah. Fremont cultural sites are distributed throughout most of the Basin. Also, the Utah-Colorado border was the traditional homeland of the Anasazi culture with many archaeological sites, mainly along the Dolores River in southwestern Colorado.

The first white contact was probably that of the Dominguez-Escalante expedition in 1776. These two friars were sent by the Catholic Church to locate an overland route from Santa Fe, New Mexico, to the California missions. The first Americans in the area were fur traders and trappers who were in Colorado and Utah by 1820. Later on, settlers began moving westward into the area in the 1840's spurred west by, among other reasons, the California gold discoveries and the Mormon migration. Many of the historical remains of this westward migration still exist in the area (e.g., trail ruts, telegraph poles, pony express stations, etc.).

The Proposed Action or "No Action" alternative could affect cultural resources that exist within the area immediately adjacent to or in the proximity of the rivers that make up the Upper Colorado River Basin system. Examples of cultural resources which might be found in and adjacent to the river areas are ancient Indian burial grounds, abodes, and cliff writings; pioneer river crossings; settler homes; etc. Since flow changes, ponding, and fish hatcheries appear to be the actions with the greatest potential to create

impacts in this area, the cultural resources that would fall in those areas would be the ones that would need to be analyzed to determine the potential impacts of the program.

IV. ENVIRONMENTAL CONSEQUENCES

A. Water Resources
   - Environmental Consequences of the Proposed Action
   - Environmental Consequences of the "No Action" Alternative

B. Rare and Endangered Fishes
   - Environmental Consequences of the Proposed Action
   - Environmental Consequences of the "No Action" Alternative

C. Native Fishes (Other than the Rare and Endangered Fishes)
   - Environmental Consequences of the Proposed Action
   - Environmental Consequences of the "No Action" Alternative

D. Nonnative Fishes (With Emphasis on Sport Fish)
   - Environmental Consequences of the Proposed Action
   - Environmental Consequences of the "No Action" Alternative

E. Terrestrial Biological Resources
   - Environmental Consequences of the Proposed Action
   - Environmental Consequences of the "No Action" Alternative

F. Other Endangered and Threatened Species
   - Environmental Consequences of the Proposed Action
   - Environmental Consequences of the "No Action" Alternative

G. Candidate Species
   - Environmental Consequences of the Proposed Action
   - Environmental Consequences of the "No Action" Alternative

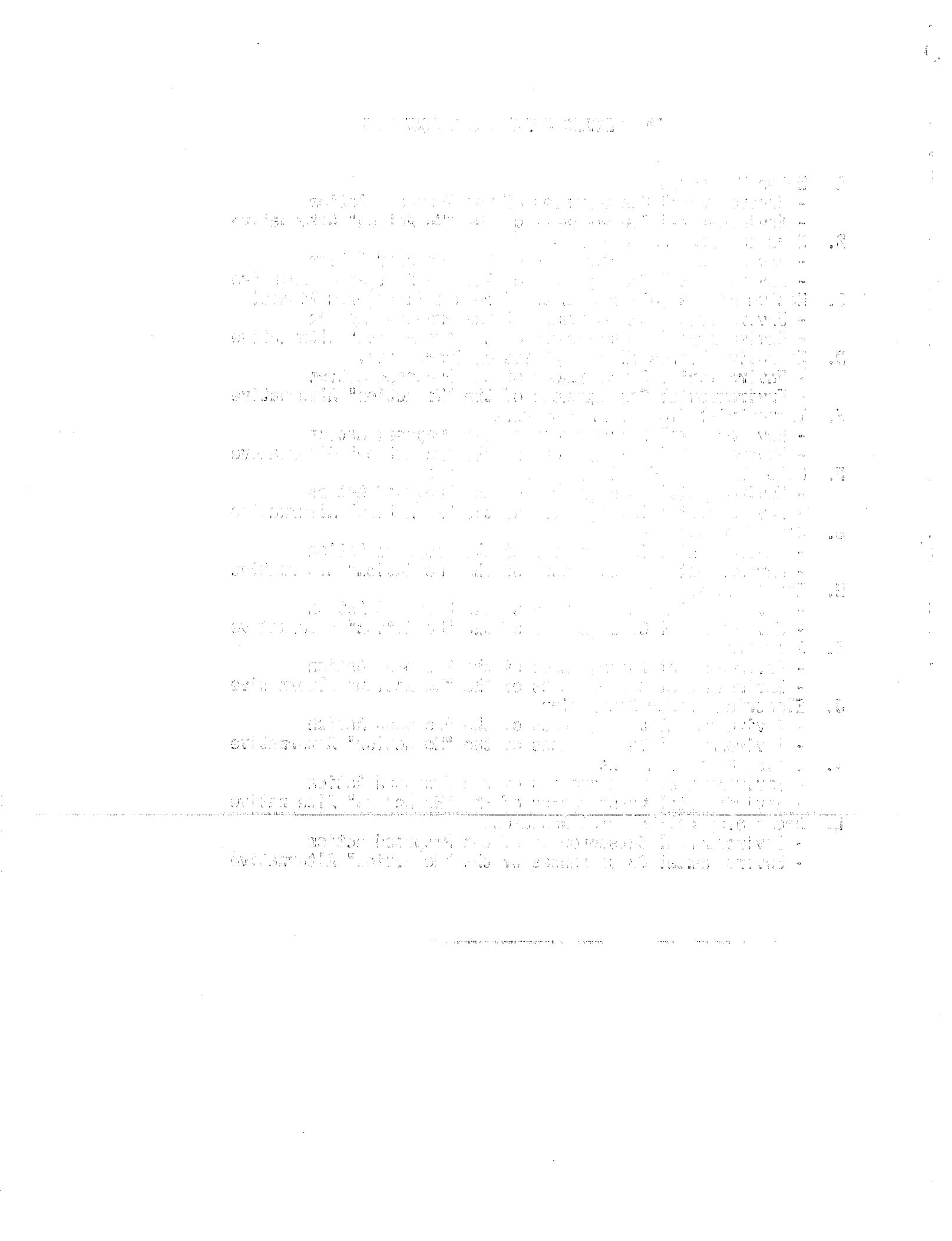
H. Recreational Boating
   - Environmental Consequences of the Proposed Action
   - Environmental Consequences of the "No Action" Alternative

I. Sportfishing
   - Environmental Consequences of the Proposed Action
   - Environmental Consequences of the "No Action" Alternative

J. Electrical Power Generation
   - Environmental Consequences of the Proposed Action
   - Environmental Consequences of the "No Action" Alternative

K. Social Considerations
   - Environmental Consequences of the Proposed Action
   - Environmental Consequences of the "No Action" Alternative

L. Archaeological/Cultural Resources
   - Environmental Consequences of the Proposed Action
   - Environmental Consequences of the "No Action" Alternative



CHAPTER IV

ENVIRONMENTAL CONSEQUENCES

This chapter analyzes the environmental consequences of the Proposed Action and the "No Action" alternative, with greater emphasis given to the former. It analyzes potential impacts from both alternatives on physical, biological, recreational, economic, social, and cultural elements of the human environment.

Prediction of future impacts is hampered by the dynamic, adaptable nature of the Recovery Implementation Program. The program sets out a broad framework and process for recovering the fish. Site-specific actions will be formulated only after habitat needs have been researched in greater depth and after threats, opportunities, conflicts, and techniques for fish recovery have been further evaluated. Many future actions cannot be specified in detail at this time since underlying research has not been completed. In fact, some planned recovery actions will not be implemented if pilot tests (research) indicate they are ineffective or impractical.

Whenever possible, this environmental assessment makes reasonable assumptions regarding the course of future program implementation. However, where future actions are truly uncertain, the environmental assessment does not speculate. Instead, as potential projects or issues become ripe for decision, supplemental, site-specific impact analysis documents will be prepared in accordance with the National Environmental Policy Act to ensure environmental review. By staging environmental analysis in this manner, meaningful National Environmental Policy Act analysis is ensured for the entire program.

The chapter begins with a discussion of water resources, since changes in the hydrologic regime of the Upper Basin can affect virtually every component of the human environment.

A. Water Resources

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

1. Water Management

a. Federal Water Management

(1) Assumptions

Table IV-A-1 identifies potential water sources for rare fish flows and indicates where these sources of water may be most important.

Table IV-A-1
Potential Sources of Water by River Reach

River	Source
Green	1. Refinement of operations at Flaming Gorge (Section 7 consultation) 2. Acquisition of water rights on Yampa River and conversion to instream flow rights
Colorado	1. Refinement of operations at Blue Mesa, Ruedi, and Green Mountain (Section 7 consultation) 2. Withholding of water from water sales at Ruedi (Section 7 consultation) 3. Acquisition of water rights and conversion to instream flow rights 4. Acquisition of existing storage water 5. Water savings from salinity control projects
White/Yampa	1. Acquisition of water rights and conversion to instream flow rights 2. Acquisition of existing storage water

Section 7 consultation is expected to result in refinement of Federal dam operations. However, final decisions are yet to be made on releases from Flaming Gorge and Blue Mesa dams to conserve endangered fish. Therefore, flow release assumptions were developed for each project (see Table IV-A-2). Following is a discussion on the bases for the flow release assumptions and the caveats in using them and interpreting resultant impact analyses.

Ruedi/Green Mountain: The assumed flow releases are those specified in the June 15, 1987, biological opinion (see Table IV-A-2). Specific year-to-year adjustments to this release pattern will likely be requested as better information becomes available on the endangered fishes' habitat needs. Due consideration will be given to the Fryingpan River trout fishery and Ruedi Reservoir recreation impacts in the development of a release pattern for the endangered fish flows. And, although the biological opinion examined a scenario in which 10,000 acre-feet of releases is made over a 60-day period from Ruedi Reservoir, Reclamation will also consider making releases from Green Mountain Reservoir to minimize impacts to the trout fishery or reservoir recreation.

The Ruedi-related impact findings are preliminary findings developed by Reclamation and assume 10,000 acre-feet of water is released from Ruedi Reservoir. These findings are the best available at this time, but will overstate impacts from Ruedi releases if future releases are made from Green Mountain

Table IV-A-2
Reclamation Projects in the Upper Colorado River Basin
- Assumed Future Flow Releases -

Reclamation Project	Assumed Future Flow Releases
Ruedi/Green Mountain	5,000 acre-feet/year will be withheld from sale and made available for rare and endangered fish flows as necessary. An additional 5,000 acre-feet/year will be provided through refined operations on an average of 4 out of 5 years. This water will be released as follows: a) Dry water year: release 81 cfs/day for period 7/15-9/15 b) Average water year: release 81 cfs/day for period 8/1-9/30 c) Wet water year: release 81 cfs/day for period 8/1 - 9/30
Flaming Gorge	Flow releases will vary between 800 and 2,600 cfs from the third week in July through September. During this period, releases will not exceed 100,000 acre-feet/month.
Blue Mesa	Will be operated to ensure a 2,000 cfs minimum flow below the confluence of the Gunnison and Colorado Rivers an average of 9 out of 10 years.

Reservoir. These findings will undergo public review and refinement and will be presented in final form in an environmental statement planned to be completed by Reclamation next year.

Flaming Gorge: The Service and Reclamation are conducting research on instream flow needs of rare fish in the Green River below Flaming Gorge Reservoir. Until research is completed, it is impossible to predict the release schedule that will be requested in the Flaming Gorge biological opinion scheduled for completion in 1989. The best assumption that can be made on future releases is to use the interim flow regime requested in 1985 and 1986, which has appeared to benefit the fish. [Note: Alternative flow regimes were tested in 1987 under existing research agreements.]

The environmental assessment uses the 1985-86 interim flow regime to approximate the postconsultation flow regime for Flaming Gorge Reservoir (see Table IV-A-2). Though this assumption will not result in a conclusive impact analysis, it does provide insight into possible future impacts and areas of concern. The Service anticipates that Reclamation will undertake appropriate National Environmental Policy Act review of the postconsultation conservation releases if they are a significant departure from normal release patterns.

Blue Mesa: No flow regime, interim or otherwise, has been agreed to between Reclamation and the Service for endangered fish conservation purposes at the Aspinall Unit. Under the Proposed Action, Reclamation will commit to an interim flow regime until consultation is completed. This interim regime is based on historic hydrologic data and serves as a starting point for management purposes. It will eventually be replaced by flow recommendations based on biological data. The environmental assessment uses this initial interim flow regime (see Table IV-A-2) to analyze potential impacts during the interim period and to illustrate possible impacts and areas of concern were it to be continued as the postconsultation flow regime. The Service anticipates that Reclamation will undertake appropriate National Environmental Policy Act review of postconsultation endangered fish releases if they prove to be a significant departure from normal release patterns.

In addition to refining Federal dam operations, the Proposed Action will obtain water through other means, e.g., purchase of water rights. Expecting that Federal facilities will provide at least a portion of necessary instream flows in Green and Colorado River habitats, other water acquisition efforts are anticipated to concentrate on biologically important rivers without Federal facilities, e.g., Yampa and White Rivers.

(2) Impact Findings

[Note: Biological, recreational, electrical generation, social, and cultural impacts resulting from altered hydrological regimes are discussed in Sections IV.B through L.]

Reclamation will offset the impacts of the Ruedi Round II/Green Mountain water sales on endangered fishes by releasing 10,000 acre-feet of water to improve habitat conditions in the Palisade reach of the Colorado River. If released entirely from Ruedi Reservoir, there will be a gain of 81 cfs in Fryingpan River flows in August and September in most years. When these releases are combined with water sales releases, flows in the Fryingpan River will increase by 159 cfs and 157 cfs in August and September, respectively, as compared to the presales flows. [Note: Fryingpan River flows would be less if Green Mountain Reservoir releases are made.] These changes are based on monthly averages for the period 1952 to 1982.

For Flaming Gorge, the late July-September constrained releases will reduce the peak releases (4,300 cfs down to 2,600 cfs) of the daily fluctuation, and the low releases (800 cfs) will not change in either magnitude or duration. Attenuation of peak flows will result in a minimum flow of about about 1,000 cfs through Dinosaur National Monument above the Yampa confluence during a normal peaking operation. At the confluence, an additional 200 to 800 cfs is contributed by the Yampa River during August and September. Higher flows could be released from Flaming Gorge in the months not critical for endangered fish survival.

Further downstream at Green River, Utah, the releases from Flaming Gorge will have an even smaller effect. Since the construction of the dam, flows in the Green River at Green River, Utah, have averaged 238,000 and 196,000 acre-feet during August and September, respectively. Historically, releases from the dam have comprised about 70 percent of these volumes. With the constrained releases, a decrease of about 20 percent can be expected in monthly volumes in average years. In a dry year, such as 1977 or 1981, there will be no impact because releases will be constrained by Reclamation to maintain water in Flaming Gorge to ensure that compact requirements in future years can be met. During wet years such as 1983 and 1984, the relative decrease in Green River flows due to the constrained releases will be minimal due to the high volume of water entering the Green River below Flaming Gorge Dam from other rivers. Flow variations at Green River, Utah, due to Flaming Gorge power operations are not expected to be significant because flow peaks are attenuated as downstream distance increases.

Aspinall Unit interim releases will be made to ensure no less than 2,000 cfs at Stateline (a U.S. Geological Survey gage

located on the Colorado River near the Colorado-Utah border, 31 miles below the confluence of the Gunnison and Colorado Rivers) in 9 out of 10 years. Historical flows at the Stateline gage have rarely dropped below 2,000 cfs. Between the time Aspinall was built and 1982, this has only occurred once in the August-September period. Between now and the year 2040 (when the Upper Basin is expected to fully deplete its allotment under the Compact), depletions are expected to continue to reduce river flows. Year 2040 flows below the confluence of the Gunnison and Colorado are projected to drop below 2,000 cfs 25 percent of the time, but only in August and September.

In the year 2040, if the interim regime was continued as the postconsultation regime, Aspinall releases will produce between 0-500 cfs additional flow in the Gunnison River during August and September, the exact quantity dependent on natural flow in the Colorado River. Current Reclamation projections of future water demand indicate that after the year 2040, 75 percent of the time no additional releases will be needed to meet the 2,000 cfs target. Fifteen percent of the time supplemental releases of up to 500 cfs will be supplied in August and September. Ten percent of the time no additional releases will be requested to meet the 2,000 cfs target (since the agreement is for 9 out of 10 years). Future research on the Gunnison and Colorado Rivers as a part of Section 7 consultation on the Aspinall Unit will further evaluate the 2,000 cfs flow target and the frequency that the target must be met.

Water right transactions involving rivers such as the Yampa and White Rivers will attempt to preserve naturally occurring flows. Research investigations will determine instream flow needs on the White River and refine estimates of instream flow needs on the Yampa River.

b. State and Private Water Management

(1) Assumptions

A year 2000 analysis was undertaken because the year 2000 is commonly accepted as the near term planning target for most planning endeavors and because it approximates the 15-year timeframe for the completion of the Proposed Action. This analysis provides insight, on a gross level, into potential "hot spots," i.e., Upper Basin reaches where there may be conflicts (due to depletions) between proposed development actions and endangered fishes instream flow needs. Appendix D displays project depletion data used to project the year 2000 flows.

(2) Impact Findings

The year 2000 analysis identified several river segments where water development could occur. Depletions associated with these

developments might adversely affect three reaches important for endangered fish recovery: the Yampa River, lower White River, and the Colorado River mainstem below Palisade, Colorado. Under the Proposed Action, projects causing potentially adverse depletion impacts and which require Federal authorization can offset these impacts through a monetary contribution under Section 7 consultation. Contributions will fund recovery measures such as purchase of water rights to offset depletion impacts where needed. Project sponsors will not be required to offset depletion impacts by changing project design or operation. Moreover, it is likely that the permitting process for these future projects will be facilitated by the ability to accept contributions toward recovery, since it will no longer be necessary to develop case-by-case reasonable and prudent alternatives for each proposed project to offset depletion impacts prior to permitting.

2. Water Rights

The potential Federal-State conflict over instream flows for endangered fishes made it imperative that the Proposed Action directly address the manner in which protection of flows for listed species will affect the existing water rights system. The Proposed Action is clear on several points regarding the acquisition of water rights to protect instream flows:

a. The acquisition of water rights and conversion to instream flow rights will occur under the individual States' water rights programs. The establishment of instream flow rights will not affect existing uses of the water, but it may affect the ability of existing water right holders to transfer or change their pattern of use, which is an effect any water right holder has on other right holders. In addition, should the Proposed Action be implemented, Section 7 consultation will not affect the ability of water developers to use their water rights because of depletion impacts from their project.

b. The Secretary will not condemn water rights for instream flows.

c. In order to maximize the benefit realized from water rights acquisition it will be combined with other forms of instream flow protection (e.g., release of stored water, alternate points of diversion, etc.).

3. Water Quality

Because assumed reservoir flow changes are expected to be minor, no substantial change in water quality is expected. Increased flows during otherwise low flow periods may dilute concentrations of salts and other contaminants but probably will not change the total stream loading (i.e., tons of salt per year). Some water temperature changes may occur, particularly below Flaming Gorge Dam.

4. Channel Maintenance

The assumed flows are expected to have minimal effects on channel erosion and sediment deposition. Slight changes in channel stability may occur due to the interim flow releases from Flaming Gorge on the Green River. The releases from Flaming Gorge would depress flows in August and September and increase flows in the latter part of the year. Channel flows of sufficient magnitude to cause some movement of cobble in spawning riffles to remove substantial silt and sediment may benefit the fish species use of these riffles. It remains uncertain as to whether such scouring flows will be requested. The magnitude and duration of such flows will depend on future research results and water system constraints. Effects of projects in the Colorado River on channel stability/flushing flows will be determined on a case-by-case basis, after completion of studies to establish minimum requirements.

ENVIRONMENTAL CONSEQUENCES OF THE "NO ACTION" ALTERNATIVE

1. Water Management

a. Federal Water Management

Water management actions involving Federal dams will be virtually the same as those in the Proposed Action--except that the Aspinall Unit will not be expected to meet an interim 2,000 cfs minimum flow requirement prior to completion of consultation. However, since flows at the confluence very rarely drop below 2,000 cfs at present, there is a very low probability that Aspinall Unit operations will need to be changed under the Proposed Action to meet the 2,000 cfs minimum flow requirement before consultation is completed. Therefore, water management impacts resulting from modifications to Federal facilities operation will be virtually the same for the "No Action" and Proposed Action alternatives before consultation is completed on the Aspinall Unit, and will be exactly the same after consultation is completed.

b. State and Private Water Management

Section 7 consultation may recommend modification of future projects to offset depletion impacts, altering or resulting in cancellation of project development plans. In addition, the process of developing reasonable and prudent alternatives to offset depletion impacts would be complicated and time-consuming, and could delay the process of obtaining permits for proposed projects.

2. Water Rights

Purchase of water rights on the Yampa, Colorado, and White Rivers is unlikely due to lack of funds for this purpose. Therefore, protection of instream flows in the Yampa and White Rivers will be accomplished by a combination of conservation measures. Section 7 will be used to

discourage depletions in critical months. In addition, some water rights could be acquired (if the States will agree to administer instream flow rights) and/or other institutional arrangements could be put in place by the private sector to ensure water availability for endangered fishes. If no method can be found to preserve a flow regime favorable to the survival of the endangered fish, projects that jeopardize the fish through depletion impacts may likely receive jeopardy biological opinions.

Section 7 measures to protect endangered fishes from adverse depletion impacts may affect the ability of future project sponsors to use all or some of their water rights. Under extreme circumstances, i.e., if no other means were available, the Secretary could condemn water rights to avoid jeopardy to endangered fishes. This action will be avoided if at all possible. Legislative mechanisms exist in Colorado, Utah, and Wyoming that could be used to protect instream flows for the endangered fishes, but it is unlikely that progress will be made in the area of obtaining water rights for instream flows without the funding provided and State cooperation that will be agreed to in the Proposed Action.

3. Water Quality

Overall, impacts will be the same as under the Proposed Action.

4. Channel Maintenance

Overall, impacts will be the same as under the Proposed Action.

B. Rare and Endangered Fishes

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

Overview

The goal of the Proposed Action is to recover and delist the endangered Colorado squawfish, bonytail chub, and humpback chub, and to manage the razorback sucker so that it does not require the protection of the Endangered Species Act. The following paragraphs discuss how each of the five recovery elements will protect, manage, and recover the rare fish. [Note: If the razorback sucker is listed, it will be treated as the other endangered species under the Proposed Action.]

Habitat Management

Colorado squawfish.--Changes in flow regimes could affect all life history stages of the Colorado squawfish. Young Colorado squawfish appear particularly sensitive to flows. The recommended summer releases from Flaming Gorge Dam are expected to increase the amount of available nursery habitat for Colorado squawfish in the Green River. However, reduced summer releases in an average or wet year will result in increased fall releases or fall/winter releases. These higher flows might have an adverse impact on habitat used by young Colorado squawfish during the early winter period. This potential adverse impact is being investigated by current research studies investigating year-round flow requirements for all life history stages of rare fishes below Flaming Gorge Dam. When studies are completed, a dam release regime to improve Colorado squawfish recruitment and survival will be developed as a result of Section 7 consultation.

Releases from Ruedi and/or Green Mountain Reservoirs will ensure more water is available for habitat for endangered fishes in the Colorado River between Palisade, Colorado, and the confluence of the Gunnison River during the Colorado squawfish spawning and recruitment period. Releases from the Aspinall Unit are expected to maintain river flows for the fish in dry years. For those reaches where Federal dams cannot ensure needed flows, water rights will be acquired to ensure critical flows needed by the rare fish.

Humpback Chub, Bonytail Chub, and Razorback Sucker.--Flaming Gorge Dam releases could affect the humpback chub and razorback sucker in the Green River downstream from the confluence with the Yampa River. Flows from Ruedi Reservoir and the Aspinall Unit could affect these species in the Colorado River downstream from the confluence of the Green and Colorado Rivers. Flow requirements for the various life stages of these rare fishes are not well enough known to predict the effect of these flows. However, studies on these fishes in the Colorado River are planned relative to operation of the Aspinall Unit. Information from these studies will help refine future dam releases to benefit the rare fishes.

Habitat Development and Maintenance

Colorado Squawfish.--Manmade backwaters could possibly increase survival and growth of these fish during early years of life, especially if accompanying problems of nonnative fish predation on or competition with young-of-the-year and juvenile Colorado squawfish can be controlled. Natural backwaters in the Upper Basin are small areas at the mouths of small intermittent tributaries, side channels, and embayments at the edges of the main channels. The permanence of a backwater is dependent upon streamflow conditions, and their dynamic nature may make them difficult to construct and maintain.

Instream habitat improvement structures such as jetties might be used to provide habitats for Colorado squawfish, but the benefits of these structures have not yet been proven. Favorable habitat conditions created by structures could be outweighed by negative impacts, including proliferation of introduced fishes that prey on or compete with rare fishes in these habitats. Development of spawning habitats could increase or enhance spawning sites used by rare fishes, or provide areas suitable for reintroducing eggs or larvae of hatchery origin. Studies will be conducted to determine the relative value of habitat development and improvement actions for rare fishes.

An experimental fish passage facility will be evaluated to determine if fish passage facilities are a viable recovery technique. If so, fish passage facilities can be used to allow rare fish to reoccupy formerly inhabited reaches now blocked by dams. These facilities will most likely benefit the Colorado squawfish and razorback sucker because these species can exhibit extensive movement. Although adult Colorado squawfish use the upper reaches of the major tributaries and mainstream rivers, there are no known spawning areas above existing dams. Therefore, the importance to the recovery effort of extending the range through additional fish passages is unknown at this time.

Humpback Chub, Bonytail Chub, and Razorback Sucker.--Habitat development actions have been directed primarily toward the Colorado squawfish. However, ponds were developed in 1987 for rearing young razorback suckers at Ouray National Wildlife Refuge, Utah.

Stocking of Rare Fish Species

Hatcheries provide refugia and can prevent extinction for the rare fishes. Artificial propagation and stocking will also be used to produce fishes for research to learn how rare fish populations can be made self-sustaining. Stocking may also be used to augment existing populations or to reestablish the species in unoccupied habitat where suitable conditions exist. Efforts will be made to preserve genetic diversity of broodstocks for propagation and stocking efforts.

Colorado squawfish.--Research will be conducted to determine if stocking could be used to augment Colorado squawfish populations in the Colorado River. Though stocking cannot substitute for the need to provide adequate habitat, it may enhance the distribution and overall recovery prospects for the Colorado squawfish in the Upper Basin. Hatchery-reared Colorado squawfish are

scheduled to be stocked into Kenney Reservoir, Colorado (White River), as part of research efforts to evaluate their potential as a sport fish. As planned, 20,000 3-inch fingerlings will be planted annually for 3 years. If there is high survival and large numbers of them move downstream from the reservoir, survive to maturity and breed with wild stocks, the genetic diversity of wild stocks could be reduced. A successful Colorado squawfish sport fishery in Kenney Reservoir may promote angler acceptance of the Colorado squawfish and promote awareness of the status of this species. However, it may also lead to increased fishing for the species elsewhere, necessitating increased law enforcement and educational efforts to protect wild fish.

Humpback chub.--There are no plans to stock this species in the Upper Basin at this time.

Bonytail chub.--The Proposed Action specifies that bonytail chub will be stocked immediately because this species appears to be in imminent danger of extinction in the Upper Basin. This action will benefit the fish by increasing their numbers as a measure to prevent extinction and will allow research to be conducted on the little-known ecological requirements of this species.

Razorback sucker.--Streamside propagation and stocking of this species is under investigation near Ouray, Utah, using wild adults from the Green River as broodstock. Measures will be needed to protect the resultant young from predation, because Lower Basin studies have shown that young razorback suckers are vulnerable to predation. It is assumed that releasing fishes of larger size will reduce losses from predation. Stocked razorback suckers will aid recovery prospects for the razorback sucker, and provide needed information about this species. No impact on the environment is anticipated with this effort.

Nonnative Fish Species and Sportfishing

Protection and management of rare fish may require control of nonnative species which prey on or compete with them. Such control measures will be evaluated by research. Potential control measures to favor rare fishes over competing or predatory nonnatives could include water management, limited poisoning, electrofishing to capture and remove nonnative fish, seining or trapping of nonnative fish, limitations on stocking nonnative fish, and regulation of sportfishing. There may be incidental mortality to the rare fish as a result of some of these control measures.

The Colorado squawfish and humpback chub are vulnerable to capture by sportfishing, a source of direct mortality or delayed mortality caused by angling stress. The predaceous Colorado squawfish appears to be especially vulnerable to capture by angling. In some years, as many as 10 percent of the Colorado squawfish in the Green River that were marked for various studies were reported caught by anglers. An information and education program that includes identification and proper handling of rare fishes could reduce mortality from sportfishing. If necessary, States could reduce sportfishing mortality by enacting regulations that restrict fishing in areas where rare fishes concentrate or where losses due to angling are significant.

Research/Monitoring

Research and monitoring efforts can result in occasional mortality to individual specimens. However, researchers minimize mortality wherever possible. In addition, research and monitoring activities are controlled by an endangered species permit system administered by the Service. Because of this, no significant impacts to rare fish populations as a whole are anticipated.

ENVIRONMENTAL CONSEQUENCES OF THE "NO ACTION" ALTERNATIVE

Overview

Although protective measures will continue, research and recovery programs under the "No Action" alternative will be undertaken at a lower level of effort than under the Proposed Action. Protective measures should ensure that the rare fishes do not become extinct, but reduced research and recovery programs may not be sufficient in scope or timely enough to recover the listed fishes. The Service expects that the Colorado squawfish, humpback chub, and bonytail chub will remain on the endangered species list and that the razorback sucker would be federally listed to prevent its extinction.

Habitat Management

As in the Proposed Action, adjusted water releases from Federal reservoirs will benefit rare fishes in the Green and Colorado Rivers, provided these releases are protected from diversion. But, without special Congressional funding, it is unlikely that water will be purchased to guarantee instream flows in critical reaches where there are presently no Federal reservoirs. This could result in adverse impacts to rare fishes in low water years. However, Section 7 consultation will ensure that instream flows are not depleted to a level that would jeopardize the fishes. Even if funds did become available for acquiring instream flows for rare fishes, the delay in establishing instream flow requirements could increase the expense and legal difficulties in procuring instream flow rights.

Research efforts to determine the year-round flow requirements of rare fishes in the Upper Basin will continue, but at a slower pace. Uncertainties regarding instream flow needs of the rare fishes could result in jeopardy opinions under Section 7 of the Endangered Species Act.

Habitat Development and Maintenance

Habitat development and maintenance actions will be undertaken, but over a longer period of time than under the Proposed Action. Impacts will be similar to those in the Proposed Action, only they will occur more slowly. Fish passageways could allow fish to migrate to and from spawning or wintering areas in instances where instream barriers block this movement. Constructing

a fish passageway might be practical on existing or proposed low-head diversion dams. However, the high cost of retrofitting large dams with a fish passageway may discourage this activity.

Stocking of Rare Fish Species

To date, only limited propagation and stocking efforts have occurred or been planned. In the future, propagation and stocking efforts will proceed at a slower pace than in the Proposed Action. Current research indicates that recruitment may not be adequate for all rare fish species, particularly the bonytail chub and razorback sucker, and if left as is, continuing adult mortality would eventually lead to extinction. The "window of opportunity" for developing and maintaining a genetically diverse hatchery population will shrink each year, increasing technical difficulties and financial costs in creating a successful propagation and stocking program. As the genetic diversity of the wild population decreases, so does the opportunity to establish a genetically diverse captive broodstock.

Nonnative Fish Species and Sportfishing

Control of problem nonnative species will occur more slowly than in the Proposed Action. Such delay could adversely impact the rare fishes and increase future control costs.

Mortality to rare fishes from incidental take by fishermen is expected to continue, even if known concentrations of rare fishes are protected by State fishing regulations. State efforts to manage sportfishing to minimize incidental take of rare fish may occur more slowly. Reduced efforts in conducting education programs emphasizing proper fish handling and release practices might decrease the possibility of allowing sportfishing to continue in areas where rare fishes congregate, and could necessitate more sportfishing closures than under the Proposed Action to protect the rare fishes. Greater Federal intervention may become necessary, i.e., using Section 9 of the Endangered Species Act to minimize incidental take of rare fishes.

Research and Monitoring

Research and monitoring actions will continue, but at a lesser level of effort and slower pace than in the Proposed Action. These actions will result in mortality to individual specimens, but this mortality will have an insignificant impact on rare fish populations as a whole. The slower pace of research will have an adverse impact on the overall effort to recover the rare fishes, inhibiting the ability to identify and maintain habitat while it is available and before any additional degradation can occur.

C. Native Fishes (Other than the Rare and Endangered Fishes)

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

Overview

Warmwater native fishes could be impacted by the Proposed Action. Flow management efforts are anticipated to produce warmwater habitat conditions that more closely resemble pre-dam conditions in the Upper Basin. If flow changes are a more important limiting factor for warmwater native fishes than are interspecific interactions with nonnative fishes, flow changes might shift overall warmwater species abundance and composition of the Upper Basin toward the historic pattern, i.e., toward warmwater native species common in the past. However, the minor flow changes envisioned are unlikely to cause major shifts. If interspecific interactions are a more important limiting factor, control of problem nonnative species could benefit warmwater native fishes by reducing predation and competition. However, since problem nonnative species are likely to be controlled on a selective or limited basis, there should be only minor positive benefits to other native fishes, at best. Habitat development actions may benefit native minnows and suckers.

Coldwater native species found in the headwaters will not be impacted by the Proposed Action.

Habitat Management

The specific habitat requirements of the other native fishes are not well known. However, habitat management actions that partially recreate historic conditions may create opportunities for the return of a more historic warmwater native fish composition in the Upper Basin. Warmwater native fishes that have declined in modern times due to flow regime changes may increase in abundance. Adaptable native warmwater fish may experience no change in number. Given the minor flow changes assumed in this document, it is unlikely that there will be significant changes in native species composition due to habitat management actions. There will be no impact on coldwater native species in headwaters, since no management activities are planned in headwaters.

Habitat Development and Maintenance

Though habitat requirements of the other native fishes are not well known, some generalizations can be ventured in predicting impacts from habitat development and maintenance. Warmwater native minnows and suckers inhabit riverine reaches similar to those used by the rare fishes (see Table 5, Tyus, et al. [1982:64]), so it is probable that habitat development actions that benefit rare fishes will benefit other warmwater native minnows and suckers.

Backwater areas would be developed primarily for Colorado squawfish. If manmade backwaters are effective, the impact of these backwaters is expected to be the same for warmwater native minnows and suckers as for rare fishes,

i.e., if predation and competition by nonnatives can be controlled, these backwaters should benefit warmwater native fishes. Development of backwaters will have no impact on native fishes using other habitats, except for possible minor displacement by construction activities.

Native fish may use the fish passage facilities constructed for the rare fishes, providing access to upstream areas. If such a facility is constructed, follow-up studies will be conducted to determine the use of the facility by other fish species.

Stocking of Rare Fish Species

The stocking of rare fish may intensify interspecific interactions with other native fishes, but these impacts will be insignificant as the populations reach recovery. The immediate and local impacts of stocking will depend on the type, size, and number of stocked fish, as well as the time and location of stocking. In addition, there are other, complicating factors to be considered over the long term. There is a possibility that there may be an increase in any hybridization that might already be occurring, e.g., between bonytail and humpback chubs, or between razorback and flannelmouth suckers. This possibility will be addressed prior to stocking and evaluated afterwards. Young, stocked Colorado squawfish will provide prey for other fish, but those that survived to adult size will feed on other fish. Because the Colorado squawfish coevolved with other native species in the Colorado River (occupying the top predatory niche), it is unlikely that reintroduction of this native species would disrupt native populations in the long term.

Nonnative Fish Species and Sportfishing

The method(s) used to control predatory or competing nonnative fishes will determine impacts to native fishes. Nonselective control measures (e.g., toxicants) would kill all fishes in the treated area. The extent of the impact and the native species affected will be determined by the extent and location of the area treated. Nonselective control measures are likely to be used only in rare instances. If necessary, studies could be conducted to assess impacts. Selective removal methods (e.g., seining, electrofishing) to capture and remove specific nonnative species should have a positive impact on native fishes by reducing competition from and predation by nonnative fishes, though there may be minor incidental mortality to native fishes from such measures. Likewise, any curtailment of stocking of specific problem nonnative fishes could benefit native fishes by reducing future threats. By controlling predatory or competing nonnative fish species, these techniques are expected to provide minor, positive benefits to native species, overall.

Research and Monitoring

Although there will be losses of individual native fishes during sampling efforts, impacts to populations will be insignificant.

ENVIRONMENTAL CONSEQUENCES OF THE "NO ACTION" ALTERNATIVE

Overview

Problem nonnative species will be controlled at a slower pace, hence native warmwater species may decline as problem nonnatives continue to proliferate. Coldwater native species in headwater areas will not be impacted.

Habitat Management

Impacts will be virtually the same in the Green and Colorado Rivers as a result of refined dam operations. Native fishes in the Yampa and White Rivers may decline in abundance as future development depletes flows (Appendix D).

Habitat Development and Maintenance

Impacts will be similar to those in the Proposed Action though impacts may occur more slowly.

Stocking of Rare Fish Species

Impacts would be similar to those in the Proposed Action though they may occur at a slower pace.

Nonnative Fish Species and Sportfishing

Overall, there will be less control of problem nonnatives relative to the Proposed Action, allowing greater proliferation of nonnatives and more potential adverse impacts to warmwater natives from competition and predation. No impacts are expected for native coldwater species.

Research and Monitoring

Impacts will be virtually the same as those in the Proposed Action.

D. Nonnative Fishes (With Emphasis on Sport Fish)

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

Overview

Depending upon the situation, the Proposed Action could either benefit or adversely impact coldwater sport fishes as a result of changes in reservoir flow releases. The impact will depend on timing, amount, and fluctuation of releases. Mitigation for coldwater sport fish would be considered before finalizing dam regimes suggested under Section 7 consultation. The other four recovery elements will not affect coldwater sport fishes.

Recovery efforts for rare fishes may require a reduction in the abundance and distribution of nonnative warmwater fishes that prey on or compete with the rare fishes. The degree of adverse impact would depend on the control method used, the species involved, and the intensity of the control effort. Since the control methods are anticipated to be used on a limited or selective basis, impacts are not anticipated to be major.

Habitat Management

Coldwater fishes.--The assumed releases from Flaming Gorge Reservoir should not significantly affect sport fish in the reservoir. Although it would be possible for a substantial drawdown of Flaming Gorge Reservoir in the fall and/or winter to affect kokanee spawning along the reservoir shoreline, assumed flow releases are within normal operating criteria and are therefore unlikely to result in drastic reservoir drawdowns.

Future flows could affect fish and their habitat in the tailwater of Flaming Gorge Reservoir. The lower velocity and warmer water provided by the constrained summer flows will benefit stocked fingerling trout by improving survival and growth during this period. Higher water releases following this period, however, might adversely affect trout survival in the tailwater, depending on the manner and amount of excess water released. Excess water will be stored in average and high water years in order to meet the restricted summer flows. The release of excess water will depend on hydrologic conditions, e.g., releases would likely occur during October-December in a normal water year, during October-March in a high water year. There may be no excess water releases in a low water year.

High water conditions with associated high water velocities are generally detrimental to the survival of young trout, especially emergent fry. The severity of any impact will depend on Reclamation release schedules. Additional studies are being done to assess the effects of different flow releases on coldwater sport fish.

For Ruedi Reservoir, preliminary findings indicate that the additional releases recommended for endangered fish conservation purposes will cause some loss of brown trout spawning habitat. However, this loss is not considered

important because the quantity of spawning habitat remaining is greater than the amount necessary to sustain a quality trout population. In addition, if releases are made from Green Mountain Reservoir, impacts to brown trout spawning habitat will be reduced.

No negative impact to reservoir sport fish is anticipated from the Aspinall Unit under the proposed release pattern, since reservoir water level fluctuations already occur and would not be modified significantly. The supplemental releases will likely benefit trout in the tailwater area in dry years. However, if frequent adjustments in flow from the Aspinall Unit are such that the downstream river shows appreciable water level changes during summer, it is possible that newly emerged rainbow trout fry could be negatively affected.

Warmwater fishes.--Responses of warmwater nonnative fishes to altered streamflows are unknown so impacts cannot be predicted, though the minor changes in flow are unlikely to cause major impacts. The monitoring program could be used to detect population trends for these fish and to identify any adverse impacts if this becomes a concern.

Habitat Development and Maintenance

Coldwater fishes.--No impacts are anticipated because habitat development and maintenance actions will not occur in coldwater habitats.

Warmwater fishes.--Warmwater nonnative fishes that inhabit the mainstem rivers and major tributaries and do not prey on or compete with the rare fishes would benefit from habitat development and maintenance actions since these fish are also likely to use these diverse habitats. However, warmwater nonnative fishes that prey on or compete with rare fishes are likely to be removed from the artificial habitats if feasible (see following paragraphs on "Management of Nonnative Fish and Sportfishing").

Stocking of Rare Fish Species

Coldwater fishes.--No impact is anticipated because no stocking of rare fish in coldwater habitats will occur.

Warmwater fishes.--Any impacts on warmwater sport fish by the stocking of rare fishes will depend on the degree to which the stocked fish compete with or prey on other warmwater species. For example, the piscivorous Colorado squawfish may have a greater impact on other fish than the nonpiscivorous razorback sucker. It is not possible to predict impacts until further information is known about the types, sizes, and quantities of rare fishes to be stocked; the locations for stocking; and interspecific interactions between the rare and nonnative fishes.

Management of Nonnative Fish and Sportfishing

Coldwater fishes.--No impacts are anticipated since these actions will not occur in coldwater habitats.

Warmwater fishes.--Control of certain warmwater nonnative species in selected areas may be needed to minimize predation on and competition with the rare fish. If successful, this will adversely impact problem warmwater species. The degree of impact will depend on the control method used, the species involved, and the intensity of the control effort. However, these control methods are expected to be used on a limited and selective basis, and only where necessary. Stocking of problem nonnative species will be confined to areas where conflict with rare fishes can be avoided and where there is no possibility of the nonnative species expanding their distribution. This could ultimately eliminate any problem nonnative species that were stocked in the Upper Basin but have not established self-sustaining populations. Selective removal of problem nonnatives may also be feasible for some species. Since the relative abundance of a fish species usually decreases the higher up it is on the food chain, control methods may be able to reduce top fish predators (e.g., northern pike and walleye) if these species are vulnerable to capture at specific locations. Problem nonnative fishes that are ubiquitous in the Upper Basin will not be significantly impacted by control actions because the actions will most likely be confined to specific areas that are relatively small (e.g., backwaters).

Research/Monitoring

Coldwater fishes.--No impacts are anticipated since research and monitoring actions will not take place in coldwater habitats.

Warmwater fishes.--Although individuals may be taken during sampling efforts, overall, the impact on populations will be insignificant.

ENVIRONMENTAL CONSEQUENCES OF THE "NO ACTION" ALTERNATIVE

Overview

For coldwater fishes, impacts will be the same as those in the Proposed Action. For warmwater fishes, impacts will be similar to, but more gradual than, those in the Proposed Action due to the reduced level of effort.

Habitat Management

Impacts will be virtually the same as the Proposed Action for coldwater sport fishes. Impacts will be the same for warmwater sport fishes in the Green and Colorado Rivers as in the Proposed Action.

Habitat Development and Maintenance

As in the Proposed Action, there will be no impacts on coldwater sport fishes. For warmwater sport fishes, impacts will be similar to, but more gradual than, those in the Proposed Action.

Stocking of Rare Fish Species

As in the Proposed Action, there will be no impacts on coldwater sport fishes. For warmwater sport fishes, impacts will be similar to those in the Proposed Action though they would occur at a slower pace.

Management of Nonnative Fishes and Sportfishing

As in the Proposed Action, there will be no impacts on coldwater sport fishes. For warmwater sport fishes, impacts will be similar to, but more gradual than, those in the Proposed Action.

Research and Monitoring

Impacts will be virtually the same as those in the Proposed Action.

E. Terrestrial Biological Resources

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

The habitat management actions envisioned under the Proposed Action have the potential to affect terrestrial habitat dependent on river flows and water use. If habitat is affected, then wildlife species could be affected. The other four recovery elements are unlikely to result in impacts of concern. The potential impacts identified from refining Flaming Gorge operations are those expected in average or wet water years. The assumed operating constraints do not constrain Flaming Gorge operations in dry years.

1. Diked, managed waterfowl areas along the rivers

The availability of adequate water at the appropriate time is a major concern at diked waterfowl areas. Stewart Lake Waterfowl Management Area is not dependent on river flows, so impacts are unlikely from habitat management actions, except if extremely high flows are required from Flaming Gorge Reservoir. The two Browns Park areas and Ouray National Wildlife Refuge obtain most of their water directly from the Green River by gravity flow or pumping. Low river flows could make it difficult or impossible to maintain water levels in the impoundments. Exceptionally high flows could damage dikes and other structural features, however, low flows are more often the problem.

Diked, managed waterfowl areas are a major concern for two reasons. First, they are biologically important habitat. Water control capabilities enable these areas to provide relatively dependable habitat when adverse climatic conditions reduce nesting success or food availability in uncontrolled natural habitat. Management practices further increase waterfowl population density. Second, there is a governmental obligation to preserve these waterfowl areas. Browns Park Waterfowl Management Area was established with Federal funds to mitigate habitat losses caused by Flaming Gorge Reservoir Project. Browns Park and Ouray National Wildlife Refuges were established in part with funds contributed by hunters through purchase of migratory bird hunting stamps. Though these latter areas were not explicitly funded as mitigation under the Colorado River Storage Project Act, inundation of habitat by Flaming Gorge Reservoir was part of the reason for establishing these refuges.

The constrained summer releases assumed for Flaming Gorge Dam are not expected to affect nesting waterfowl. Canada geese typically nest from about March 1 through April 30. Most ducks nest later but usually have finished by late July. The critical nesting season will be finished by the time the summer flow regime is initiated.

The releases assumed for Flaming Gorge Dam could create difficulties in maintaining adequate water levels in waterfowl impoundments. Water control structures at the management areas were designed to accommodate

specific flow regimes; flows higher or lower than design parameters could create problems. For example, a hypothetical sustained Flaming Gorge release of 800 cfs will preclude diverting water at the two Browns Park areas. A hypothetical sustained 8,000 cfs release could cause flooding problems at Ouray National Wildlife Refuge if it coincided with high natural flows in the Yampa.

The constrained September releases are of particular concern. From a waterfowl management standpoint, it would be preferable to increase releases in early September rather than October. September is often a critical month for water supplied to managed waterfowl areas. Water units have evaporated to low levels and little water is available for fall migrants. This is also the time when river flows usually are at their lowest; in some years it may be impossible to pump at this time.

The assumed Flaming Gorge flow regime does not preclude filling of impoundments at the two Browns Park areas during the period of constrained releases. As noted in Section IV.A.1, neither the frequency or duration of minimum flows (800 cfs) is expected to increase under the assumed flow regime. The upper range of the summer flows (2,600 cfs), though marginal, appears acceptable for the Browns Park areas since flows near 2,000 cfs or more for a substantial portion of time will permit maintenance of water levels in impoundments. Pumping costs could increase, though, relative to some previous years. For future reference, it should be noted that an extended period of 800 cfs releases could lead to serious water management problems. Soils are quite permeable at Browns Park Waterfowl Management Area. If systems dry out, considerable water must be pumped just to resaturate the substrate before surface water begins to accumulate in the impoundments. The problem of permeable substrate occurs at other managed waterfowl areas, but to a lesser degree.

Effects of the assumed Flaming Gorge flow regime are more difficult to predict at Ouray National Wildlife Refuge because the refuge depends on flows from both the Green and Yampa Rivers. Reduced Flaming Gorge flows are likely to cause a problem only when combined with low Yampa flows. Gravity flow inlets at Ouray National Wildlife Refuge require a minimum of 3,200 to 4,000 cfs flow to fill; pumps can be operated in most cases at flows about 500 to 800 cfs lower than those required for gravity flows. (The above flows are not exact. They were obtained by correlating flows recorded at the Jensen Gage with river elevations required for refuge operations.)

Under the assumed flow regime in an average year, Green River flows at Ouray National Wildlife Refuge will average between 1,500 to 2,500 cfs in September, the driest month. In a wet year, September flows will average between 1,740 to 2,840 cfs. August flows will be 200 to 440 cfs higher in average and wet years, respectively. Water could still be pumped into the impoundments at the upper end of these flows, though it may stretch refuge capabilities. The constrained Flaming Gorge flows will increase pumping costs, but such costs can be minimized by keeping the refuge manager informed of flow regime changes so he can devise the most economic means for keeping impoundments filled at critical times of the year. In fact,

the Service fisheries office located in Vernal, Utah, maintains communications with the Ouray refuge manager on anticipated flow changes from Flaming Gorge. This working relationship is expected to continue.

It is expected that the summer curtailment of Flaming Gorge releases will result in increased reservoir releases in the fall. Increased fall flows could benefit all waterfowl habitat, especially managed areas, by helping maintain water levels during fall migration. Although September releases would be preferable, increased October flows should still benefit migrating waterfowl.

The managed waterfowl areas have been operating for several years under the assumed Flaming Gorge flow regime. The constrained flow regime has increased pumping costs, but these costs have been and can be kept to a minimum by good communication between the fisheries biologists and the refuge managers.

Flooding problems at Ouray are caused primarily by uncontrolled flows of the Yampa River. Therefore, the program should have little effect on flooding most of the time. A possible exception could occur if scouring flows are required. Releases of up to 8,000 cfs from Flaming Gorge are not expected to cause flooding problems in the waterfowl management areas. However, if scouring flow releases from Flaming Gorge coincided with high natural flows in the Yampa, this could intensify flooding problems at Ouray. For future reference, flow levels that would cause adverse effects at Ouray are summarized below:

Water overflows natural river banks	-	20,800 cu. ft./sec.
Tops Sheppard Protective Dike	-	33,400 cu. ft./sec.*

*All other bottoms will flood prior to this volume of water.

The potential impacts of scouring flows cannot be addressed at this point since the likelihood, magnitude, duration, and timing of such flows are presently unknown. Potential problems presented by possible future scouring flows would probably not be significant since reservoir management could be utilized to minimize overall impacts. However, careful planning and coordination with State and Federal refuge personnel on timing and magnitude of flows would be essential.

Purchase of water rights on the Yampa River will benefit Ouray National Wildlife Refuge by preserving flows that might otherwise be consumed by future water developers.

2. Natural riparian-wetland habitat along the rivers

In general, effects of proposed flows on natural riparian-wetland habitat probably will be similar to the effects described for managed waterfowl impoundments. Low summer flows will limit the amount of available habitat. However, low flows in late summer have been a natural occurrence in the Yampa and Green Rivers, historically. Both natural wetlands and the life cycles of waterfowl using them evolved around this flow pattern.

To a limited degree, the curtailment of late summer flows represents a shift back toward pre-dam conditions. Therefore, no drastic impacts are likely.

A natural flood plain is a dynamic ecosystem where channels migrate laterally, and alluvium is continually being eroded from one location and deposited in another. Most flood plain vegetation is adapted to these ever changing conditions. The immediate, direct effect of curtailed summer flows might be a reduction in amount of usable waterfowl habitat. However, the nesting of migratory waterfowl on the major river systems is relatively insignificant. In addition, reduction of daily fluctuations during the summer growing season could reduce bank erosion and eventually encourage expansion of riparian habitat into new areas.

If scouring flows are required during the spring or early summer, waterfowl nesting in natural habitat would be vulnerable to losses. Close coordination between waterfowl and fishery management efforts would be necessary to minimize potential conflict.

3. Irrigation-associated riparian habitat

Riparian-wetland habitat associated with irrigated agriculture potentially could be affected adversely if water rights are purchased and used for streamflow augmentation rather than irrigation. Agricultural wetlands tend to occur in relatively small units, and in some cases are partially supported by natural ground water as well as irrigation drainage and seepage. Much of this habitat occurs on privately owned lands and is not managed for wildlife. The quality of the habitat for wildlife varies considerably from place to place.

Areas in which preservation of agricultural wetlands is of particular concern are the Uinta Basin in the Duchesne River drainage of Utah and the Grand Valley on the Colorado River in Colorado. Water rights purchases would most likely occur in the Yampa River Basin and in the Grand Valley on the Colorado River. It appears that some Grand Valley agricultural wetlands have the potential to be negatively impacted by the Proposed Action. Local adverse impacts on agricultural wetlands caused by water purchases for streamflow augmentation might be offset by downstream benefits. For example, low flows in late summer are a frequent problem at Ouray National Wildlife Refuge and might be exacerbated by future water development on the Yampa River. If Yampa River water rights are purchased to preserve instream flows, future potential depletion impacts would be reduced. Actual benefits to the refuge would depend upon the amount of depletion prevented.

Alternatively, if conversion of irrigation water to instream use caused loss of agricultural wetlands, the potential exists for mitigating this loss by improving other wetlands. Because agricultural wetlands are basically unimproved and unmanaged, many of them are in less than optimum condition for wildlife. They could be expected to respond favorably to improvement measures.

4. Terrestrial wildlife

Potential impacts of the Proposed Action on waterfowl were discussed earlier. Other stream-associated wildlife, such as raptors, herons, egrets, sandhill cranes, whooping cranes, and numerous mammals, will not be affected significantly by the Proposed Action. Cottonwoods and other streamside bottomland habitat are not expected to change materially. In theory, lowered river flows during the summer growing season could lower the water table and affect the growth of cottonwoods and other terrestrial vegetation. However, from a practical standpoint, it is doubtful if such change would be noticeable.

A potential does exist for conflict between the Proposed Action and one site in Colorado's river otter restoration program. The river otter feeds extensively on fish, and could feed on endangered fishes within the same drainage. However, from a practical standpoint, the likelihood of serious or irreconcilable conflict is probably not great, since most areas in Colorado considered important for restoration of the river otter are outside the Colorado River Basin and would not be affected. An exception is the Gunnison River. The endangered Colorado squawfish occurs in the Gunnison River only in the lower reach near the confluence with the Colorado just above Grand Junction, Colorado. The river otter primarily occurs approximately 35 miles upstream where the Gunnison River and the North Fork of the Gunnison come together above Delta, Colorado.

Otters tend to prefer higher elevations where water quality is better and aquatic habitat is more productive than the turbid waters where squawfish normally occur. Also, otter populations seldom become very dense or concentrated even in good habitat. The possibility does exist that otters might take up residence in some critical aquatic area, such as a Colorado squawfish grow-out pond, backwater rearing area, or where squawfish are concentrated at the foot of a dam. If this situation developed, the problem otters could be trapped and moved. Also, it is not inconceivable that otters might provide a net benefit if their diet includes a preponderance of nonnative fish that prey on or compete with the native endangered fishes. The rare fish restoration program, therefore, is not likely to conflict significantly with the plans of Colorado for the restoration of the river otter.

The Colorado Division of Wildlife will need to consider potential conflicts with endangered fishes on a case-by-case basis as they carry out their otter reintroduction activities. The majority of the otter restoration program, which occurs on the eastern slope, will not be impacted by the Proposed Action.

ENVIRONMENTAL CONSEQUENCES OF THE "NO ACTION" ALTERNATIVE

Since flow releases from Federal projects will be the same under both alternatives, impacts to managed waterfowl areas, natural riparian-wetland habitat along the rivers, and terrestrial wildlife caused by altered dam

operations will be the same under both alternatives. There may be some differences between the two alternatives' impacts on terrestrial biological resources due to acquisition of water rights under the Proposed Action.

If funds are not forthcoming from Congress under the "No Action" alternative to purchase water rights, this will eliminate the possibility that agricultural wetlands could be adversely impacted through purchase of agricultural water rights for instream flow uses. However, it does not eliminate the possibility that agricultural wetlands might be impacted from conversion of agricultural water rights to other uses. Some irrigation water could be converted into municipal or industrial uses which might result in loss of agricultural wetlands. In addition, such a change would tend to be detrimental (to an unknown degree) to riparian habitat. The new water uses probably would be largely consumptive, providing little, if any, compensating benefits to downstream habitat. By contrast, water purchased under the Proposed Action for low flow augmentation, though locally detrimental, potentially could benefit habitat downstream.

In addition, a lack of funds to purchase water rights will make it more difficult to preserve Yampa River flows. If Section 7 consultation and/or other institutional arrangements were not able to preserve some measure of instream flows during the dry months, Ouray National Wildlife Refuge will probably experience lower summer flows under the "No Action" alternative than under the Proposed Action.

F. Other Endangered and Threatened Species

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

Uinta Basin hookless cactus. Due to the restriction of this plant's distribution to areas away from the flood plain, this plant will not be affected by program actions involving direct disturbance of the riparian zone. However, certain actions (jetty and fish passage construction, creation of backwaters and spawning habitat) may involve ancillary activities which could disturb areas outside the riparian zone. This type of incidental disturbance could impact the Uinta Basin hookless cactus if work is proposed in an area harboring a population of the species.

Since specific habitat development and maintenance sites have not yet been identified in the Proposed Action and will not be until after approval of the Proposed Action, the potential for this type of impact cannot be addressed at this time. Section 7 of the Endangered Species Act requires the Service to avoid activities which could jeopardize listed species. As activities identified in the Proposed Action are proposed for specific sites, it will be necessary for the Service and any other involved agency to ensure through Section 7 consultation that the Uinta Basin hookless cactus does not occur in that area or, if it does occur, that individuals of the species and its associated habitat are not disturbed in any way. Based on this, the Proposed Action is not expected to result in any significant impact to the Uinta Basin hookless cactus.

Kendall Warm Springs dace. Due to the isolated nature of this species' habitat and its location in the upper portions of the Green River system above Flaming Gorge Dam, the Kendall Warm Springs dace will not be subject to any impacts that could accrue to portions of the Upper Basin further downstream as a result of implementing the Proposed Action. Therefore, the Proposed Action is not expected to result in any impact to the Kendall Warm Springs dace.

Whooping crane. The Proposed Action should not affect any areas utilized by whooping cranes above Flaming Gorge Dam, since flow regulation and habitat enhancement will be emphasized for areas below Flaming Gorge. Below Flaming Gorge and within the Upper Basin, the riverine system does not serve as a primary use area by this species. This also is true at the Ouray Refuge; no dependence on the Green River has been documented, and all use of the refuge has been on a transient basis. Hence, the Proposed Action is not expected to result in any impact to whooping cranes in riverine areas.

Whoopers use nonriverine wetland areas and might possibly use agricultural wetlands. The quantity or quality of some of these wetlands could be reduced if the Proposed Action encouraged farmers to develop more efficient irrigation systems through its purchase of water or water rights. However, until the Proposed Action has reached the stage where specific irrigation waters or water rights are under consideration for purchase, specific impacts to whooping cranes cannot be meaningfully assessed.

Peregrine falcon. The Proposed Action potentially could impact the peregrine falcon through direct disturbance from site-specific habitat enhancement work, and through modification of the peregrine's prey base in some way as a result of flow manipulation or construction activities within the riparian zone. The Service believes that the effect on the prey base cannot really be addressed. Riparian areas within the Upper Basin currently experience and will continue to experience substantial fluctuations in flows throughout the year and across years. The Proposed Action is not expected to significantly alter current conditions to the point that prey utilized by the peregrine will become unavailable (see Section IV.E, Terrestrial Biological Resources).

As site-specific activities are proposed for various areas of the Upper Basin it will be necessary for workers to contact the appropriate Service Field Office and ensure through Section 7 consultation that their project will not affect peregrine falcons. This may require altering the location of the proposed activity to avoid an eyrie, or to avoid work while peregrines are present at the site. The above procedures will be followed as specific activities are proposed within riparian habitat, hence the Proposed Action is not expected to significantly impact the peregrine falcon.

Bald eagle. Bald eagles would be more vulnerable than other avian species to certain components of the Proposed Action because of their close association with the waterways of the Upper Basin, and dependence upon these rivers for major prey items. Actions which involve site-specific modification of riparian habitat create the potential for direct disturbance of bald eagles if carried out within close proximity of a nest or winter roost site, and for impact to the eagle's prey base if carried out within the foraging range of bald eagles. In addition, any manipulation of the flow regime that floods nest areas could potentially result in the loss of a pair's nest tree or the loss of suitable winter roost areas.

It will again be necessary for the Service to avoid disturbing nesting or wintering bald eagles by either altering the proposed location of activity, or by restricting the work to times the birds are not present. However, it may not be possible to avoid allowing high flows for a specific period of time within the vicinity of a bald eagle nest or roost site if such flows are considered necessary for creation or maintenance of endangered fish habitat. The Service assumes that areas containing bald eagle habitat have historically experienced substantial fluctuations in the flow regime at various times of the year. The assumed flow regimes will not significantly alter flow patterns from those that are already occurring and will not result in flows exceeding the current maximum within the Upper Colorado River System. Based on this, the Proposed Action is not expected to significantly impact the bald eagle.

ENVIRONMENTAL CONSEQUENCES OF "NO ACTION" ALTERNATIVE

For the Kendall Warm Springs dace, expected impacts will be same as the Proposed Action, i.e., none. For the Uinta Basin hookless cactus, peregrine falcon, and bald eagle, impacts will essentially be the same as those under the Proposed Action, though it should be noted that the "No Action"

alternative is likely to occur at a slower pace than the Proposed Action. For the whooping crane, expected impacts in riverine areas will be the same as those in the Proposed Action, i.e., none. Whooping cranes may be adversely impacted by loss of agricultural wetlands under the "No Action" alternative if farmers improve their irrigation systems to sell water to municipal and industrial interests.

G. Candidate Species

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

Due to lack of evidence of its occurrence within the Upper Basin in recent times, the Proposed Action is not expected to result in any impacts to the southwestern otter.

The long-billed curlew is not directly associated with riparian habitat. Therefore, the Proposed Action is not expected to result in any impacts to this species.

No information exists associating the western snowy plover with the main drainages of the Upper Basin. Based on this, it is assumed that the Proposed Action will not result in any impact to this species.

Most specimens of the yellow-billed cuckoo that have been taken in Colorado are of the eastern variety. It is suspected that the Upper Basin constitutes the eastern edge of the western yellow-billed cuckoo's range, and that significant populations of this subspecies do not exist within this area. Therefore, no impact is expected to occur to this subspecies as a result of the Proposed Action.

The Daggett County population of Spiranthes diluvialis could be affected by flow changes in the Green River. It is assumed that substantial fluctuations of flows in the Green River have occurred historically in this area both before and after the construction of Flaming Gorge Dam, and that the species has survived in accordance with these flows. The assumed Flaming Gorge flow regime will not substantially modify the current flow regime and will not result in flows higher than the current maximum. However, the species could be subject to impact from site-specific activities proposed in the immediate area of the plant. Candidate species receive no statutory protection under the Endangered Species Act. However, in carrying out the Proposed Action, the Service will make every effort to avoid any work that could cause the loss of individuals in this population or in any previously undiscovered one. Therefore, the Proposed Action is not expected to significantly impact Spiranthes diluvialis.

Due to its isolated range in cooler headwater streams, no aspect of the Proposed Action is expected to impact the Colorado River cutthroat trout.

ENVIRONMENTAL CONSEQUENCES OF "NO ACTION" ALTERNATIVE

For the same reasons provided in regard to the Proposed Action, the slower "No Action" alternative is not expected to result in any significant impacts to the southwestern otter, the long-billed curlew, the western snowy plover, the western yellow-billed cuckoo, Spiranthes diluvialis, or the Colorado River cutthroat trout.

H. Recreational Boating

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

Habitat management and habitat development and maintenance could potentially impact reservoir and river-based recreation in the Upper Basin. Modified reservoir operations and water acquisition will alter reservoir levels and river flows; instream habitat structures might create obstructions to river use.

Habitat Management Impacts

Ruedi: [Note: The impact findings presented here were derived from materials prepared by Reclamation for use at a public meeting on May 12, 1987, to address the sale of water from Ruedi Reservoir. These findings may be modified following public input. Final impact conclusions will be presented in an environmental statement to be completed by Reclamation next year.]

Ruedi Reservoir Impacts: The last 18 years of reservoir operations, which have included a 1982 water sale of 7,850 acre-feet and have not included any releases for endangered species, represent optimal operations for recreation because reservoir levels are not drawn down through the critical summer heavy use season. Reservoir levels under existing operational criteria will remain more than 80 percent full (85,000 acre-feet of storage) at the end of August in 32 out of 33 years. This is important because: (1) over 75 percent of all recreation use at the reservoir occurs between July 1 and Labor Day weekend (the first week in September), and (2) this provides for maximum surface area for boating activity. Fall and winter drawdown of the reservoir occurs in preparation for spring runoff, but there is relatively little recreational use in these seasons.

Many of the reservoir's recreational facilities are designed to operate only at relatively full reservoir levels. Facilities such as boat ramps at Deer Hammer Campground and the Aspen Yacht Club are inoperable or their usefulness is greatly diminished at storage levels below 85,000 acre-feet. The Ruedi Marina boat ramp would remain operable to 52,000 acre-feet. At a reservoir level below 52,000 acre-feet, all three reservoir boat ramps are out of the water. If this lower lake level occurs during the summer use season, reservoir recreational users would be significantly impacted.

Table IV-H-1 presents the probability of Ruedi Reservoir storage levels dropping below 85,000 acre-feet and 52,000 acre-feet under currently existing operations, a scenario of water sales without endangered fish releases, and a scenario of water sales with endangered fish releases.

The greatest impact to reservoir boating occurs because of the water sales themselves. The impact of endangered fish releases is to increase the probability of lake levels falling below 85,000 acre-feet by 2 percent in July

Table IV-H-1

Probability (in percent) of Ruedi Reservoir Storage Dropping Below 85,000 acre-feet and 52,000 acre-feet in July and August, Respectively

Storage (acre-feet)	Month	Existing Operations	Water Sales: Without Endangered Fish Releases	Water Sales: With Endangered Fish Releases
85,000	July	3	6	8
85,000	August	3	17	25
52,000	July	<1	<1	<1
52,000	August	<1	<1	<1

and 8 percent in August, i.e., lake levels will drop below the 85,000 acre-feet level an additional 2 out of every 100 years in July and an additional 8 out of every 100 years in August. The probability that reservoir levels will fall below 52,000 acre-feet is not increased appreciably by the water sales or the endangered fish releases. Consequently, the impact of the endangered fish releases on recreational boating will be that two of the three boat ramps will experience an increased probability of being inoperable (or have their usefulness greatly diminished) 2 percent in July and 8 percent in August.

Ruedi Reservoir Downstream Impacts: The Fryingpan River below the reservoir is primarily a fishing area, little used by floaters. Therefore, endangered fish releases are not expected to result in any noteworthy impacts to recreational boaters in the Fryingpan River, though there may be mildly beneficial impacts to boaters more downstream.

Flaming Gorge:

Flaming Gorge Reservoir Impacts: The releases assumed for this analysis for rare fish would cause negligible changes in reservoir levels. Since the constrained summer releases will cause the reservoir to remain at higher levels during the summer months, reservoir recreation may be positively affected.

Flaming Gorge Downstream Impacts: The constrained releases from Flaming Gorge could affect downstream rafters, when released in accordance with hydropower demands. Low releases of 800 cfs during the late evening hours resulting from low power demand will produce a trough in the release pattern that typically lasts 6 to 8 hours. As this trough travels downstream, fluctuation extremes dampen and result in minimum flows in Lodore Canyon of about 1,000 to 1,200 fs during the night.

The National Park Service and commercial river runners have advised that river flows be no less than 1,500 cfs for rafters. Their experience indicates that this minimum flow will reduce accidents that occur on the river and will provide the minimum flow for an acceptable river recreation experience. At levels less than 1,500 cfs, the National Park Service experiences a reduced

demand for river use and an increased rate of cancellations of scheduled trips at Dinosaur National Monument. In this analysis, the 1,500 cfs level will henceforth be referred to as the minimal level of acceptable flows.

The recreational boating area of greatest concern extends from the Gates of Lodore to Rainbow Park, a distance of about 35 river miles. Beyond Echo Park, the Yampa River contributes an additional 200 to 800 cfs to Green River flows. This analysis assumes that few accidents would occur as long as flows were above 1,500 cfs between the hours of 10:00 a.m. and 3:00 p.m. each weekday. In addition, the Yampa River is assumed to contribute 300 cfs to Green River flows in an average year. Each river mile was modeled for the critical 5-hour period. Figures IV-H-1 through IV-H-4 are graphs of flows at selected locations along the 35 miles of the Green River, with each mile having 5 critical hours of use. Total use therefore equates to 175 hour-miles.

The assumed releases will not cause river flows to drop below the minimal level of acceptable flows during prime rafting hours upstream of Jones Hole. The area of greatest impact extends from Jones Hole to Rainbow Park, a distance of about 10.6 river miles. In an average year, each mile in this section will experience flows which fall below the minimally acceptable range by 0 to 100 cfs for a length of time from less than 1 hour to almost 3 hours for a total of nearly 20 hour-miles. Flows will fall be below the minimal level of acceptable flows 11 percent (20 of 175 hour-miles) of the time in August and September. Commercial rafters may decide to use smaller craft for which 1,400 cfs is a satisfactory flow. However, such a decision will likely result in increased costs due to new boat purchases, reduced economies of scale from a higher boatman-to-passenger ratio, and higher trip costs.

In addition, reduced flows can be expected to decrease the quality of the rafting experience. As can be seen in Figures IV-H-1 through IV-H-4, peak flow levels are decreased 30 to 40 percent below normal levels between the Gates of Lodore to Rainbow Park. The value of this lost quality of experience is not quantifiable.

Recreational boating impacts due to constrained endangered fish releases will be less in wet and dry years. In wet years, Yampa River flows exceeding 400 cfs will allow rafters' minimum flow preferences (1,500 cfs) to be met or exceeded below the confluence of the Green and Yampa Rivers. In dry years, reduced river flows will be more a function of hydrologic conditions than constraints for endangered fish purposes.

Blue Mesa (Aspinall):

Blue Mesa Reservoir Impacts: Under the worst-case situation, assumed rare fish releases could drop Blue Mesa Reservoir levels 5 feet. In and of itself, this should not result in impacts to reservoir boating. However, it is possible that during a dry year, normally low reservoir levels combined with up to a 5-foot drop due to rare fish releases could drop reservoir levels below the 7,489-foot elevation. This would cause potential problems for activities such as sewage pumping from the marina and providing access from parking areas and campgrounds, and reduced reservoir surface area. However, since the assumed releases would be made no more frequently than 15 percent of

FIGURE IV-H-1
GREEN RIVER
BELOW FLAMING GORGE DAM
AT GATES OF LODORE

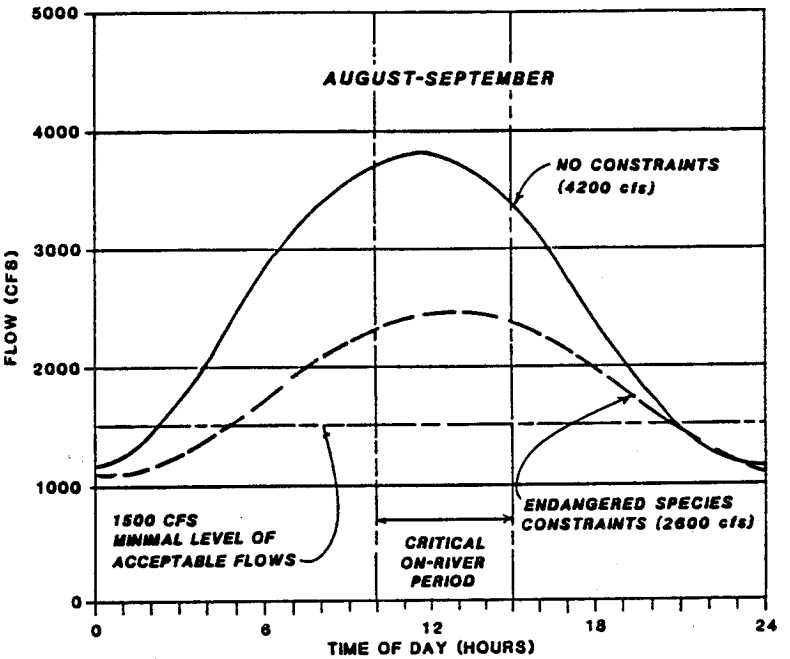


FIGURE IV-H-2
GREEN RIVER
BELOW FLAMING GORGE DAM
AT HELLS HALF MILE

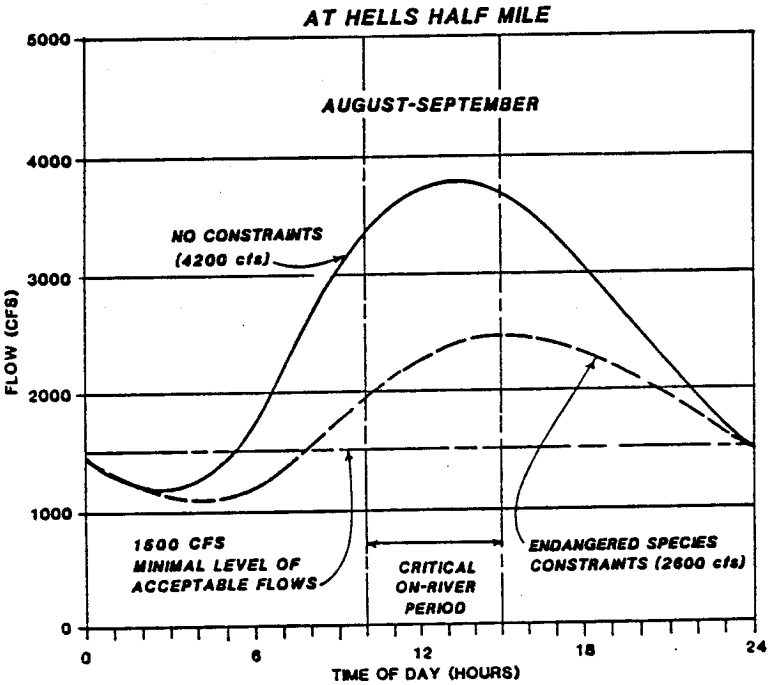


FIGURE IV-H-3
GREEN RIVER
BELOW FLAMING GORGE DAM
AT JONES HOLE

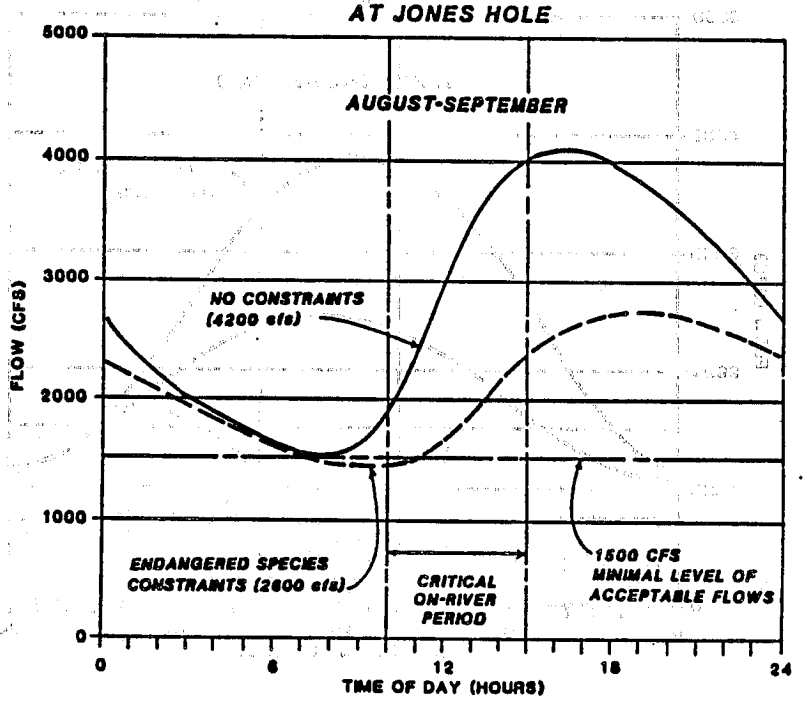
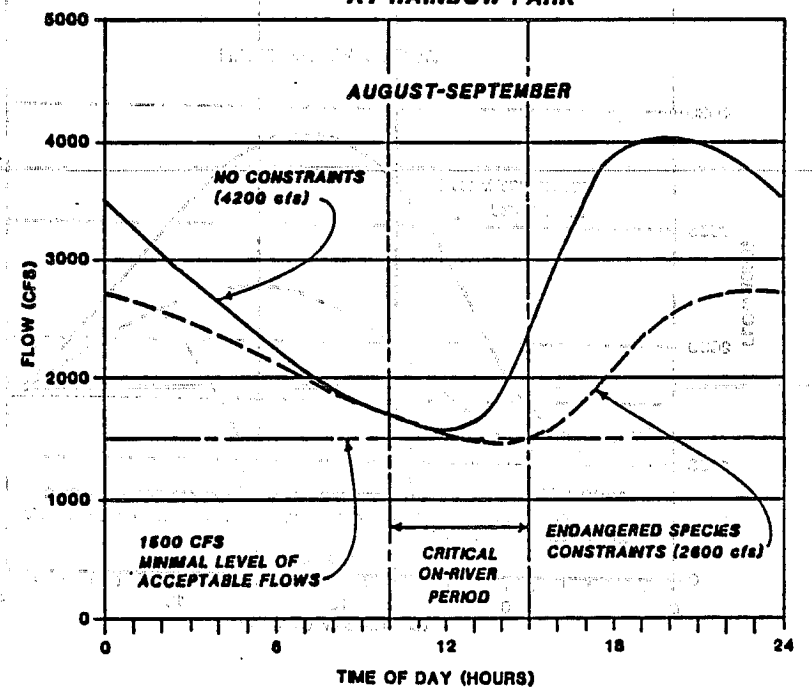


FIGURE IV-H-4
GREEN RIVER
BELOW FLAMING GORGE DAM
AT RAINBOW PARK



the time by the year 2040, and a 5-foot drop is the maximum possible drop associated with these releases, such problems would occur very infrequently, if at all.

Blue Mesa Downstream Impacts: Under existing conditions, summer flows often drop below the 700-800 cfs minimum level desired by boaters. Current operating practices at the Aspinall Unit have attempted to ensure at least a 300 cfs minimum for fishery purposes. The assumed flow releases, combined with the fishery releases, could enhance Gunnison River flows downstream of the Aspinall Unit, and perhaps benefit rafters. Specifically, releases from the Aspinall Unit will increase or maintain total flows in the Gunnison River below the Gunnison Tunnel up to 700 cfs in dry years in August and September. This would provide flows for a minimally acceptable rafting experience for small rafts in dry years, where before it would have been impossible to raft. In addition, Aspinall releases should also improve rafting conditions at Westwater Canyon in the Colorado River in dry years.

Acquisition of Water Rights:

Water rights may be acquired on rivers such as the Yampa and White Rivers. If acquired from consumptive users, these rights will provide additional flows that could improve the quality of the rafting experience or extend the rafting season. However, until further research is completed on rare fish flow needs, and specific water rights are under consideration for purchase, it is not possible to determine the degree which future water rights acquisition would benefit rafters.

Habitat Development and Maintenance

The only habitat development action that might conceivably have an impact on rafters would be jetty construction. However, until a specific jetty size and location are proposed, impacts to rafting cannot be determined.

ENVIRONMENTAL CONSEQUENCES OF THE "NO ACTION" ALTERNATIVE

Impacts resulting from modified Federal reservoir operations are expected to be the same under the "No Action" alternative as under the Proposed Action. Impacts from habitat development and maintenance actions will be similar under the two alternatives. There would probably be no purchase of water rights by the Federal government on the White or Yampa Rivers. However, Section 7 consultation could preserve some instream flows, which might benefit rafters.

I. Sportfishing

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSE ACTION

Overview

Habitat management actions have the greatest potential for impacting coldwater sportfishing due to reservoir drawdown and adjustments to reservoir water releases. The magnitude of specific impacts are unknown, though studies are being conducted at Flaming Gorge to address this possibility. Impacts could be insignificant, positive, or negative, depending on the time of year and the amount of water released. For example, constrained summer releases from Flaming Gorge Dam are likely to benefit the tailwater trout fishery, whereas augmented fall/winter releases may be detrimental. No significant impacts are anticipated to coldwater sportfishing from the other recovery elements in the Proposed Action.

Negative impacts to warmwater sportfishing could result from control measures used to protect rare fishes. The type and magnitude of the impacts will be determined by whether a particular species is shown to prey on or compete with rare fishes, the degree to which a problem sport fish must be or can be controlled, and the type of control measures used (see Section IV.D., Nonnative Species). This program will implement control measures in a judicious manner, hence significant impacts are unlikely to important sportfishing opportunities.

Habitat Management

Coldwater sportfishing.--No significant overall impact is anticipated to sportfishing in Flaming Gorge Reservoir from the assumed flow releases. The flows below Flaming Gorge Reservoir will be lower than normal from late July through September. This will benefit stocked fingerling trout growth and survival in the tailwater during this period and will provide better fishing conditions for anglers by making fish more accessible. Increased fall/winter flows could decrease the quality of sportfishing by increasing trout mortality. Increased winter flows may have a negative effect on the survival of juvenile-size (<300 mm total length) trout. These fish could experience additional winter mortality due to greater expenditures of energy reserves under the higher winter flow conditions (Jim Johnson, Utah Division of Wildlife Resources, personal communication). Studies are being conducted to assess impacts on tailwater trout populations below Flaming Gorge from different flows.

Impacts to sportfishing in Ruedi Reservoir and its tailwater fishery are being evaluated in the Addendum to the Supplement to the Fryingpan-Arkansas Final Environmental Impact Statement being prepared by Reclamation. Preliminary analyses indicate some loss of spawning habitat for brown trout in the tailwater will occur as a result of the recommended flow releases. This loss is not considered important to the trout population because the quantity of remaining spawning habitat exceeds that necessary to sustain a quality trout

population. However, the increased flows will reduce the percentage of the river that can be easily waded while fishing. Thus, under conditions of very high angler demand and increased river flow, some anglers may not have the opportunity to wade some parts of the river. Additionally, data show that as river flows increase, the catch rate of trout by anglers decreases. This may result from the greater distribution and lower density of fish at higher flows. Reclamation has agreed to consider shifting some of the responsibility for endangered fish releases from Ruedi to Green Mountain Reservoir to minimize impacts to the Fryingpan River trout fishery. In addition, Reclamation will evaluate the impacts of the endangered fish releases from Ruedi Reservoir on the economy of the Roaring Fork Valley.

No impacts to sport fish are anticipated from assumed Aspinall Unit releases other than beneficial effects on the tailwater fishery in dry years. However, if future flow requirements are suggested for the spring, with frequent adjustments in flow such that the downstream river shows appreciable water level changes during April and May, it is possible that newly emerged brown and rainbow trout fry could be negatively affected (Barry Nehring, Colorado Division of Wildlife, personal communication).

Warmwater sportfishing.--It is not possible to predict the specific impact of altered flows on warmwater sport fish, though minor flow changes are unlikely to cause major impacts. Therefore, there are unlikely to be major impacts on warmwater sportfishing.

Habitat Development and Maintenance

Coldwater sportfishing.--No impacts are anticipated since habitat development and maintenance actions will not occur in coldwater habitats.

Warmwater sportfishing.--Habitat improvement structures (for example, jetties) could provide additional areas to fish from shore, especially where dense bank vegetation would otherwise limit the number of fishing locations.

Stocking of Rare Fish Species

Coldwater sportfishing.--No impacts will occur because rare fishes will not be stocked in coldwater habitats.

Warmwater sportfishing.--Because it is not possible to predict impacts of stocking of rare fishes on warmwater nonnative fish, it is not possible to predict impacts on warmwater sportfishing (see Section IV.D).

Nonnative Fish Species and Sportfishing

Coldwater sportfishing.--Insignificant impacts are anticipated because these management methods will not occur in coldwater habitats, though there may be a need to conduct interpretation and education efforts in transition zones between cold and warmwater habitats to avoid incidental killing of rare fishes by trout fishermen.

Warmwater sportfishing.--Sport fish management is likely to include control measures for warmwater predatory species, which could reduce sportfishing opportunities for these fishes. Control measures removing fish from specific locations or curtailing stocking of problem warmwater species could affect species that are limited in number and distribution, thereby reducing sportfishing opportunities for these fishes. However, these control measures are likely to be very limited in application. Actions directed toward removal of fishes ubiquitous in the Upper Basin will have an insignificant overall effect on sportfishing for these fishes because removal efforts would be restricted to small areas. Curtailment of stocking of nonnative species that prey on or compete with rare fishes would reduce and might eliminate sportfishing for these species in some areas of the Upper Basin.

Sportfishing would be impacted at locations where State regulations must prevent fishing in order to protect known concentrations of rare fishes (e.g., at spawning grounds, in water at the downstream face of dams, etc.). Sportfishing could be impacted on either a temporary or permanent basis depending on the circumstances at each location (i.e., the length of time fish are present, vulnerability of rare fishes to angling, the degree of public adherence to the requirement to release endangered fishes, etc.). However, these are commonly used management practices in sport fishery management and are usually acceptable to anglers. There is one example of local conflict caused by a management regulation, which was resolved the next year. The Colorado Division of Wildlife issued a closure for trout fishing in the first 400 yards of the tailwaters below Taylor Draw Dam on the White River in 1985 because Colorado squawfish were concentrating below the newly constructed dam and were being caught and killed by trout anglers (Martinez 1986). However, in 1986, the Colorado Division of Wildlife implemented an information and education program to alert anglers to this rare fish and the trout fishery was not closed because Colorado squawfish were returned to the water by informed The resolution of this local sportfishing issue demonstrates the opportunities for compatible management.

Sportfishing control measures will be implemented in a judicious manner, with due consideration for sportfishermen concerns. Important sportfishing opportunities are unlikely to be significantly impacted due to State and Service participation in the program.

Restrictions on the use of live fish for bait are in effect for Upper Basin waters in Utah, Colorado, and Wyoming. In addition, stocking of potential problem fish species is currently restricted. The continuation of these restrictions will therefore have no additional impact on sportfishing.

Research/Monitoring

Coldwater sportfishing.--No impacts are anticipated since these efforts will not affect coldwater fishes.

Warmwater sportfishing.--No discernible impacts are anticipated.

ENVIRONMENTAL CONSEQUENCES OF THE "NO ACTION" ALTERNATIVE

Overview

Impacts to coldwater sportfishing will be the same under the "No Action" alternative as under the Proposed Action, because actions affecting coldwater sport fish would be the same under both alternatives. Impacts to warmwater sportfishing will occur as a result of measures used to control problem warmwater nonnatives and minimize incidental take of rare fishes. Overall, adverse impacts will occur more slowly to warmwater sport fish from the "No Action" alternative due to the reduced nonnative species control effort relative to the Proposed Action. However, there might be a greater negative impact on warmwater sportfishing opportunities if strong protection efforts are needed in warmwater fishing areas where there is a high degree of incidental take of endangered fishes by fishermen.

Habitat Management

Impacts will be the same on coldwater sportfishing as those described in the Proposed Action. As in the Proposed Action, it is not possible to predict specific impacts on warmwater sportfishing, though impacts are unlikely to be major.

Habitat Development and Maintenance

As in the Proposed Action, no impacts are expected to occur to coldwater sportfishing. For warmwater sportfishing, impacts will be virtually the same as those under the Proposed Action, though they will occur more slowly.

Stocking of Rare Fish Species

Coldwater sportfishing.--As in the Proposed Action, no impacts are anticipated because these efforts will not occur in coldwater habitats.

Warmwater sportfishing.--As in the Proposed Action, it is not possible to predict impacts on warmwater sportfishing.

Nonnative Fish Species and Sportfishing

Coldwater sportfishing.--As in the Proposed Action, there will be no impacts to coldwater sportfishing.

Warmwater sportfishing.--Impacts to warmwater sport fish will be similar to those anticipated under the Proposed Action, but on a smaller scale due to the lesser level of effort. Although the Service will continue to implement its policy limiting stocking of nonnative fishes to areas where there will be no conflict with rare fishes, States may not be as aggressive in implementing information and education programs, managing nonnative fishes that prey on or compete with rare fish, or developing sportfishing restrictions to protect

rare fishes from incidental take. If there are warmwater fishing areas with high incidental take of rare fishes, strong Federal protection efforts limiting sportfishing could become necessary.

Research and Monitoring

Impacts will be virtually the same as those described under the Proposed Action.

J. ELECTRICAL POWER GENERATION

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

1. Background

Section 7 consultation is expected to result in flow refinements which could affect generating facilities at Flaming Gorge Dam and the Aspinall Unit. Final flow recommendations will be prepared after research is completed. Section IV.A.1. discusses the flow releases assumed for these facilities, including caveats in using these assumptions.

Flow refinements could affect the amount of generating capacity and/or timing of total energy produced at Flaming Gorge and Aspinall. This analysis estimates the impacts of the assumed flow refinements at these facilities on Western, electricity distributors, and ultimate consumers. For simplicity, impacts will be described as revenue impacts, wholesale power costs and societal impacts and, finally, retail rate impacts.

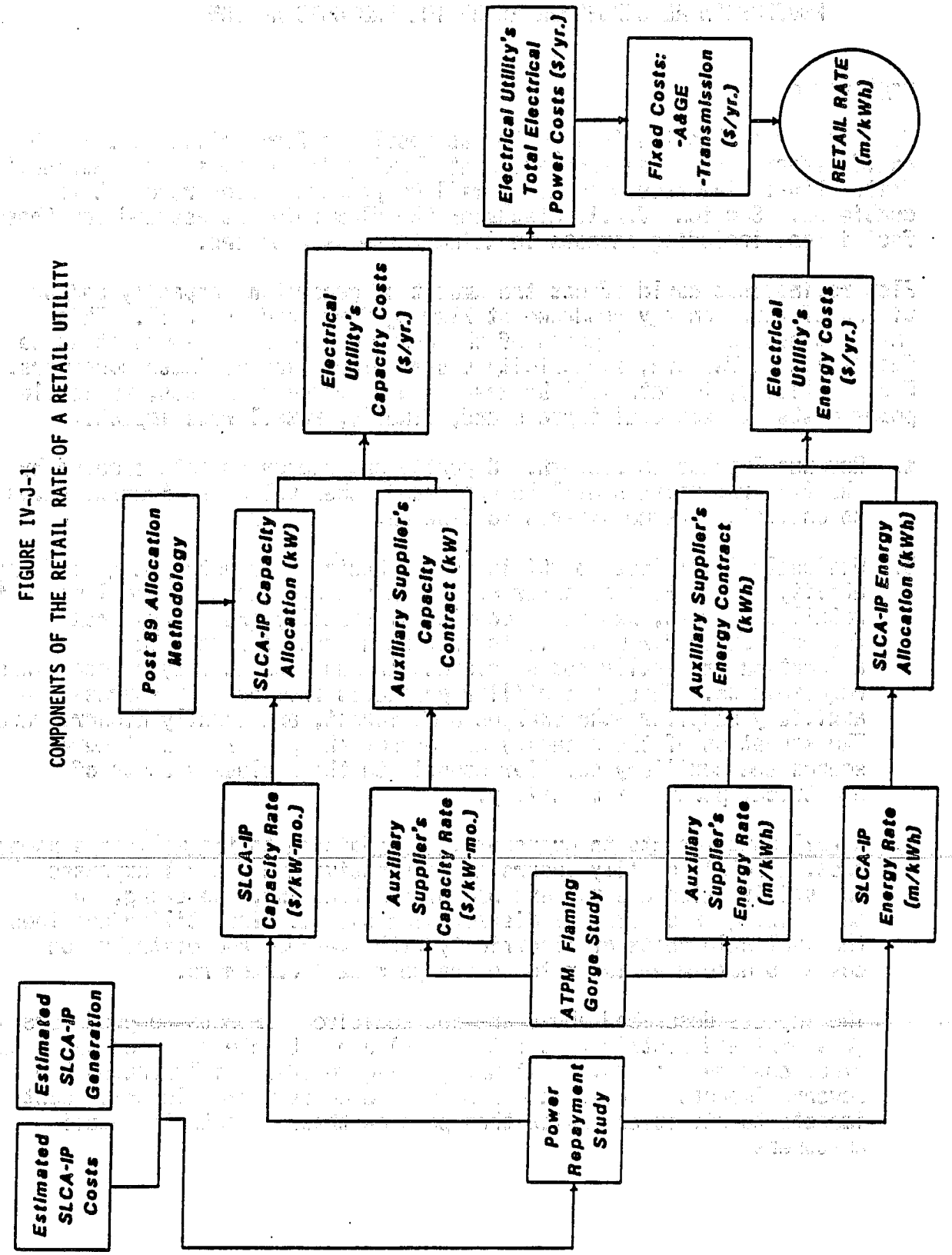
a. Revenue Impacts to Western. Capacity and energy impacts created by the flow refinements will be estimated, then valued at Federal rates to estimate revenue impacts to Western.

b. Wholesale Power Cost to Utilities and Societal Impacts. A qualifying utility with a Federal contract, which distributes electrical power to retail customers, has an allocation of capacity and energy from a Federal source for which it is charged a Federal rate. This allocation is usually not sufficient to meet the utility's total load requirements. Thus, the utility purchases from another source--the auxiliary supplier--who charges a different, and usually higher, rate. The summation of the capacity and energy charges from the Federal source and auxiliary supplier constitute the wholesale costs of electrical power for a utility.

c. Retail Rate Impacts to Customers. In addition to the wholesale power cost, a retail utility incurs administrative and general expenses. The utility also has the expense of constructing, operating, and maintaining an electrical distribution system. The utility combines the wholesale costs of electricity with overhead and distribution costs to determine the rate to charge retail customers.

The impacts described above are not additive. Impacts to producers (Western) and distributors (utilities) are ultimately passed on to the final consumers (retail customers). Figure IV-J-1 illustrates how revenue impacts to Western can be passed on as wholesale power cost impacts to utilities, which then pass on these impacts to retail customers.

FIGURE IV-J-1
COMPONENTS OF THE RETAIL RATE OF A RETAIL UTILITY



2. Short-term Impacts (1989-1999)

Under the assumed flows (See Table IV-A-2), there would be potential short-term financial impacts to Western from partial loss of summer capacity at Flaming Gorge and rescheduled generation at Flaming Gorge and Aspinall. These short-term revenue impacts will eventually be recovered in a rate adjustment. The rescheduled generation may also be viewed as a short-term societal impact, since society places different values on energy based on time of year or day. The following paragraphs discuss these impacts further.

a. Flaming Gorge Unavailable Capacity

Western's SLCAO has marketed the combined resources of three Reclamation projects beginning in 1987. Final allocations of capacity and energy for a marketing period beginning in 1989 have been determined and published in the Federal Register on April 2, 1987 (corrected on May 20). This is the final step prior to the negotiation and letting of contracts for this resource.

Under the assumed flow regime, one generating unit would be made unavailable at Flaming Gorge beginning in July and lasting into September.

Generating units at Flaming Gorge are expected to be uprated to a nameplate capacity of 50 MW each. However, the availability of capacity at any hydroelectric facility depends on hydrologic conditions. For the purposes of these studies, Western estimated that the marketable capacity available from one of these uprated units at Flaming Gorge is 47 MW, assuming that the uprated capacity of the Flaming Gorge generating units is available with the same probability as the CRSP system as a whole. The August marketable capacity at Flaming Gorge would therefore be 5.38 percent less than the nameplate capacity using the same probability level used to determine marketable capacity for the CRSP [Western 1985].

The new marketing plan for SLCAO resources, which becomes effective in 1989, allows for a possible adjustment of both capacity and energy allocations in 1999, based upon the marketable resource. Western determines available marketable capacity for the 6-month summer season by using the peak summer month of August. Since restricted releases are assumed for late July, August, and September, there would be a reduction of marketable capacity for the entire summer season, under current marketing procedures.

Over the short term, it is assumed that Western would be able to market the 47 MW as excess capacity, and that this capacity would be sold at firm power rates. Using the proposed SLCA Integrated Projects' (SLCA-IP) demand charge ($2.09/kw-month), the annual lost revenue from 47 MW of unavailable capacity is estimated as:

$2.09/kw-month x 47,000 kw x 6 months = $589,380

b. Altered Operation Schedules at Flaming Gorge and Aspinall

The assumed flow refinements would result in rescheduled water releases, which in turn, would result in rescheduled electrical generation at Flaming Gorge and the Aspinall Unit. Although the total amount of energy (kwh) generated at each facility would be the same, Western's revenues would be affected because of the different monthly rates charged for nonfirm or surplus electrical power.

Flaming Gorge: The constrained releases at Flaming Gorge are assumed to reschedule 95,000 acre-feet of water (normally released in August and September) to be released during October-December, since Reclamation normally attempts to release water so that the CRSP reservoirs are low in January in order to accommodate the high runoff of the following spring. Ignoring any variation in reservoir head, this amount of water generates 35,081 MWh of energy at Flaming Gorge. Due to seasonal difference in electrical power rates, rescheduling this generation represents a revenue loss to Western. This analysis assumes that this small amount of energy would be sold as Fuel Replacement Energy, a product whose rate differs on a monthly basis. The calculation for the short-term annual revenue loss to Western is below:

35,081 MWh	x $0.025m/kwh (summer rate)	=	$877,025
35,081 MWh	x $0.01733m/kwh (fall rate)	=	$607,954
Difference			$269,071

Aspinall: Western prepared a draft in-house study--Impacts on the Aspinall Unit Power System as a Result of Maintaining Minimum Flows for Endangered Fish Species (Aspinall Fish Study) [Western 1987]. This study shows that the assumed flows at Aspinall would produce a revenue gain in dry years, since a slightly greater percentage of energy would be produced in the peak summer season due to the increased August-September releases. The magnitude of these beneficial effects was not estimated for the short term. Based on the long-term analysis, it is not expected to exceed $47,000 per year.

c. Cooperative Agreements with Other Utilities

The Inland Power Pool (IPP) is an association of some Western States' utilities organized to establish reserve levels and share power reserves. By pooling power reserves, members reduce individual reserve requirements for maintaining reliability. According to Western's agreement with the IPP members, generating capability above load can be sold as spinning reserve (a reserve requirement) to IPP members with insufficient reserves. Specifically, IPP members with surplus capability on a specific day share revenues acquired from those IPP members in deficit on that day. The share of an entity's revenue is in proportion to the amount of surplus that entity had as compared to the surplus of the entire pool.

Since this analysis assumes that the 47 MW of unavailable capacity at Flaming Gorge would be marketed entirely as excess capacity sales during the short term, loss of this capacity would have no effect on spinning reserve sales.

d. Operational Considerations

A further consideration must be given to the flexibility afforded Western when generation at Flaming Gorge is not restricted. Transmission capability in the Flaming Gorge area is limited. Generation at Flaming Gorge reduces the need to meet load requirements in Utah from generation facilities in Colorado and thus reduces the loading on Utah to Colorado transmission facilities. The economic impact of this factor escapes quantification but may affect Western's operations.

e. Short-term Revenue Impacts--Summary and Conclusion

To summarize, the short-term financial impacts to Western from the assumed flow regimes is as follows:

Flaming Gorge Unavailable Capacity:	$589,380
Flaming Gorge Rescheduled Generation:	$269,071
Aspinall Rescheduled Generation:	[Benefit not Estimated]
Total Annual Financial Loss to Western	$858,451

To place this short-term financial loss in perspective, this revenue reduction represents 0.95 percent of the Colorado River Storage Project's (CRSP) annual average revenue requirement of $90 million. There may be opportunities to reduce this impact through special intertie, purchase, generation, or other arrangements. The revenue loss may eventually be passed on as a slightly higher CRSP rate. Western believes that the utilities to whom Western sells this power are unlikely to pass on any increase in the Federal rate in the short term.

f. Societal Impacts

There would be no societal cost when excess capacity becomes unavailable. Instead, Basin utilities currently purchasing excess capacity from Western may purchase capacity from another supplier or use an existing thermal plant when 47 MW of Western's excess capacity becomes unavailable. While some revenue may change hands, the overall impacts to a typical Western customer would be insignificant.

There would be societal impacts related to the generation of energy. The energy market is much more responsive to changes in demand than the market for electrical capacity. The short-term societal impact is the value of rescheduled generation at Flaming Gorge and Aspinall.

3. Long-term Impacts (after 1999)

a. Revenue Impacts

Over the long term, Western would react to the short-term reduction in revenues by increasing the wholesale power rate. Western is required to set its power rates in order to just recover the cost of operating, maintaining, and repaying the capital expenses of the power systems that it markets. Therefore, Western would increase the SLCA-IP rate, and there would be no revenue impacts to Western.

b. Societal Impacts and Wholesale Power Cost Impacts

The assumed summer flow restrictions could impact wholesale electrical utilities in three ways:

(1) by increasing the SLCA-IP rate on the SLCA-IP power that these utilities purchase,

(2) by decreasing the amount of Federal capacity that these utilities can purchase in the summer season (47 MW).

(3) by altering the value of excess energy available from Federal resources. This change stems from rescheduled generation at Flaming Gorge and Aspinall.

Hence, Basin utilities would pay a small additional amount for the SLCA-IP capacity that they purchase. Moreover, these utilities are assumed to construct or purchase 47 MW of summer capacity from private or non-Federal public auxiliary suppliers to make up the unavailable firm power from the SLCA-IP resources. Finally, these utilities will change the seasonal patterns in which energy is generated or purchased to replace unavailable excess capacity or energy from Western. These conditions impact the costs for resources of the utilities.

The SLCA-IP rate increase will be described in the section which deals with retail rate impacts.

The lost Federal firm power will be analyzed in two steps: the first is to identify how a Basin utility would make up the lost power. The second is to identify the rate that would apply. In the long term, the assumption is made that the value of the lost power is equivalent to the cost of constructing an alternative thermal generating facility. Since excess power among electrical utilities in the RMPA is not expected to disappear until the late 1990's, it is assumed that if additional generating capability needs to be built, it will not need to be on line until after the turn of the century.

Rescheduled energy will be analyzed for Flaming Gorge and Aspinall. It is assumed that Basin utilities will compensate for this by rescheduling generation to meet existing loads.

(1) Societal Impacts at Flaming Gorge

(a) Unavailable Firm Power

Hydrogeneration lost at Flaming Gorge was valued using the Alternative Thermal Plant Method (ATPM). A summary of this study is included as Appendix E: Alternative Thermal Plant Study for Flaming Gorge. According to this study, lost power at Flaming Gorge is valued at $248 per kw-year, in terms of replacement cost. If this facility was operated to replace the entire 6-month block of marketable power made unavailable in the summer season, it would cost Basin utilities $5,835,050 annually.

(b) Altered Generation Schedule

As noted earlier, 35,081 MWh of August-September generation would be rescheduled to October-December. Since the value of October-December energy is less, there is a cost to society from having 35,081 MWh being produced in a less desirable part of the year. Western calculated the long-term cost of rescheduled generation using values from the ATPM for Flaming Gorge and used weighted dollar values for the months of August and September (summer rate) and the months of October-December (fall rate):

35,081 MWh x $0.02743m/kwh (summer rate)	= $962,272
35,081 MWh x $0.01733m/kwh (fall rate)	= $607,954
Difference	$298,189

(2) Aspinall Altered Generation Schedule

The Aspinall Fish Study summarizes an analysis prepared to identify operational changes at Aspinall as a result of the assumed Aspinall flows [Western 1987]. Once operational changes were described, dollar values representing the market value of the resource were assigned to the predicted changes. Essentially the assignment of value proceeded via an Alternative Thermal Plant valuation of each generating facility at Aspinall. Weights were assigned to this value to reflect seasonal variations in the value of capacity and energy. Weighted values were multiplied by the number of kwh identified as rescheduled generation. This study concluded that generation would be reduced during months of relatively low demand (and subsequently relatively low value) to months of higher demand and higher value, resulting in a net societal benefit of $47,000 annually.

(3) General Assumptions Discussed and Summary of Long-term Wholesale and Societal Impacts:

The assumption that the SLCA-IP resources would alter energy commitments to customers to reflect needed rescheduling of

generation is a stronger assumption than needs to be applied here. Contracts for SLCA-IP resources allow customers some flexibility in scheduling energy delivered from Western. Hence, Western's customers may not be directly affected by rescheduled generation at Flaming Gorge and Aspinall. However, Western may have to purchase energy to meet its customers' needs. Therefore, given existing load patterns, thermal energy suppliers will either need to reschedule generation to meet the demands of Western's customers or reschedule to meet Western's demands.

The above discussion brings out a more general point. Whatever assumptions are used relative to the reaction that Western or other utilities would have, the rescheduling of energy generated at Flaming Gorge and Aspinall affects the power generating industry. The value of this impact is measured by comparing current operating conditions in the industry with potential operating conditions after dam operations are refined following Section 7 consultation, and valuing this changed condition with market values. Therefore, the value of unavailable power from Flaming Gorge is the increase in the CRSP rate and the partial loss of use of 47 MW of generating capacity valued at thermal plant replacement rates. This is not to imply that a new generating facility would be built immediately to accommodate the unavailable power at Flaming Gorge, as other, less expensive, options may be available. The ATPM study is an attempt to measure the value of capacity to society. This value is not sensitive to the ultimate reactions of the utilities to unavailable power. It is, however, sensitive to any market changes created by these reactions. Hence, the difference between the impacts to society in the short term versus the long term.

The value of rescheduled generation at Flaming Gorge and Aspinall is the decrease in generation in one season multiplied by its market price in that season minus the subsequent increase in generation in the other season times its market price in this season. Since market rates are used here, the following is assumed to be an estimate of societal impacts.

The following is a summation of the value to society of the lost capacity and rescheduled generation. This estimate is based on the assumption that lost capacity would be replaced with a thermal facility, per Appendix E.

Flaming Gorge Unavailable Capacity:	($5,835,050)
Flaming Gorge Rescheduled Energy:	(298,189)
Aspinall Rescheduled Energy:	47,000
Future Value of Societal Impacts	($6,086,239)

There may be ways to reduce these impacts. For example, Western may be able to replace the lost 2-plus months of capacity by:

(1) exchanging power through intertie arrangements with another producer with a different peak season, (2) purchasing power from another producer, or (3) generating capacity temporarily using a gas turbine. By combining the 2-plus months of capacity provided through these means with the months of unaffected summer capacity, Western could continue to market a 6-month block containing 47 MW of firm power.

c. Retail Rate Impacts

This section continues along the methodological path described visually by Figure IV-J-1. It converts the costs described in the preceding section into changes in the retail rate for electrical power paid by the ultimate consumer.

(1) Change in CRSP Rate

The loss of revenues to Western will require that Western, in the long term, increase the SLCA-IP rate. The process by which Western determines the appropriate rate to charge for electrical power is called a power repayment study (PRS). This study estimates future costs and generation and assigns a rate for generation which develops sufficient revenue to pay the costs of the projects. The SLCAO completed a PRS to estimate the rate that would be applicable under the flow regimes assumed in this document. Specific assumptions were made by Western in completing the PRS:

- 50 MW of marketable power at Flaming Gorge was assumed to be unavailable during the entire 6-month summer season. Fifty MW was used in the PRS for computational use. The use of 47 MW, while more accurate, was not deemed to affect the result of the study.

- There were assumed to be no changes in the sales of surplus energy. As described earlier, there would be no reduction in energy production from rescheduled flows. However, rescheduling this generation from one season to another will affect its value. The PRS does not allow for seasonal variation in the estimated rates for surplus energy, since there is no mechanism in the PRS to accommodate the impact of lost revenues resulting from rescheduled generation.

Nevertheless, the PRS gives an approximation of the impact of revenue reduction on the SLCA-IP rate, the loss in revenues from unavailable power being more significant than revenue changes associated with rescheduled generation. The PRS concluded that reduced revenues are sufficient to cause an increase of 0.11m/kwh, increasing the SLCA-IP composite rate from the existing 9.92 m/kwh to 10.03 m/kwh, or a 1.1 percent increase.

(2) Assumptions Used

The PRS defined the change in the CRSP rate that would result from the refined flows. Following are additional assumptions regarding the SLCA-IP rate increase and calculation of retail rate impacts.

(a) Allocations of Federal power are assumed to decrease and replacement capability is required. The cost of the replacement capability was estimated to be $5,835,050 annually using the Alternative Thermal Plant Method. It is assumed that Basin utilities will fully pass on the SLCA-IP rate increase and the cost of replacement power to retail consumers.

(b) Representative Customers

Two representative customers were selected to represent retail rate impacts. The first of these is a hypothetical customer (HYPO 1) chosen to represent a typical Western customer. Recently, Western performed a statistical analysis based on a customer survey to determine some of the general characteristics of its customers [DOE 1985]. Northern Division customers serve an average of 70 percent of load through purchases from Western. The remaining 30 percent is either purchased or generated by fossil-fuel generating units. Impacts on this hypothetical customer will be considered typical. The auxiliary suppliers' rate for this customer will be those developed through the ATPM study of Flaming Gorge, adjusted for present value. This is consistent with the use of this study to identify market rates.

The second of these customers provides a specific example. The City of Truth or Consequences, New Mexico (T or C), purchases 90 percent of its power from Western's SLCA office. Sierra Electric Power Cooperative provides auxiliary power for T or C.

(c) Fixed Expenses

Another survey undertaken by Western [ibid] found that, among public utilities in the Upper Basin, 35 percent of the retail rate these customers charged was associated and general expenses or transmission expenses. It is therefore assumed in this analysis that 35 percent of the estimated retail rate charged by the representative customer are not costs associated with the purchase of capacity or energy.

3. Results of Retail Rate Analysis

The table below summarizes the estimated impact on the retail rate using the above assumptions:

Table IV-J-1
Impacts of the Assumed Flow Refinements on the Retail Rate

Customer	Estimated Rate w/out Flow Refinements (m/kWh)	Estimated Rate w/ Flow Refinements (m/kWh)	Rate Change (m/kWh)	Percent of Rate Change
Assuming 6 months of nonmarketable capacity are replaced with thermal facility:				
HYPO 1	50.60	52.67	2.07	4.09
T OR C	23.12	24.01	0.89	3.85

The details of the analysis summarized in the above table are in Appendix F: Impacts of the Assumed Flow Refinements on the Retail Rate. As Table IV-J-I shows, if a thermal facility similar to that described in Appendix E needed to be built, the flow refinements are estimated to increase the retail rates of a typical customer of Western (Hypo 1) by 4.09 percent. Also, it is estimated that the retail rate increase to the City of Truth or Consequences would be 3.85 percent. If one uses a "5 percent" criterion for determining significance, as was done in Western's 1985 Environmental Assessment [DOE 1985], these retail rate increases are not significant.

4. Operational Flexibility at Flaming Gorge

Western has suggested that electrical generation impacts could be reduced by allowing some operational flexibility at Flaming Gorge during the period of constrained releases. The effects on firm power could be reduced significantly if releases of up to 4,200 cfs could be permitted for periods of short duration (1-3 hours) to address spinning reserve needs, generate against inadvertent flow (unscheduled energy on a transmission line), reduce emergency transmission line overload on the system, or meet peak demand when demand is especially high. This would allow Western to maintain its marketable resources and eliminate need for replacement power valued at $5.8 million annual cost. If this idea could be implemented, the only remaining impacts to Western, its customer utilities, and consumers would be those arising from rescheduled generation (valued as a $298,189 annual economic loss at Flaming Gorge, and offset by a $47,000 annual economic gain at Aspinall over the long term). This would result in an estimated increase in retail rates of less than 0.2 percent.

Western, Reclamation, and the Service feel operational flexibility holds much promise for keeping electrical generation impacts to a minimum at Flaming Gorge, and are planning field tests in 1988 to investigate this option further. At a minimum, the field tests will need to examine the effects of ramping rate, duration, frequency, and timing on the rare and endangered fishes. Conclusions of the field tests to analyze ramping rate, duration, frequency, and timing will be considered in development of

the final recommendation for flows below Flaming Gorge. The blue-ribbon trout fishery immediately below the dam, and sportfishermen safety concerns are impacts not related to Section 7 consultation but should be considered in the overall systems management.

ENVIRONMENTAL CONSEQUENCES OF THE "NO ACTION" ALTERNATIVE

If the Proposed Action is not implemented, the CRSP dams in the Upper Basin will still undergo Section 7 consultation to ensure their operations do not jeopardize endangered fishes. The flow refinements will be exactly the same as those assumed under the Proposed Action, and the impacts on Western, Basin utilities, and retail customers will be exactly the same as those presented under the Proposed Action.

K. Social Considerations

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

Under the Proposed Action, a Recovery Implementation Committee will represent Federal, State, private water development, and conservation interests. It will oversee implementation of recovery actions and provide a basis for progress and stability through enhanced coordination, shared expectations, and a systematic plan of action. Both litigation and legislative battles will be avoided more often, as the Recovery Implementation Committee will provide a forum for resolving water use issues between water developers and conservationists.

Legal relationships will remain stable. Section 7 consultation will continue but will become a part of a comprehensive recovery program that evaluates each development proposal relative to specific recovery goals in the Upper Basin. The acquisition of instream flow rights for rare fishes will allow a more efficient and consistent application of existing Federal and State laws and regulations with a lower level of conflict.

The Proposed Action includes few site-specific details; therefore, only general impact conclusions can be drawn. In most instances, future site-specific actions will require National Environmental Policy Act compliance documents to be filed. Full implementation of the recovery elements is expected to have the following general social and economic effects:

Habitat Management

Once habitat and flow requirements are established, there will be a better scientific basis for decisions on habitat management. Necessary water rights will be acquired for water obtained from Federal sources, unappropriated sources, water savings, or willing sellers. Water will not be acquired by condemnation. Potential sources of water are shown in Table IV-A-1 and impacts from obtaining water from these sources are discussed in the following paragraphs:

1. Allocating and releasing water from new and existing water storage projects: Few impacts are anticipated since these allocations and releases will need to be compatible with the purposes and design of the projects.

2. Refining operations at existing and new Federal reservoirs: Depending on the nature of the refinement, there will be impacts on whitewater rafting, sportfishing, and electrical generation and revenues which are addressed in Sections IV.H through IV.J. Appropriate National Environmental Policy Act review will be undertaken for each Federal reservoir, if significant operational changes need to be made to accommodate the fish.

3. Modifying the use, timing, or location of existing developed consumptive water rights: The primary areas of interest for these efforts will be on those stretches of river not regulated by or below major storage reservoirs or in over-depleted critical reaches. Some agricultural and industrial water rights holders are expected to be willing sellers. It is anticipated that the most willing sellers of water rights will be those using water rights for marginally productive activities, or for whom the value of their water rights has diminished due to changed development expectations. Since the water rights will be acquired from willing sellers under the jurisdiction of State water courts, no major impacts are anticipated.

4. Federal or State filings on nontributary ground water that could be pumped into streams and original appropriations of instream flows in surface streams. These options will be explored under procedures established by the State water courts. These filings and appropriations will not be in conflict with existing uses and no significant impacts are anticipated.

Because instream flow rights will be acquired in accordance with State law, instream flow needs will be met within the context of existing uses and users. Future water development will be facilitated by a Section 7 consultation approach that emphasizes a systems perspective and works within the context of a defined recovery program intended to be compatible with development. This will be an improvement over current Section 7 consultation, which offers case-by-case solutions under a broadly defined protection goal.

The effect on people will be almost as diverse as the program itself. Conflicts between environmental groups and developers will be restricted to nondepletion issues, resulting in less litigation. Clarification of depletion-related issues, increased resources, and cooperation to implement solutions in a comprehensive systematic manner will allow development and recovery goals to be met through coordination rather than court action. With the high priority placed on municipal water, purchase and conversion of these water rights for instream flows is unlikely to be supported by the States. Agricultural water utilization will be more efficient, since marginal producers may be among the first to sell their water rights through willing seller transactions. Future provision of water development and environmental flow needs will be subject to less uncertainty. No direct impacts are anticipated on population, employment, or income as a result of habitat management actions, though resolution of depletion issues could facilitate regional water development actions.

All groups participating on the Recovery Implementation Committee will benefit from cooperative solutions to common problems. Potential impacts to water-based recreation and electrical generation from refinements in dam operation will need to be given due consideration prior to finalization of flow regimes. Federal management and regulatory agencies such as the National Park Service, Western Area Power Administration, Bureau of Land Management, Army Corps of Engineers, Federal Energy Regulatory Commission, Rural Electrification Administration, and the Forest Service will need to be consulted to ensure

compatible water management. The Uinta-Ouray Ute Tribe and the Bureau of Indian Affairs would likely consulted regarding the potential flow changes in the river adjacent to the reservation.

Habitat Development and Maintenance

Compared to water storage facilities' construction, a relatively minor, short-term effort will be necessary to develop and maintain rare fish habitat. Due to the relatively small size of these structures, minor, temporary, positive impacts will result to local employment and income from construction of these structures. No significant influx of population is expected as a result of the construction, and only a small impact on local infrastructure is anticipated.

Effects of these habitat development and maintenance actions on recreation, in terms of sportfishing and whitewater boating, are either minor or nonexistent. Site-specific analysis will be necessary during the planning phase of these facilities, as will coordination with local, State, and Federal agencies whose land is adjacent to the river. Cooperation will be sought with water user groups along the affected stretches of the river. No impacts on water rights and uses are seen as a consequence of this part of the program.

Stocking of Rare Fish Species

Artificial propagation and stocking of the rare fish species through the use of hatcheries and grow-out ponds as refuge areas, rearing areas, and as a source for a stocking program will have minimal impact on the human environment. The principal potential impact will be the construction of a specialized hatchery which will entail acquisition of water rights and will result in a minor impact on population, income, and the local infrastructure.

Nonnative Fish Species and Sportfishing

Efforts to refine flows from Federal dams and to manage problem nonnative fishes and sportfishing (coordinated through the States) could impact sportfishing. Information and education efforts will attempt to educate the public in order to minimize the need for restrictions and closures where incidental take of rare fishes is a problem. Potential impacts are discussed in Sections IV.D, Nonnative Fishes, and IV.I, Sportfishing. Management actions could affect local economies near popular fishing areas, but the significance of any impact cannot be determined until specific proposals are brought to light and site-specific National Environmental Policy Act analyses are prepared, as is being done for the second round of water sales proposed from Ruedi Reservoir.

Research, Monitoring, and Data Management

Research is needed to reduce the uncertainty and speculation currently plaguing water issues in the Upper Basin. A firmer funding base for research efforts will allow development of an essential scientific base for the direction and evaluation of preservation, recovery, or development proposals in a timely manner. A firm base for discussion, cooperation, coordination,

and conflict resolution will be provided by this element of the proposal. Indirectly, the impacts could be important since any one of the potential court cases which could be generated by the lack of the information could last for years.

ENVIRONMENTAL CONSEQUENCES OF THE "NO ACTION" ALTERNATIVE

The absence of comprehensive coordination, shared expectations, and a systematic recovery program will result in more adversarial relationships between public and private entities with interests in how the Upper Basin's resources are developed. Conflict resolution will more often take the form of litigation. Developers will likely find "reasonable and prudent" alternatives developed under Section 7 consultation to offset depletion impacts to incur a wide range of costs, creating financial difficulties or changes for some projects. The lack of a coordinated, comprehensive, and systematic recovery program with a stable funding base will result in smaller, more fragmented, and controversial actions done in a less timely manner.

Habitat Management

There will be no basinwide forum for the discussion of comprehensive long-term habitat management. Section 7 consultation will continue to develop solutions to depletion impacts on a case-by-case basis. Formulation of consistent "reasonable and prudent" alternative solutions to depletion impacts will be more difficult, while jeopardy opinions will be more likely due to conservative assumptions being required in the absence of timely biological data. Section 7 consultation will continue--but without firm funding for research, the necessary forum for discussion, and basinwide coordination among groups, the result of Section 7 consultation will be quite different. Litigation or legislative battles to change laws rather than cooperation will be more often used by developers and other groups to resolve conflicts.

Refinement of operations at existing and new Federal reservoirs will occur as described in the Proposed Action. Impacts on electrical generation and water-based recreation will be the same or virtually identical to those described in the Proposed Action.

The States are not currently active in securing non-Federal instream flow water rights to meet the needs of the endangered fish. Without State cooperation to protect instream flow rights, the recovery of the endangered fish must remain in doubt. A lack of funds for purchasing instream flow rights will impact proposed development in reaches without Federal dams, since there will be a greater probability of proposed depletions jeopardizing endangered fishes, resulting in a jeopardy opinion. In extreme situations (e.g., drought), Federal condemnation of an existing water right may have to be considered in these reaches as an alternative. Although this scenario will be avoided if at all possible, the resulting court case would create confusion over Federal versus State water right jurisdiction.

The effect on people will be a continuation of current trends with higher levels of conflict, uncertainty, and litigation. All water users will become more defensive, while environmental and conservation groups will find it necessary to be more aggressive in their actions. New proposals for development will have fewer opportunities and higher costs due to uncertainty of water availability and potential jeopardy opinions. Agricultural water utilization on marginal lands will continue at current rates in order to preserve water rights until such water could be sold for municipal and/or industrial uses. No direct impacts are anticipated on population, employment, or income, but opportunities for regional economic improvement based on potential development will be reduced.

Habitat Development and Maintenance

Impacts will be similar to those in the Proposed Action, only they will occur at a slower pace. Perhaps the one major difference will be that there might be fewer fish passage structures built due to funding limitations, resulting in fewer positive impacts to local economies.

Stocking of Rare Fish Species

Impacts will be identical to those discussed in the Proposed Action; however, they will proceed at a much slower pace.

Nonnative Fish Species and Sportfishing

Solutions to the issues raised by the presence of problem nonnative species will take longer to develop since predation and competition studies will progress at a slower pace due to funding limitations. Impacts will be similar to those discussed under the Proposed Action, though they will likely occur more slowly. If there was a lack of significant State progress in minimizing incidental take by fishermen, Federal officials may be forced to take a more direct role. Invoking Section 9 of the Endangered Species Act, rigorous enforcement by Federal officers may be necessary to ensure that incidental take is minimized. If this becomes necessary, cooperation among the affected Federal, State, and local officials with affected publics would deteriorate drastically.

Research, Monitoring, and Data Management

Research will proceed at a slower pace. The essential scientific basis for direction and evaluation of preservation, recovery, or development proposals will be lacking for a longer period of time, extending the period of uncertainty and speculation plaguing water issues in the Upper Basin. Debates over the status of the fish and what can and should be done will continue under the handicap of limited scientific information.

L. Archaeological/Cultural Resources

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

Although the Upper Basin is rich in historical, archaeological, and paleontological resources, it is unlikely that implementation of the Proposed Action will significantly affect these resources.

Extreme changes in flow regimes could adversely impact cultural sites located in or along riverbanks. For example, markedly increased flows could accelerate erosion of cultural sites located in riverbanks. Conversely, the total dewatering of a stream course could adversely impact cultural sites by increasing the probability of vandalism. Such extreme flow changes were not assumed for any of the Federal reservoirs, nor are extreme flow changes likely to result as an indirect consequence of the assumed release patterns. Therefore, significant impacts to archeological/cultural resource sites along the river are unlikely if future flow releases are similar to those assumed. If extreme changes in flow regimes were recommended in the future to protect and recover rare fish, these recommendations will trigger consultation under the National Historic Preservation Act of 1966 (36 CFR Part 800) which protects the Nation's historic and cultural sites by developing appropriate cultural mitigation measures.

Site-specific development actions such as the construction of backwaters or hatcheries could potentially affect cultural sites in the immediate vicinity of the action. As yet, it is impossible to predict the location of such site-specific actions. However, prior to implementation, these actions will be preceded by a full cultural resource inventory of the area and consultation under 36 CFR Part 800. The consultation will result in recommendations insuring that any adverse effect will be mitigated. Therefore, it is unlikely that there will be a significant impact to cultural resources from site-specific actions.

ENVIRONMENTAL CONSEQUENCES OF THE "NO ACTION" ALTERNATIVE

The "No Action" alternative is unlikely to affect archaeological resources for the same reasons listed in the Proposed Action, i.e. assumed flow releases are not extreme enough to impact cultural sites located in or along riverbanks, and any actions likely to impact cultural resources will be preceded by a full cultural resource inventory and consultation as required by law.

V. CONSULTATION AND COORDINATION

A. Development of the Proposed Action--Public Involvement
B. The Environmental Assessment--Public Involvement
C. The Proposed Action--Future Public Involvement

CHAPTER V

CONSULTATION AND COORDINATION

A. Development of the Proposed Action--Public Involvement

In August 1984, the U.S. Fish and Wildlife Service, Bureau of Reclamation, and States of Colorado, Utah, and Wyoming formed the Upper Colorado River Basin Coordinating Committee. Their goal was to develop a program to resolve the Section 7 conflict between endangered species preservation and water development in the Upper Basin in a manner that fully acknowledged State water rights systems and interstate compacts.

With assistance from representatives of private development and conservation organizations, the Coordinating Committee developed the basic program framework. The concepts and recommendations included in the Recovery Implementation Program were developed from items in previous plans (e.g., recovery plans, conservation plan, State plans, etc.) or from other documents pertaining to resolution of the Section 7 conflict or protection/recovery of the listed fish (e.g., biological opinions). A comprehensive list of these items was developed from all available published sources or identified by participants in the coordinating process, and reviewed and analyzed by the task group for inclusion in the program, as appropriate.

In March 1986, a preliminary draft entitled, "Recovery Program for Endangered Fish Species in the Upper Colorado River Basin" was circulated to 59 organizations and individuals for review and comment:

Caspar Star Tribune--Ann MacKinnon
Chevron Shale Oil Company--Gary Bishop
Colorado Congressional Delegation
    Senator Gary Hart
    Senator Gary Hart (Attn: Alan Salazar)
    Senator William L. Armstrong
    Representative Hank Brown
    Representative Ken Kramer
    Representative Dan Schaefer
    Representative Patricia Schroeder
    Representative Michael L. Strang
    Representative Timothy E. Wirth
Colorado Department of Natural Resources
    Assistant Director--Laurie Mathews
    Colorado Water Conservation Board
        Director
        Gene Jencsok
    Division of Wildlife
        Director
        Jim Bennett
Colorado River Fishes Recovery Team--Team Leader
Colorado River Water Conservation District--Eric Kuhn
Colorado Wildlife Federation--Reed Kelley

Denver Water Board--Bob Taylor
Friends of the Earth--Connie Albrecht
Mobil Alternative Energy--Gus Mattsson
National Audubon Society, Boulder
    C. Eugene Knoder
    Carse Pustmueller
National Wildlife Federation--Chris Meyer
Nature Conservancy
    Sydney Macy
    Robert Wigington
Nevada Department of Wildlife--William Molini
Rio Blanco Oil Shale Co.--Butch Slawson
Sierra Club Boulder--Maggie Fox
Trout Unlimited--Jim Belsey
U.S. Department of Energy
    Western Area Power Administration
        William Clagget
        Area Manager, Salt Lake City
U.S. Department of the Interior
    Bureau of Reclamation
        Missouri Basin Region
            Max Haegele
            Gordon Wendler
        Upper Colorado Region
            Assistant Regional Director
            Chief, Branch of Biological Studies
            Chief, Water Resources Branch
    National Park Service--Ron Hermance
    Office of Environmental Project Review--Bob Stewart
    Office of the Solicitor
        Washington, D.C.
            Don Barry
            Mike Young
        Denver--Margot Zallen
    U.S. Fish and Wildlife Service
        Associate Director, Federal Assistance
        Region 2, Albuquerque
            Regional Director
            Assistant Director, Federal Assistance and Fishery Resources
        Region 6, Denver
            Assistant Director, Federal Assistance
            Assistant Director, Fishery Resources
            Regional Hydrologist
            Chief, Division of Endangered Species
            Colorado River Fishery Project--Lynn Kaeding
University of Nevada, Lake Mead Limnological Center--Dr. Larry Paulson
Upper Colorado River Commission--Jerry Zimmerman
Utah Department of Natural Resources
    Division of Water Resources
        D. Larry Anderson
        Barry Saunders

Division of Wildlife Resources
William Geer
Rod Stone
Wyoming
Game and Fish Department--Mike Stone
State Engineer's Office--Louis Allen

Eighteen comment letters were received. The majority of comments (44 percent of 208 comments) had to do with clarification or further explanation of plan content (additional background on biology, water management, impacts, clarification of terms and concepts, etc.). Clarification or changes were incorporated as appropriate. Thirty-nine comments (19 percent) simply stated an opinion or position without raising an issue.

Issues raised in 78 comments (36 percent) are listed below:

1. Four comments expressed concern over the restriction of the Recovery Implementation Program and delisting of the endangered fishes to the Upper Basin, and suggested that the Lower Basin and the San Juan River should be included.

   This issue had been pursued in 1984, when the Coordinating Committee was first established. It was felt that the endangered species/development issues and problems that needed to be addressed were primarily an Upper Basin concern. Most water development in the Lower Basin had been completed prior to passage of the Endangered Species Act (1973) and few Section 7 consultations were expected on future Lower Basin water projects. However, in the Upper Basin, over 100 consultations had already been issued, and numerous additional projects were expected to go through consultation in the future. Moreover, it was recognized that habitat conditions and population status for endangered fishes were dissimilar between the basins, with most natural habitat already modified in the Lower Basin and most natural populations located in the Upper Basin. Last, since the State of New Mexico declined to participate on the Coordinating Committee, the San Juan River portion of the Upper Basin was excluded from the Recovery Implementation Program.

2. There were three comments expressing concern on the extent to which conservation efforts would be undertaken for the razorback sucker, a candidate species.

   The razorback sucker was included within the program because its biological status was sufficiently precarious that it could be listed under the Endangered Species Act. Were it not included in the program, potential future listing of this species might disrupt the progress the program would be making towards resolving Section 7 conflicts. Inclusion of this imperiled species in the program would provide positive measures for its protection and enhancement, and could improve its biological situation to the point where listing would not be necessary.

3. One comment requested that specific numerical recovery goals be defined.

   In the past, limited amounts of quantitative data on the needs of the endangered fishes created difficulties in developing appropriate Section 7 measures to offset jeopardy. The same problem faced the drafters of this plan. There were not enough biological data to allow a more precise statement of recovery goals. In addition, existing recovery plans were under revision. So, the Recovery Implementation Program emphasizes gathering information and then using that information to establish more specific goals at specified times within the implementation phase.

4. There were nine comments on the Section 7 consultation approach outlined in the draft. The primary concern was whether there were enough safeguards (e.g., sufficient funds or flows) available to allow projects to comply with Section 7 of the Endangered Species Act by simply by providing funds for the recovery effort.

   The Recovery Implementation Program outlines specific assumptions and commitments that should enable this Section 7 approach to work. Major assumptions and commitments include: provision of sufficient funds to fund the acquisition of necessary water rights, the option for the Service to pursue outside of this program any Section 7 consultation on a project causing problems that could not be handled under the program, and commitment by all parties to support the acquisition and appropriation of necessary instream flows within the State water law system.

5. There were six comments questioning the circumstances under which the program was developed and would be implemented. All commenters suggested that there should be a memorandum of understanding or cooperative agreement between the parties implementing the program.

   Information and assumptions underlying the development of the plan and the relationships between the tasks in the plan leading to implementation were added to the introduction. The details for a signed implementing agreement were added to the program.

6. Nine comments expressed concern over the legality of the proposal to reoperate Federal reservoirs (Flaming Gorge, Ruedi, and Blue Mesa) to meet instream flow needs of endangered fish.

   This issue was thoroughly pursued with Reclamation and other interested/affected parties. Federal reservoirs have changed Upper Basin flow regimes. Reclamation is conducting studies to determine the type and extent of impacts to endangered fishes caused by these flow regime changes. The results of these studies will be used in completing Section 7 consultation on these Federal reservoirs. These potential changes were incorporated into the plan with the acknowledgement that they would be modified after completion of Section 7 consultation on each project. In addition, it was felt that these changes to Reclamation operations were within the operational and legal capabilities of the projects.

7. There were two comments on the stocking/control of nonnative fish and the impact on State fisheries and authorities.

   There is some documentation on the effects of exotic fish and sportfishing on native fish (predation, competition, etc.). Some researchers have felt that these impacts may be as great as those caused by stream flow modification, stream blockage, etc. on the three endangered fishes. Given this possibility, the impacts of nonnative fish would need to be addressed for the recovery effort to succeed. The tasks outlined in the program were structured such that further data would be gathered and management methods would be tested before stringent controls were put in place. The program notes that States had already modified their stocking strategies to avoid many of these issues.

8. Thirteen comments expressed concern over the authority that would be granted to the Recovery Implementation Committee and whether this authority overstepped Federal (e.g., Federal Advisory Committee Act) or State laws. Two comments requested more biological interests on the committee.

   The role and duties of this committee were modified and limited to accommodate these concerns.

9. There were 26 comments on funding, expressing concern over the adequacy of funds to carry out the program, the source(s) of funds (private and State versus Federal), the legality of using certain funding sources (Colorado River Storage Project), how the fee assessment under Section 7 was determined and whether it was appropriate (too high or too low).

   More information was included in the program to explain how the figures were derived and allocated to specific sources or items.

10. One comment focused on clarifying the relationship between the recovery plans developed under Section 4 of the Endangered Species Act and the Recovery Implementation Program.

    At the time the Recovery Implementation Program was being developed, the Service was in the process of revising the three recovery plans, so no new information could be included from those plans. The Recovery Implementation Program was changed to explain the relationship between these documents.

11. Two comments asked about National Environmental Policy Act compliance.

    The Service was pursuing its obligations under the National Environmental Policy Act at the time.

In September 1986, a second, public review draft entitled, "Recovery Implementation Program for Rare and Endangered Fish Species in the Upper Colorado River Basin" was circulated to 109 organizations and individuals for review and comment:

Arizona Game and Fish Department--James Brooks
Carlson, John U.
Chevron Shale Oil Company--Gary Bishop
Colorado Congressional Delegation
    Senator Gary Hart
    Senator William L. Armstrong
    Representative Hank Brown
    Representative Ken Kramer
    Representative Dan Schaefer
    Representative Patricia Schroeder
    Representative Michael L. Strang
    Representative Timothy E. Wirth (Attn: Jim Martin)
Colorado Department of Natural Resources
    Executive Director
    Assistant Director--Laurie Mathews
    Colorado Water Conservation Board
        Director
        Gene Jencsok
    Division of Wildlife
        Director
        Jim Bennett
        Eddie Kochman
Colorado Forum--Executive Director
Colorado River Energy Distributors Association
Colorado River Fishes Recovery Team--Team Leader
Colorado River Water Conservation District
    Secretary
    Eric Kuhn
Colorado Wildlife Federation
    Ken Henser
    Reed Kelley
Denver Water Board--Bob Taylor
Environmental Defense Fund
    Michael Bean
    Melinda Kassen
Friends of the Earth--Connie Albrecht
Mobil Alternative Energy-- Gus Mattsson
National Audubon Society
    Bill Butler
    Lori Jackintell
    Carse Pustmueller
Nature Conservancy--Robert Wigington
National Wildlife Federation Natural Resources Clinic--Chris Meyer
Nevada Department of Fish and Game--Regional Assistant, Fisheries
Pitts & Associates--Tom Pitts
Resource Associates Inc.--Bob Weaver
Rio Blanco Oil Shale Co.--Manager, Environmental Affairs
Saunders, Snyder, Ross, & Dickson, P.C.
    Jack Ross
    Jim Sanderson
Sierra Club, Boulder--Maggie Fox
Southeast Colorado Water Conservancy District--President

Stone and Webster Engineering Corp., Denver--Mike Barningham
Trout Unlimited, Denver--Jim Belsey
Uintah and Ouray Tribal Business Council--Chairman
U.S. Department of Agriculture
    Forest Service
        Rocky Mountain Region
            Regional Forester
            S.H. Hanks
        Intermountain Region--Regional Forester
U.S. Department of Defense
    Army Corps of Engineers
        Sacramento District--Col. Wayne School
        Omaha District--Mark Harberg
U.S. Department of Energy
    Federal Energy Regulatory Commission, Office of Electric Power Regulations--Director
    Western Area Power Administration
        Assistant to the Administrator for Conservation and Environment
        Area Manager, Salt Lake City
        Director of Environmental Affairs, Golden
U.S. Department of the Interior
    Bureau of Indian Affairs
        Area Director, Albuquerque
        Area Director, Window Rock
    Bureau of Land Management
        State Director, Colorado
        State Director, Utah
        State Director, Wyoming
    Bureau of Reclamation
        Missouri Basin Region
            Regional Director
            Loveland--Ray Willms
            Loveland--Max Haegele
        Upper Colorado Region
            Regional Director
            Chief, Branch of Biological Studies
            Flagstaff--Grand Canyon Study Manager
            Grand Junction--Walter Fite
National Park Service
    Rocky Mountain Region
        Regional Director
        Ron Hermance
        Dinosaur National Monument--Stephen Petersburg
        Glen Canyon NRA--Larry Belli
Office of the Solicitor
    Associate Solicitor--Gail Norton
    Regional Solicitors Office, Denver--Margot Zallen
Office of Surface Mining
    Denver--Regional Director

U.S. Fish and Wildlife Service
Washington Office
Director
Associate Director, Fish and Wildlife Enhancement
Region 1, Portland--Regional Director
Region 2, Albuquerque
Assistant Regional Director, Federal Assistance, Fishery Resources and Engineering
Gerald Burton
Region 6, Denver
Regional Director
Assistant Regional Director, Federal Assistance
Assistant Regional Director, Fishery Resources
Assistant Regional Director, Habitat Resources
Regional Hydrologist
Chief, Division of Endangered Species
Colorado River Coordinator
Colorado River Fishery Project--Lynn Kaeding
Colorado River Fishery Project--Dr. Harold Tyus
Grand Junction Suboffice--Keith Rose
Grand Island Field Office--Dennis Buechler
Helena Field Office--Wayne Brewster
Salt Lake City Field Office--Bob Ruesink
Salt Lake City Field Office--Don Archer
Research
National Ecology Center--Dr. Clair Stalnaker
U.S. Department of Justice
Land and Natural Resources Division, Denver--John Hill
U.S. Environmental Protection Agency, Denver--Regional Administrator
U.S. General Accounting Office, Portland--Jim Luckeroth
University of Colorado Natural Resource Law Center--Lawrence McDonnell
University of Nevada, Lake Mead Limnological Research Center--Director
Upper Colorado River Commission--Jerry Zimmerman
Utah Department of Natural Resources
Executive Director
Division of Water Resources--Barry Saunders
Wildlife Conservation Foundation--Rob Peters
Wyoming
State Planning Coordinator
Game and Fish Department
Director
Mike Stone
State Engineer's Office
State Engineer
Jeff Fassett

Responses were received from 20 organizations and were used to develop the final version of the Recovery Implementation Plan. There were 115 comments expressed: 39 (34 percent) requested clarification or elaboration of items discussed in the plan; 19 expressed only an opinion. The remaining 57 comments (50 percent) are covered in the discussion below:

1. There were four comments concerning the treatment of the Upper and Lower Basins in this plan--three against including the Lower Basin and one for inclusion.

   For the reasons expressed during the first public review of this plan, the task group again decided that it was not appropriate to include the Lower Basin. Any attempt to include the geographic/political area of the Lower Basin would greatly delay program implementation and its intended use to resolve conflicts in the Upper Basin. After program implementation is initiated, it was suggested that discussions should be held to determine the relationship of this effort and its goals to the two basins.

2. Four comments were raised on the inclusion of the razorback sucker in the program--three against and one for inclusion.

   Discussions were held with principal parties to resolve this issue. It was agreed that it was desirable to avoid further negative impacts to this species and to work towards improving its status. Therefore, the language in the program was changed to focus on management (rather than recovery) of this nonlisted species, thus separating its goals from those of recovery for the other three listed fish, and denoting its different legal status.

3. There were seven comments concerning the composition and authority of the Recovery Implementation Committee--six requesting more representation from nonwater interests and one asking that the committee's authority be reduced.

   The authority issue was resolved as described in the response to the earlier review. The option to include other participants (at their request) was included and a list of likely parties was included (e.g., Western Area Power Administration, National Park Service, Forest Service, Bureau of Land Management).

4. Fifteen comments were provided on the issue of Section 7 compliance. Of these, six requested that specific parties be excluded from compliance (a threshold established or exemption from the $10/acre-foot fee) and three requested that the Section 7 "trigger" be strengthened to give the Service more control over depletion impacts.

   This issue was carefully reviewed and discussed with affected parties. After careful consideration, it was felt that the scenario proposed within the program was the most equitable and conformed most closely with the mandate of Section 7 to consider and avoid jeopardy for all Federal projects, as well as provide an opportunity for all parties impacting or benefiting from the river system to share in the costs of the program.

5. There were two comments on the relative emphasis placed on flow and nonflow tasks outlined in the program--one for more emphasis on flow issues and one against.

The task group determined early on in the development stages of this program that the flow issue was the most complex and controversial, therefore, major emphasis needed to be placed on properly handling this issue. At the same time it was felt that emphasis should be placed on other, nonflow activities important to the eventual recovery of these fish as well. Therefore, the program provides both flow and nonflow measures to address demonstrated needs of the fish as described in recovery plans.

6. Seven comments concerned the legality of the operation of Federal reservoirs as described in this program.

   The Bureau carefully examined this issue through their Solicitor's Office and through discussions with the various concerned parties. It was agreed that the proposal as written was factually and legally correct.

7. There were four comments on the States' commitment of funds and participation in the program, requesting that the States' funding commitments be more equitably distributed among the three States.

   After considerable discussion between the States, a change in the distribution of funding commitments was agreed to and the plan was changed accordingly.

8. There were four comments on compliance with the National Environmental Policy Act.

   The Service was developing its National Environmental Policy Act compliance document concurrently with the latter stages of program development.

9. One comment requested that critical habitat or other Federal legal designation be considered.

   This issue had been discussed in the early stages of the development of the program and deemed to be outside the scope and intent of the document. The Service also does not have sufficient information to specify critical habitat.

10. One comment requested that the program be broadened to include other endangered/threatened species associated with the river system.

    The purpose of the program is to resolve a specific problem involving the listed fish and water development. Other listed species have not been affected or as adversely affected by changes in the river regime as the three listed fish. Section 7 consultation is the more appropriate mechanism to handle potential problems with other listed species, if they arise. The potential impacts of program implementation on other listed species have been addressed in the National Environmental Policy Act document.

11. There were three comments expressing concern as to whether program goals and objectives would be accomplished within the 15-year term of the plan.

This concern was recognized by the task group. The program contains provisions for modifying the program and its timeframes through a series of checkpoints.

12. There were four comments on the relationship between the recovery plans and the implementation program--two comments requested the Service to finalize recovery plans before the program is implemented, two asked that the program replace the recovery plans.

    The program was clarified to show the specific relationship between these documents. The Recovery Implementation Program serves as a means to resolve a conflict in the Upper Basin by providing an agreed-upon management procedure to implement recovery tasks outlined in the recovery plans. The recovery plans are biological documents that provide the rationale for the necessity of various recovery activities found in the implementation program. The Service is completing revision of the recovery plans and they should be completed in approximately the same timeframe as the Recovery Implementation Program.

13. There were two comments stating that recovery is the sole responsibility of the Secretary of the Interior and that the program should be funded and carried out by the Secretary.

    The goal of the Coordinating Committee as stated in the Memorandum of Understanding is to resolve the conflict between complying with Section 7 of the Endangered Species Act and developing water resources in the Upper Basin. After much consideration, the Coordinating Committee decided that the best means to accomplish this goal would be to recover the listed fishes. Hence, program participants are voluntarily funding recovery actions for the listed fishes because recovery is the best means to resolve the Section 7 conflict, protect the rare and endangered fishes, and accomplish the program goal, and not because they are all obligated to recover the listed fishes.

B. The Environmental Assessment--Public Involvement

As the proposal for the Recovery Implementation Program was being finalized, a decision was made to begin the National Environmental Policy Act compliance process. On July 30, 1986, a detailed Notice of Intent was published in the Federal Register to scope out public concerns. The notice outlined crucial elements of the Proposed Action and alternatives, and solicited public input on the Proposed Action, its impacts, and alternatives. Comments, requests for additional information, and requests for the environmental assessment were received from 27 respondents:

Chevron U.S.A., Inc.
Colorado--Department of Natural Resources
Colorado River Basin Salinity Control Forum
Colorado River Energy Distributors Association
Colorado River Water Conservation District
Colorado Water Congress

Colorado Water Conservation Board
Conservation groups--joint letter from:
    National Audubon Society
    Colorado Wildlife Federation
    Environmental Defense Fund
    Sierra Club, Southwest Region
    Friends of the Earth
Five County Association of Governments
High Country News--Ed Marston
J.E. Sinor Consultants, Inc.
Jacobs Engineering Group, Inc.
KKBNA Engineers
U.S. Department of Defense
    Corps of Engineers--Sacramento District
U.S. Department of the Interior
    Bureau of Land Management
        Craig, CO
        Montrose District
    National Park Service
        Canyonlands National Park
        Curecanti National Recreation Area
        Glen Canyon National Recreation Area
        Rocky Mountain Regional Office
    Office of Surface Mining--Reclamation and Enforcement
National Wildlife Federation
Northwestern University--Center for Urban Affairs and Policy Research
Upper Colorado River Commission Utah--Office of the Governor
Western Area Power Administration
Wyoming--Representative Dick Cheney

Most commenters requested additional information on the program or a copy of the environmental assessment. Major comments were as follows:

1. Seven commenters expressed concerns regarding National Environmental Policy Act compliance. Of these, five commenters felt National Environmental Policy Act compliance was premature. They felt that agreement to participate in the program was insufficient Federal action to trigger the National Environmental Policy Act review process or that the program was too general to analyze in a meaningful manner. Instead, environmental analysis should be initiated only when specific, well-defined program actions were ready to be undertaken. One commenter supported environmental review of the program at this time and environmental review of specific program actions in the future. Another commenter felt that the entire National Environmental Policy Act compliance process for this program should be clarified.

   The Service feels that adoption of the program constitutes a "major Federal action" subject to National Environmental Policy Act review (40 CFR Part 1508). And, although the Service agrees that the general nature of the program makes specific impact analysis problematic or impossible in many instances, important conclusions and/or concerns can nonetheless be surfaced to inform decision-makers of the possible consequences of

implementing this program. Given the evolving nature of the program, the Service decided on a parallel National Environmental Policy Act compliance process, whereby a programmatic-level environmental impact document would provide a broad overview of potential impacts. If the program was implemented, it would be supplemented by site-specific environmental documents providing more detailed impact analyses. This staged approach is explained in the environmental assessment.

2. Seven commenters emphasized coordination, i.e., the need for program actions to be coordinated with land or water management actions by other entities, asked to participate in program-related activities, or requested to be kept informed of actions that could affect them.

   The Recovery Implementation Program provides the opportunity for other entities to serve on the Recovery Implementation Committee, or observe, as appropriate. For example, Western Area Power Administration is recommended as a committee member. And, as can be seen in this chapter, an extensive mailing list of organizations and individuals with an expressed or potential interest in this program has been developed, and these entities will be informed of the latest program development. Last, future research and management activities in furtherance of program objectives will be coordinated with affected land management entities.

3. Five commenters were concerned about program impacts on water resource development interests and on power users.

   When reasonable assumptions could be made about the course of future program implementation, the environmental assessment analyzed impacts to water development interests and power users. The environmental assessment discloses that, overall, the program will benefit water development interests and provides detailed estimates on possible impacts to power users and means to reduce those impacts. In addition, when Section 7 consultation is completed on CRSP dams in the Upper Basin, site-specific environmental impact analysis could be conducted to provide better impact estimates.

4. Many commenters had questions on various specific actions that would be taken in the program in the future, such as the need to conduct research before actions were implemented, research topics and priorities, greater emphasis on nonflow alternatives, etc.

   These concerns were addressed or clarified to the extent possible. If it was not possible to address these concerns at present, they can be addressed in future environmental impact analyses.

C. <u>The Proposed Action--Future Public Involvement</u>

The approval of the Recovery Implementation Program by the Secretary of the Interior and the Governors of the States of Colorado, Utah, and Wyoming will be but one of several levels of public involvement and approval required for program implementation.

Legislative involvement and approval is equally important, since Federal and State legislative bodies must authorize and appropriate funding for the program. Extensive legislative review is likely to occur prior to authorization of funds and would occur annually thereafter during the budget appropriations process.

The Recovery Implementation Committee, which will oversee implementation of the Proposed Action, will provide another level of public involvement during program implementation. At a minimum, its membership is expected to include representatives from the Service, Reclamation, Colorado, Utah, Wyoming, water development interests, and conservation organizations. A representative from Western Area Power Administration is recommended as a committee member. Other agencies such as the National Park Service, Bureau of Land Management, or the National Forest Service may participate or observe as appropriate.

Lastly, as major Federal actions in support of program objectives are proposed for implementation, they will be reviewed in accordance with the National Environmental Policy Act. Site-specific National Environmental Policy Act documents will be prepared and given public review, as appropriate.

VI. LITERATURE CITED

CHAPTER VI

LITERATURE CITED

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VII. LIST OF PREPARERS

CHAPTER VII

LIST OF PREPARERS

This environmental assessment was prepared by the U.S. Fish and Wildlife Service (Region 6, Denver) with cooperation from the Bureau of Reclamation (Upper Colorado Region, Salt Lake City) and the Western Area Power Administration (Salt Lake City Area Office). A list of persons who wrote portions of this document or participated to a significant degree in preparing the assessment is presented below.

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APPENDICES

A. Proposed Action--Background
B. Research and Recovery Actions Common to Both Alternatives--Relative Rates of Implementation
C. Single-Strategy Alternatives Which will not Accomplish the Recovery Goal
D. Water Resources Data
E. Alternative Thermal Plant Study--Flaming Gorge
F. Impacts of the Assumed Flow Refinements on the Retail Rate

APPENDIX A

Proposed Action--Background

The Colorado squawfish (Ptychocheilus lucius), humpback chub (Gila cypha), and bonytail chub (Gila elegans), are federally listed as endangered species. The razorback sucker (Xyrauchen texanus) has been proposed for listing, and remains a candidate for Federal listing. All four fish species are designated as "endangered" in the State of Colorado and "protected" in the State of Utah.

It has become more and more difficult to protect these rare fishes and proceed with water development in the Upper Basin. In addition to the impacts to the fish caused by project construction, the Service is also concerned about the impacts of water depletions. Water depletions reduce instream flows, deteriorate habitat in essential reaches, and ultimately jeopardize the rare fishes.

In the late 1970's and early 1980's, the Service protected endangered fish by recommending reasonable and prudent alternatives for major water projects likely to jeopardize them. Since these projects were Federal reservoirs, the most commonly recommended alternative was to commit water releases from existing storage to offset project depletions.

In 1981, the White River, Cheyenne Stage II, and Windy Gap projects came to the Service for consultation, but project sponsors were unable to guarantee flow releases to offset depletion impacts to the endangered fishes. To address this dilemma, the Service developed a consultation approach (now known as the "Windy Gap" approach) in which project sponsors could compensate for depletion impacts by contributing funds toward research and recovery measures for the endangered fishes. The amount of each project contribution was proportional to the amount of water depleted. These contributions would count as all or part of the reasonable and prudent alternatives required to offset jeopardy to the fish, depending on the nature of project impacts. The "Windy Gap" approach was used only for consultations in the Upper Basin and was to be used as an interim approach until another approach could be developed.

In 1983, the Service drafted a conservation plan which proposed minimum year-round flows for the endangered fishes. This draft plan was not adopted because the flows were based on historical hydrological data rather than biological data and caused considerable controversy.

In 1984, the Upper Colorado River Basin Coordinating Committee was formed to address the issue of endangered species conservation and water development. The Coordinating Committee is composed of representatives from Reclamation, the Service, and the States of Colorado, Utah, and Wyoming. Water development interests and conservation groups also participated. The August 1984 Memorandum of Understanding which established the Coordinating Committee charged it with the responsibility of "seeking ways to develop and implement a program of reasonable and prudent alternatives which will enable Federal agency actions associated with water project development and depletions in the Upper Basin of the Colorado River to proceed pursuant to Section 7 of the Endangered Species Act without the likelihood of jeopardizing the continued

existence of any threatened or endangered species, while fully acknowledging and considering the beneficial uses of water pursuant to the respective State water rights systems and the use of water apportioned to a State pursuant to the compacts concerning the waters of the Colorado River." The program recommended by the Coordinating Committee is the Proposed Action evaluated in this assessment. A complete description of this proposal was released for formal public review in September 1986. The final version was completed in September 1987.

APPENDIX B

Research and Recovery Actions Common to Both Alternatives - Relative Rates of Implementation -

It is possible to gain insight into the relative rates of implementation for research and recovery actions common to the Proposed Action and the "No Action" alternative by comparing their funding levels. If one excludes funds used to purchase water from the total funds available to the Proposed Action, the remaining funding would be used to fund research and recovery actions similar to those implemented under the "No Action" alternative.

1. Funding from Government Sources

	"No Action" Alternative	Proposed Action*
Federal funding		
- annual	$1.0 million/year	$1.3 million/year**
- construction fund	[not applicable]	$5.0 million/15 years
State funding	$0.2 million/year	$0.2 million/year
Total government funding	$18.0 million/15 years	$27.5 million/15 years

*Note: This analysis does not include the $10 million water rights acquisition fund which is part of the Proposed Action but is not part of the "No Action" alternative.

**A total of $2.1 million/year will be provided from Federal sources, of which $0.80 million/year is estimated to be used for water acquisition (per Table 5-1 of September 29, 1987, version of the Recovery Implementation Program).

Over a 15-year time period, 53 percent more government funds will be available under the Proposed Action than under the "No Action" alternative for research and recovery measures other than purchase of water rights.

2. Funding from the Private Sector

It is difficult to estimate the amount of funds that would come from the private sector over the next 15 years for research and recovery measures common to both alternatives. For the "No Action" alternative, it would depend on the amount of water depleted by small projects from which the Service would accept funding for conservation measures. For the Proposed Action, it would depend on the amount of water depleted by all projects and the proportion of funds used for water acquisition versus other research and recovery measures.

This analysis estimates that up to 900,000 acre-feet of water remains to be developed in the Upper Basin (excluding Arizona and New Mexico) that has not yet been consulted on under the Endangered Species Act.

For the "No Action" alternative, this analysis assumes that funding for conservation measures could be accepted only from small projects depleting less than or equal to 12,000 acre-feet/year. This 12,000 acre-feet/year threshold was determined empirically--it is the largest project depletion to date (Stagecoach) for which the Service has accepted conservation funding under the current Section 7 policy of accepting funds only for small-volume depletions. Using historical data on projects consulted on during the period March 1981 through April 1987, it was determined that projects planning to deplete less than or equal to 12,000 acre-feet/year represented 16 percent of total depletions. Given the current charge of $14.92/acre-feet/year depleted and assuming that small volume projects ($\leq$12,000 acre-feet/year) would deplete 16 percent of the remaining 900,000 acre-feet of water that can be developed, the Service could collect up to $2.1 million for conservation measures from small-volume depleters over the next 15 years under the "No Action" alternative.

For the Proposed Action, up to $9 million could be collected from the private sector over the next 15 years, assuming a $10/acre-foot depletion charge. It is impossible to predict what proportion of the $9 million collected under the Proposed Action would be spent on water acquisition, so this analysis examines two extreme scenarios to show minimum and maximum values for private sector funding.

For both the "No Action" alternative and the Proposed Action, the minimum amount of funds available from the private sector to fund research and nonflow recovery measures could be zero. For the "No Action" alternative, this represents a situation in which nonmonetary reasonable and prudent alternatives could be developed for all small water projects having depletion impacts. For the Proposed Action, this represents a situation in which all monetary contributions would be used to acquire water.

Assuming that all water that can be developed will be depleted over the next 15 years, the maximum amount of private sector funds available for research and nonflow recovery measures would be $2.1 million for the "No Action" alternative and $9 million for the Proposed Action. Under the "No Action" alternative, this represents a situation in which monetary contributions would be requested of all small-volume depleters, who, in turn, are assumed to deplete 16 percent of the total remaining water. Under the Proposed Action, this represents a situation in which all contributions would be used to fund research and recovery measures other than water acquisition.

	No Action	Proposed Action
Private sector funding	$0-2.1 million/15 years	$0-9 million/15 years

3. Total Funding

	No Action	Proposed Action
Government funding	$18.0 million/15 years	$27.5 million/15 years
Private sector funding	$0-2.1 million/15 years	$0-9 million/15 years
	$18.0-$20.1 million/15 years	$27.5-36.5 million/15 years

Combining government and private sector funding estimates, funding for the "No Action" alternative ranges from a minimum of $18.0 million to a maximum of $20.1 million over 15 years. Similar actions conducted under the Proposed Action could be funded anywhere from a minimum of $27.5 million to a maximum of $36.5 million over 15 years. Using these figures, funding for research and nonflow recovery measures under the Proposed Action is estimated to be anywhere from 1.37 to 2.03 times that of funding for similar actions under the "No Action" alternative. This implies that, on the whole, research and nonflow recovery actions common to both alternatives would proceed anywhere from 37 to 103 percent times more quickly under the Proposed Action. State cooperation under the Proposed Action would likely further enhance the rate of implementation.

APPENDIX C

Single-Strategy Alternatives Which Will Not Accomplish the Recovery Goal

a. Section 7 consultation only. By requiring consultation, Section 7(a)(2) of the Endangered Species Act prevents Federal agencies from jeopardizing the continued existence of endangered species. However, consultation alone will not recover the listed species, for several reasons:

- limited applicability: Consultation reduces adverse impacts from proposed or existing Federal actions. It cannot address adverse impacts of non-Federal actions (e.g., incidental take by anglers, introduction of competing or predatory nonnative fishes) nor rectify the adverse effects of actions completed prior to enactment of the Endangered Species Act (e.g., water depletions or dam construction).

- piecemeal problem-solving: Consultation deals with threats to listed species on a case-by-case basis. Although consultation addresses cumulative impacts, the unpredictable timing and effects of project proposals frustrate any attempt to develop consultation recommendations that link to form a coherent, systemwide, long-term strategy for recovery. Instead the Service is forced to develop "ad hoc" solutions that cope with, but do not overcome, adverse impacts from project proposals.

Limited thusly, Section 7 consultation can slow the decline of listed fishes, but is unlikely to reverse the decline and recover the fishes.

Unless the Endangered Species Act is amended, or until the endangered fishes are taken off the List of Endangered and Threatened Wildlife, Section 7 consultation will continue as part of any effort to protect and/or recover the endangered fishes. Alternatives b through f, below, highlight possible major strategies for protecting or recovering endangered fish. However, it should be understood that Section 7 consultation must be conducted concurrently with the major strategy under discussion. Section 7 consultation provides a minimum level of protection, shielding endangered fishes and their essential habitat from unacceptable losses arising from Federal actions, but no more.

b. Hatchery stocking. The Service has engaged in an extensive stocking program for razorback sucker and Colorado squawfish in the Lower Colorado River Basin. Limited recapture data indicate that hatchery stocking efforts, as presently implemented, have not significantly enhanced razorback sucker or Colorado squawfish population levels. But, even if a stocking program could result in high population levels for the rare fishes, this would still not meet the requirements for recovery of the species because it may not result in self-sustaining populations and, more importantly, does not in any way preserve or restore the natural habitat on which the listed fish depend. Hence, this action is not sufficient to recover the fish.

c. Provision of adequate instream flows. Instream flows are a crucial component of the natural habitat for the rare fishes. Provision of adequate flows will greatly aid in restoring habitat quality, and to some extent, habitat quantity. Adequate instream flows will improve survival prospects for rare fish populations, but the outlook for self-sustaining populations will remain in serious doubt unless the negative influence of predatory or competing nonnative fishes and incidental take by fishermen is counteracted. This is borne out by the fact that a population decline occurred for the bonytail chub in the Yampa River in the absence of significant changes in flows, and that in some years up to 10 percent of Colorado squawfish that were marked for various studies were caught by anglers.

Moreover, though instream flow provision is considered one of the more potent recovery techniques, it could also be prohibitively expensive if water rights purchases were the only means to procure instream flows. An internal analysis done by the Service in 1984 estimated that it would cost $500 million to purchase sufficient senior water rights to provide dependable instream flows (estimated at 488,000 acre-feet in 1984) just in the upper Colorado River for the July-September spawning period. The same analysis indicated that purchase of water from Reclamation reservoirs could also be expensive. For example, if the remaining yield (42,150 acre-feet) in Ruedi Reservoir and the firm yield (15,000 acre-feet) in Green Mountain Reservoir were to be purchased to provide instream flows, it would cost $1.1 million/year to increase the flow of the Colorado River by only 313 cfs for the July-September spawning period.

Out-of-pocket costs for obtaining instream flows could be reduced by refining operations at Federal projects, using unsold water from Federal projects under the authority of Section 7(a)(1) of the Endangered Species Act, or various creative transactions. However, such options will be constrained by the limited operating flexibility and distribution of Federal projects, the potentially high opportunity cost of using unsold water for endangered fish conservation, and the willingness of water rights holders to cooperate with the Federal government.

Last, it is questionable whether the States would cooperate in using State law to protect instream flows. It is discretionary whether instream flow rights would be granted and without a cooperative plan in effect, it is doubtful that the States would use that discretion to protect instream flows for rare fish.

Therefore, this alternative is unlikely to recover the fishes.

d. Selective management of nonnative fish. If used at strategic locations and/or critical time periods, this measure could improve rare fish survival prospects. However, this alternative may be technically impossible and/or prohibitively expensive on a scale large enough to significantly enhance rare fish population levels. But, even if it were possible to significantly improve rare fish recruitment by controlling nonnatives, this action does not protect or restore essential habitat. Unless habitat conservation and restoration is undertaken in concert with species conservation efforts, recovery cannot be ensured.

e. Develop or modify existing habitat to enhance production and survival of the rare fishes. Habitat development and maintenance techniques are unlikely to significantly enhance recovery prospects until other limiting factors are at least partially addressed. For example, diminished habitat quality and nonnative fishes appear to be significant impediments to recruitment and survival. In addition, reliable habitat development and maintenance techniques have yet to be developed, and preliminary indications are that some techniques could be expensive. For example, a permanent fish passage facility at Redlands Diversion Dam (8.5 feet high) could cost up to one million dollars to construct. Artificial backwaters may silt up and require regular maintenance and removal of nonnative species. If used with care, habitat alteration techniques might improve habitat at specific sites, but these techniques in and of themselves do not appear to offer a clear road to recovery.

f. Reduce incidental take of rare fishes by fishermen. Although incidental take by anglers is a factor contributing to the decline of fishes, it is not the only factor. Even if there was no incidental take of rare fishes by fishermen, recovery cannot be accomplished as long as competing or predatory nonnative fishes were not controlled and deteriorating and diminishing habitat restored.

APPENDIX D

Water Resources Data

This appendix identifies specific projects used to develop the environmental baseline and year 2000 scenarios for the environmental assessment. Essentially, Tables D-1 through D-3 identify recent or planned projects which may have Section 7 consultation completed by the year 2000. Projects identified in Tables D-1 and D-2 (environmental baseline) are projects which are currently in operation or have been issued a Section 7 biological opinion by the Service during their planning process. Projects identified in Table D-3 (year 2000) are proposed projects which are expected to complete Section 7 consultation by the year 2000.

Tables D-4, D-5, and D-6 display historical, existing, and future flows at Palisade on the Colorado River, on the White River above the confluence with the Green River, and at Cleopatra's couch in the Yampa River. Four levels of development were modeled. The historic condition and existing condition scenarios are included as yardsticks to measure the changing conditions due to development of water resource projects. Following is an explanation of the development scenarios displayed in Tables D-4 through D-6:

Historic conditions represents adjusted gage flows for the period 1952 to 1982 on the mainstem Colorado and 1930 to 1982 on the Green River. Adjustments were made to the U.S. Geological Survey gage data to account for historic diversions between the gage and the locations where data is displayed.

Existing conditions simulates the present level of flows for existing projects, modified to account for full development of all water rights which can be developed under existing permits.

Environmental baseline simulates the level of flows for all existing projects (assuming full development of water rights) and all planned projects which have been issued a Section 7 biological opinion by the Service.

Year 2000 scenario simulates the level of flow left in the river after all projects which are predicted to have completed Section 7 consultation by the year 2000 are added to the baseline and their depletions are subtracted.

Table D-1
Environmental Baseline for the Colorado River
Above the Green River Confluence

Project Name	Depletion (Acre-feet x 1,000)
Colorado River	
Homestake Transmountain Diversion	20.00
Windy Gap Diversion	57.30
Storm King Mine	.36
Kobe Project	1.80
Battlement Mesa	1.20
GCC/CCSOP	66.70
Mobile Parachute Shale Oil	21.50
Pacific Shale Oil Project	24.60
Colony Oil Shale	8.00
Union Parachute Creek Oil Shale	13.00
Vail Expansion	.12
Keystone Arapahoe Basin Snowmaking	.11
Shoshone Pumpback	.48
Ruedi Round II/Green Mountain Water Sales	38.04
Total above Palisade, Colorado	253.21
Gunnison River	
Dallas Creek	18.00
Mount Gunnison Mine	.01
Colorado Westmorland Mine	.03
Overland Dam	.48
Crested Butte Snowmaking	.14
Total for Gunnison River	18.66
GCC/CCSOP Loma	6.30
Ridges Subdivision	1.20
Total for the Gunnison River to Stateline	7.50
Dolores River	
Nucula Fluidized Bed	.43
Dolores Project	106.00
Total for the Dolores River	106.43
Total above Cisco, Utah	385.80

Table D-2
Environmental Baseline for the Yampa and White Rivers

Project Name	Depletion (Acre-feet x 1,000)
Cheyenne Stage I	8.00
Cheyenne Stage II	15.80
Craig Power Plant Expansion	6.40
Taylor Draw Reservoir	4.00
White River Dam	80.50
Private Actions Reasonably Certain to Occur	8.90
Stagecoach Reservoir Project	12.40
Total for Yampa and White Rivers	136.00

Table D-3
Possible Year 2000 Projects

Project Name	Depletion (Acre-feet x 1,000)
Colorado River	
Denver Two Forks	49.60
Denver Williams Fork	7.50
Vail Ski Area Expansion	.12
Burnt Mountain Ski Area Expansion	.12
Rock Creek Reservoir	30.00
Una Reservoir	4.00
Colorado Ute Southwest	5.00
City of Aurora Upper Gunnison Project	Unknown*
Total above Green River Confluence	96.34
Yampa River	
Sandstone Reservoir, Little Snake River	32.20
Edna Mine, Yampa River	.01
Foidel Creek Mine, Yampa River	.01
Juniper/Cross Mountain Project	Unknown*
Total Yampa River	32.22
White River	
Yellow Jacket Reservoir, White River	30.00
Rio Blanco Oil Shale, White River	14.40
Cathedral Bluffs Oil Shale, White River	2.30
Andrikopoulos Water Disposal	.002
Total White River	46.702

*These projects are highly speculative and little information is available about project depletions.

Table D-4
Flow Changes to the Year 2000
Median Year Flows at Palisade, Colorado

Month	Historic Condition	Change	Existing Condition	Change	Environmental Baseline	Change	Year 2000
			cfs--50.0 percentile				
January	1,605	134	1,739	-302	1,437	0	1,437
February	1,574	89	1,663	-350	1,313	0	1,313
March	1,699	-12	1,687	-275	1,412	0	1,412
April	1,740	-246	1,494	-222	1,272	-81	1,191
May	5,809	-926	4,883	-587	4,296	-193	4,103
June	9,972	-149	9,823	-808	9,015	-1,280	7,735
July	3,106	-935	2,171	-267	1,904	-76	1,828
August	973	-315	658	187	845	0	845
September	657	-237	420	27	447	33	480
October	1,007	-204	803	-135	668	-1	667
November	1,950	87	2,037	-376	1,661	29	1,690
December	1,685	188	1,873	-351	1,522	-1	1,521

Table D-5
Flow Changes to the Year 2000
Median Year Flows at the White River at Mouth

Month	Historic Condition	Change	Existing Condition	Change	Environmental Baseline	Change	Year 2000
			cfs--50.0 percentile				
January	340	0	340	0	340	0	340
February	377	0	377	0	377	0	377
March	519	0	519	0	519	-7	512
April	584	0	584	0	584	-120	464
May	1,352	0	1,352	0	1,352	-271	1,081
June	1,747	0	1,747	0	1,747	-219	1,528
July	548	0	548	0	548	-127	421
August	439	0	439	0	439	-5	434
September	360	0	360	0	360	-7	353
October	435	0	435	0	435	-9	426
November	389	0	389	0	389	0	389
December	341	0	341	0	341	0	341

Table D-6
Yampa River Near Cleopatra's Couch 30-82

Month	Historical Condition	Existing Change	Existing Condition	Environmental Change	Environmental Baseline	Year 2000 Change	Year 2000
			cfs--50.0 percentile				
January	318	-24	294	-5	289	0	289
February	372	-22	350	-4	346	0	346
March	806	-24	782	-65	717	-5	712
April	3,250	-29	3,221	-102	3,119	-124	2,995
May	8,310	-29	8,281	-153	8,128	-136	7,992
June	6,889	-32	6,857	-177	6,680	-158	6,522
July	1,362	-27	1,335	-75	1,260	5	1,265
August	389	-32	357	-17	340	3	343
September	221	-30	191	-7	184	2	186
October	337	-27	310	-6	304	0	304
November	379	-25	354	-15	339	3	342
December	336	-23	313	-4	309	0	309

Note: While the modeled flows for the Yampa do not display a significant percentage change through the year 2000, the potential for development of the Yampa is high. The Yampa is currently underdeveloped and has a considerable amount of water that can be developed under the Colorado River Compact.

APPENDIX E
Alternative Thermal Plant Study
Flaming Gorge

Alternative Thermal Plant: Platte River Power Authority's Rawhide plant at Larimer, Colorado, is a 255 MW coal-fired steam plant constructed in 1984. Rawhide is an intermediate-load plant with a 48-percent plant factor.1/

The total cost of constructing the plant and adjoining generating facilities was $1,773 per kilowatt.2/

CAPACITY VALUE

I.	Total Investment Cost per Kilowatt			$1,773.00
II.	Annual Capacity Costs			
	A. Annual Investment Cost per Kilowatt			
	Interest	7.86%3/		
	Depreciation	1.14%4/		
	Insurance	0.25%5/		
	State and local taxes	0.00%6/		
	Total	9.25% of $1,773.00 per kw		$164.00
	B. Annual Fixed Fuel Charges per Kilowatt/yr		7/	$ 0.74
	C. Annual Fixed O&M per Kilowatt/yr		8/	$ 18.16
	D. Annual A&G per Kilowatt/yr			$ 13.72
	E. Annual Costs Associated with Transmission Sending Substation, 75 Mile Transmission Line and Receiving Substation per Kilowatt/yr		9/	$ 6.90
	F. Total Annual Capacity Cost in Dollars per Kilowatt			$203.52
III.	Adjustments to Annual Capacity Cost			
	A. Mechanical Availability Adjustment per Kilowatt 17% of Total Annual Capacity Cost of $203.52		10/	$ 34.60
	B. Hydrological Flexibility Adjustment per Kilowatt		11/	$ 10.18
	C. Total Adjustments to Annual Capacity Cost per Kilowatt			$ 44.77
IV.	Annual Capacity Value per Kilowatt			$248.30

ENERGY VALUE

			Fuel Costs
I.			
	A. Cost of Fuel in Cents per BTU	12/	$1.1520
	x Average Heat Rate	13/	11,377
	Base Fuel Cost in Mills per KWh		13.11
	B. Fuel Price Escalator	14/	1.81
	x Base Fuel Cost		23.72
	C. Total Annual Fuel Cost in Mills per KWh		23.72
II.	Other Variable Expenses		
	A. Variable O&M and A&G in Mills per KWh	15/	3.62
	B. Transmission Losses	16/	0.08
	C. Total Annual Other Variable Expenses		3.70
III.	Annual Energy Value in Mills per KWh		27.43

COMPOSITE VALUE

I.	Monthly Energy (in KWh) Associated with Each Kilowatt Power Factor x Number of Hours per Month	350.40
II.	Monthly Energy Charge Energy Value in Mills per KWh x Monthly Energy Amount/1,000	$ 9.61
III.	Total Monthly Charges Monthly Energy Charge + Capacity Rate per Month	$ 30.30
IV.	Composite Rate in Mills per KWh Total Monthly Charge/Monthly Energy Amount x 1,000	86.48

ANNUAL VALUE OF LOST CAPACITY AT FLAMING GORGE

I.	47 Megawatts Lost Capacity (6 months)	$5,835,050.00

FOOTNOTES TO APPENDIX E: ALTERNATIVE THERMAL PLANT STUDY--FLAMING GORGE

1/ Energy Information Administration, Historical Plant Cost and Annual Production Expenses for Selected Electric Plants, 1984 (Department of Energy: April 1986), p. 99.
2/ Ibid.
3/ Average general obligation, mixed quality State and local bond yield as of May 7, 1987, from Federal Reserve Statistical Release, May 11, 1987.
4/ Assumes a 30-year straight-line depreciation (present value).
5/ Insurance costs based on FERC Generalized Power Value (PGPV) as reported in Western Area Power Administration, Power Value Determinations (Department of Energy: April 1986), p. A-11.
6/ Assumes that public entities pay no State or local income or ad valorem taxes.
7/ Annual fixed fuel costs based upon following calculations:
Fuel Stockpile (75 days) x 24 hours x Plant Heat Rate (11,377 KWh/BTU) x Plant Factor (48%) x Fuel Cost (115.2 cents per BTU) x Annual Carrying Cost of Money (6.57%) x Unit Correction Factor (-10 x 100,000,000,000,000)
8/ Operation and Maintenance (O&M) and Administrative and General (A&G) expenses based on FGPV and adjusted for inflation using Producer Price Index (1984-85). For FGPV see Western, Power Value Determinations, p. A-9.
9/ Based on FGPV as reported in Western, Power Value Determinations, pp. A-13 and A-13a. Investment and O&M and A&G costs adjusted for inflation and cost of money assumed to be 6.57%.
10/ The Mechanical Availability Adjustment reflects the superior mechanical reliability and availability of the hydrogenerator. It is equivalent to the ration of the availability of the hydrogenerator as a percentage of a given period to the availability of the thermal facility as a percentage of the same period.
11/ The hydrological flexibility adjustment reflects the superior flexibility of the hydrogenerator to respond to regular fluctuations in load and to provide ready spinning reserves. The adjustment is equal to 5%. This figure represents a standard adjustment. See Western, Power Value Determinations, p. III-20.
12/ 1985 average annual cost of coal for steam plants of 50 MW or greater size in Mountain Census Division from, Energy Information Administration, Cost and Quality of Fuels for Electric Utility Plants, 1985 (Department of Energy: July 1986), Table 40, p. 52.
13/ Energy Information Administration, Historical Plant Cost and Annual Production Expenses for Selected Electric Plants, 1984 (Department of Energy: April 1986), p. 99.
14/ Provided by the Upper Colorado Region of the Bureau of Reclamation.
15/ Figures provided in Western, Power Value Determinations, page A-10. Adjusted for inflation in 1984-85 using PPI.
16/ Based on formula provided in Ibid., p. A-10.
17/ Assume loss of 50 MW of Flaming Gorge Capacity would occur in August and September, thus making it unavailable for marketing during the entire summer season.

APPENDIX F: IMPACTS OF THE ASSUMED FLOW REFINEMENTS ON THE RETAIL RATE

ASSUMPTIONS

AUXILIARY SUPPLIER'S RATE	86.48 mills/kWh 1/
Capacity	$20.69 kW/month
Energy	27.43 mills/kWh
Percent of Capacity Supplied	30%
SIERRA ELECTRIC'S RATE	72.18 mills/kWh 2/
Capacity	$20.40 kW/month
Energy	34.00 mills/kWh
Percent of Capacity Supplied	8.20%

ESTIMATED RATE WITHOUT THE ASSUMED FLOW REFINEMENTS

SLCA Integrated Rate	9.92 mills/kWh 3/
Capacity	$2.09 kW/month
Energy	5.00 mills/kWh

CAPACITY SOURCE PERCENTAGES 4/

Entity	SLCA-IP	Auxiliary Supplier	Total
T or C 7/	91.800%	8.200%	100.000%
HYPO 1 8/	70.000%	30.000%	100.000%

CAPACITY COST (mills/kWh) 5/

SLCA-IP	Auxiliary Supplier
4.92	38.18
4.92	59.05

WEIGHTED CAPACITY COST (mills/kWh) 6/

SLCA-IP	Auxiliary Supplier	Total
4.52	3.13	7.65
3.44	17.72	21.16

ENERGY SOURCE PERCENTAGES

Entity	SLCA-IP	Auxiliary Supplier	Total
T or C	91.800%	8.200%	100.000%
HYPO	70.000%	30.000%	100.000%

CAPACITY COST (mills/kWh)

SLCA-IP	Auxiliary Supplier
5.00	34.00
5.00	27.43

WEIGHTED ENERGY COST (mills/kWh)

SLCA-IP	Auxiliary Supplier	Total
4.59	2.79	7.38
3.50	8.23	11.73

ESTIMATED RETAIL RATES

Customer Category	Total Electic Power Cost 9/	Fixed Costs (mills/kWh) 10/	Total Retail Rate (mills/kWh)
T or C	15.03	8.09	23.12
HYPO 1	32.89	17.71	50.60

ESTIMATED RATE WITH ASSUMED FLOW REFINEMENTS
ESTIMATED CHANGE IN SLCA-IP RATE 11/

SLCA Integrated Project Rate	10.03 mills/kWh
Capacity	$2.12 kW/month
Energy	5.00 mills/kWh

	CAPACITY SOURCE PERCENTAGES 12/				CAPACITY COST (mills/kWh)		WEIGHTED CAPACITY COST (mills/kWh)		
Entity	IP HYDRO	Total SLCA	Auxiliary Supply	Total	IP HYDRO 13/	Auxiliary Supply	IP HYDRO	Auxiliary Supply	Total
T or C	89.400%	89.400%	10.600%	100.000%	5.03	38.18	4.50	4.05	8.54
HYPO 1	66.300%	66.300%	33.700%	100.000%	5.03	59.05	3.33	19.90	23.23

	ENERGY SOURCE PERCENTAGES 14/				CAPACITY COST (mills/kWh) 5/		WEIGHTED ENERGY COST (mills/kWh) 6/		
Entity	IP HYDRO	Total SLCA	Auxiliary Supply	Total	IP HYDRO 13/	Auxiliary Supply	IP HYDRO	Auxiliary Supply	Total
T or C	91.800%	91.800%	8.200%	100.000%	5.00	34.00	4.59	2.79	7.38
HYPO 1	70.000%	70.000%	30.000%	100.000%	5.00	27.43	3.50	8.23	11.73

ESTIMATED RETAIL RATES

Customer Category	Total Electic Power Cost	Fixed Costs (mills/kWh)	Total Retail Rate (mills/kWh)	Percent Change as a Result of the Assumed Flow Refinements
T or C	15.92	8.09	24.01	3.85
HYPO 1	34.96	17.71	52.67	4.09

FOOTNOTES TO APPENDIX F: IMPACTS OF THE ASSUMED FLOW REFINEMENTS ON THE RETAIL RATE

1/ These rates are estimated by an alternative thermal plant study for Flaming Gorge. Details are given in Appendix E. This rate is used as the auxiliary supplier's rate as an attempt to show how the societal cost of unavailable capacity of Flaming Gorge would impact the retail electrical power rate. These rates are not necessarily those charged by typical auxiliary suppliers in the Upper Colorado River Basin.

2/ Sierra Electric Generation Cooperative is the auxiliary supplier for the City of Truth or Consequences, New Mexico. Rates are taken from the existing contract for firm power electric service.

3/ The most recent power repayment study conducted by Western has determined that the appropriate rate for the SLCA-IP is the composite rate of 9.92 m/kWh. This is the same rate as the current CRSP rate.

4/ These are estimates of the percentage of the customers load served by the sources listed.

5/ These are given in mills per kilowatt hour. These have been converted from the $/kW/mo numbers listed under assumptions: i.e., the SLCA-IP 4.92 m/kWh translates to $2.09/kW/mo.

6/ These are the capacity values weighted by the percentage of load served by the various sources. A similar calculation was made to arrive at the weighted energy costs.

7/ Truth or Consequences, New Mexico. This city was chosen for this study due to the fact that a high percentage of its load is served by the SLCA-IP.

8/ HYPO 1 is a fictional utility. A typical SLCA-IP customer utility in the Upper Colorado River Basin receives 70 percent of its electrical power from the SLCA-IP. Source: [DOE, 1985].

9/ This is a summation of the total weighted power and total weighted energy costs.

10/ Fixed costs are assumed to be 35 percent of the total retail rate. Source: [DOE, 1985].

11/ This is the estimated change in the SLCA-IP rate due to the assumed flow refinements.

12/ The percentage of peak demand (capacity) served by the SLCA-IP resources has been reduced due to estimated reduction in Federal allocations as a result of the assumed flow refinements.

13/ This rate, in m/kWh, has been increased according to the increase in the SLCA-IP rate. Since the rate increase is relatively small, only the power or capacity rate has changed.

14/ Since no impact is estimated in annual allocations of energy, these percentages have remained the same.