

PREFACE

This document was originally finalized on October 15, 1993. Part One received a minor revision on March 8, 2000, to accommodate programmatic biological opinions. Part Two has been revised to accommodate annual updates, designation of critical habitat for the endangered fishes, and development of specific recovery goals for each of the species.

PART ONE: Section 7 Consultation, Sufficient Progress, and Historic Projects Agreement

Sections 4.1.5, 4.1.6, and 5.3.4 of the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (Recovery Program) outline procedures for consultation pursuant to Section 7 of the Endangered Species Act on water projects in the Upper Colorado River Basin. The Section 7 Agreement (including Section 7 Consultation, Sufficient Progress, and Historic Projects Agreement) was developed by Recovery Program participants to clarify how Section 7 consultations will be conducted on water depletion impacts related to new projects and impacts associated with historic projects (existing projects requiring a new Federal action) in the Upper Basin.

PART TWO: Recovery Implementation Program Recovery Action Plan

The Recovery Implementation Program Recovery Action Plan (RIPRAP) was developed by the Recovery Program participants in support of the Section 7 Agreement using the best, most current information available and the recovery goals for the four endangered fish species. It identifies specific actions and time frames currently believed to be required to recover the endangered fishes in the most expeditious manner in the Upper Basin. The RIPRAP is the Recovery Program's long range plan. It contains dates for accomplishing specific actions over the next 5 years and beyond. The RIPRAP will serve as a measure of accomplishment so that the Recovery Program can continue to serve as a reasonable and prudent alternative for projects undergoing Section 7 consultation to avoid the likelihood of jeopardy to the continued existence of the endangered fishes as well as to avoid the likely destruction or adverse modification of critical habitat.

PART ONE:

RECOVERY IMPLEMENTATION PROGRAM
SECTION 7 CONSULTATION, SUFFICIENT PROGRESS,
AND HISTORIC PROJECTS AGREEMENT

Agreement

Section 7 Consultation, Sufficient Progress, and Historic Projects

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

October 15, 1993

Revised March 8, 2000

I. Background

The Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (RIP) is intended to go considerably beyond offsetting water depletion impacts by providing for the full recovery of the four endangered fishes. The RIP participants recognize that timely progress toward recovery in accordance with a well-defined action plan is essential to the purposes of the RIP, including both the recovery of the endangered fishes and providing for water development to proceed in compliance with State law, Interstate Compacts, and the Endangered Species Act (ESA). Recovery activities which result in significant protection and improvement of the endangered fish populations and their habitat need to receive high priority in future planning, budgeting, and decision making. The RIP participants accept that certain positive population responses to RIP initiatives are not likely to be measurable for many years due to the time required for the endangered fishes to reach reproductive maturity, limited knowledge about their life history and habitat requirements, sampling difficulties and limitations, and other factors. The RIP participants also recognize that further degradation of endangered fish habitats and populations will make recovery increasingly difficult.

II. RIP Recovery Action Plan (RIPRAP)

The Recovery Action Plan (RIPRAP) identifies actions currently believed to be required to recover the endangered fishes in the most expeditious manner possible in the upper basin. It has been developed using the best information available and the recovery goals established for the four endangered fish species. By reference, the RIPRAP is incorporated and considered part of this agreement. The RIPRAP will be an adaptive management plan because additional information, changing priorities, and the development of the States' entitlement may require modifications to the RIPRAP. The RIPRAP will be reviewed annually and modified or updated, if necessary, by September 30 of each year or prior to adoption of the annual work plan, whichever comes first. The RIPRAP will serve as a guide for all future planning, research, and recovery efforts, including the annual work-planning and budget decision process.

The RIP is intended to provide the reasonable and prudent alternatives for projects undergoing Section 7 consultation in the upper basin. While some recovery actions in the RIPRAP are expected to have more direct or immediate benefits for the endangered fishes than others, all are considered necessary to accomplish the objectives of the RIP. Recovery actions which protect or improve habitat conditions and result in more immediate, positive population responses will be most important in determining the extent to which the RIP provides the reasonable and prudent alternatives for projects undergoing Section 7 consultation. In general, these actions will be given highest priority in the RIPRAP.

The Fish and Wildlife Service (FWS) will determine whether progress by the RIP provides a reasonable and prudent alternative based on the following factors:

- a. Actions which result in a measurable population response, a measurable improvement in habitat for the fishes, legal protection of flows needed for recovery, or a reduction in the threat of immediate extinction.
- b. Status of fish population.
- c. Adequacy of flows.
- d. Magnitude of the impact of projects.

Therefore, these factors were considered in the development and prioritization of the recovery actions in the RIPRAP.

III. Framework for Agreement

The following describes the agreement among RIP participants on a framework for conducting Section 7 consultations on depletion impacts related to new projects (as defined in Section 4.1.5 a. of the RIP) and impacts¹ associated with historic projects in the Upper Colorado River Basin. This agreement is meant to supplement and clarify the process outlined in Sections 4.1.5, 4.1.6 and 5.3.4 of the RIP. This agreement applies only to the four Colorado River endangered fishes in the Upper Colorado River Basin, excluding the San Juan River, and is not a precedent for other endangered species or locations.

1. Activities and accomplishments under the RIP are intended to provide the reasonable and prudent alternatives which avoid the likelihood of jeopardy to the continued existence of the endangered Colorado River fishes (hereinafter the "reasonable and prudent alternative") resulting from depletion impacts of new projects and all existing or past impacts related to historic projects with the exception of the discharge by historic projects of pollutants such as trace elements, heavy metals, and pesticides. However, where a programmatic biological opinion applies, the appropriate provisions of such an opinion will apply to future individual consultations.

The RIP participants intend the RIP also to provide the reasonable and prudent alternatives which avoid the likely destruction or adverse modification of critical habitat, to the same extent as it does to avoid the likelihood of jeopardy. Once critical habitat for the endangered fishes is formally designated, the RIP participants will make any necessary amendments to the RIPRAP to fulfill such intent.

2. The RIP is intended to offset both the direct and depletion impacts of historic projects occurring prior to January 22, 1988 (the date when the Cooperative Agreement for the RIP was executed) if such offsets are needed to recover the fishes. Under certain circumstances, historic projects may be subject to consultation under Section 7 of the ESA. An increase in depletions from a historic project occurring after January 22, 1988, will be subject to the depletion charge. Except for the circumstances described in item 11 below, depletion charges or other measures will

¹ All impacts except the discharge of pollutants such as trace elements, heavy metals, and pesticides.

not be required from historic projects which undergo Section 7 consultation in the future.

3. The Bureau of Reclamation (BR) and the Western Area Power Administration will operate projects authorized and funded pursuant to Federal reclamation law consistent with its responsibilities under Section 7 of the ESA and with any existing contracts. No depletion charge will be required on depletions from BR projects as long as BR continues its contributions to the RIP's annual budget.
4. The FWS will assess the impacts of projects that require Section 7 consultation and determine if progress toward recovery has been sufficient for the RIP to serve as a reasonable and prudent alternative. The FWS will use accomplishments under the RIP as its measure of sufficient progress. The FWS will also consider whether the probable success of the RIP is compromised as a result of a specific depletion or the cumulative effect of depletions. Support activities (funding, research, information and education, etc.) in the RIP contribute to sufficient progress to the extent that they help achieve a measurable population response, a measurable improvement in habitat for the fishes, legal protection of flows needed for recovery, or a reduction in the threat of immediate extinction. Generally, sufficient progress will be evaluated separately for the Colorado and Green River subbasins (but not individual tributaries within each subbasin). However, the FWS will give due consideration to progress throughout the upper basin in evaluating sufficient progress.
5. If sufficient progress is being achieved, biological opinions will identify the activities and accomplishments of the RIP that support it serving as a reasonable and prudent alternative.
6. If sufficient progress is not being achieved, biological opinions for new and historic projects will be written to identify which action(s) in the RIPRAP must be completed to avoid jeopardy. Specific recovery actions will be implemented according to the schedule identified in the RIPRAP. The FWS will confer with the Management Committee on the identification of these actions within established timeframes for the Section 7 consultation. For historic projects, these actions will serve as the reasonable and prudent alternative as long as they are completed according to the schedule identified in the RIPRAP. For new projects, these actions will serve as a reasonable and prudent alternative so long as they are completed before the impact of the project occurs. The FWS has ultimate authority and responsibility for determining whether progress is sufficient to enable it to rely upon the RIP as a reasonable and prudent alternative and identifying actions necessary to avoid jeopardy.
7. Certain situations may result in the FWS determining that the recovery action in previously rendered biological opinions are no longer serving as a reasonable and prudent alternative. These situations may include, but are not limited, to:
 - a. Critical deadlines for specified recovery actions are missed;
 - b. Specified recovery actions are determined to be infeasible; and
 - c. Significant new information about the needs or population status of the fishes becomes available;
8. The FWS will notify the Implementation and Management Committees when a situation may result in the RIP not serving as a reasonable and prudent alternative.

The Management Committee will work with the FWS to evaluate the situation and develop the most appropriate response to restore the RIP as a reasonable and prudent alternative (such as adjusting a recovery action so it can be achieved, developing a supplemental recovery action, shortening the timeframe on other recovery actions, etc.).

9. The RIP is responsible for providing flows which the FWS determines are essential to recovery of the endangered fishes. Whether or not a Section 7 review is required, the RIP will work cooperatively with the owners/operators of historic projects on a voluntary basis to implement recovery actions needed to recover the endangered fishes.
10. The responsibility for the efficiency and effectiveness of the RIP, and for its viability as a reasonable and prudent alternative, rests upon RIP participants, not with individual project proponents. RIP participants fully share that responsibility.
11. If the RIP cannot be restored to provide the reasonable and prudent alternative per item 8, above, as a last resort the FWS will develop a reasonable and prudent alternative, if available, with the lead Federal Agency and the project proponent. (RIP participants recognize that such actions would be inconsistent with the intended operation of the RIP). The option of requesting a depletion charge on historic projects or other measures on new or historic projects will only be used in the event that the RIPRAP does not or can not be amended to serve as a reasonable and prudent alternative. In this situation, the reasonable and prudent alternative will be consistent with the intended purpose of the action, within the Federal Agency's legal authority and jurisdiction to implement, and will be economically and technologically feasible.
12. This agreement becomes effective upon adoption of the RIPRAP by the Implementation Committee. Until the RIPRAP is adopted, the FWS will use the procedures in this agreement and the January 1993, draft RIPRAP as the basis for identifying reasonable and prudent alternatives.
13. Experience may dictate a need to modify this agreement in the future. This agreement may be modified or amended by consensus of all the RIP participants. A review of the agreement may be initiated by any voting member of the Implementation Committee.

PART TWO:

RECOVERY IMPLEMENTATION PROGRAM
RECOVERY ACTION PLAN
(RIPRAP)

**RECOVERY IMPLEMENTATION PROGRAM
RECOVERY ACTION PLAN
(RIPRAP)**

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	RECOVERY PROGRAM PURPOSE	1
1.2	SPECIES RECOVERY GOALS	1
1.3	RECOVERY ACTION PLAN PURPOSE	2
1.4	ESTIMATED COST OF RECOVERY ACTIONS	2
1.5	MEASURING PROGRESS TOWARD RECOVERY AND SCHEDULING RIPRAP ACTIVITIES	3
1.6	RECOVERY ACTION PLAN STRUCTURE	3
2.0	DISCUSSION OF RECOVERY ACTION PLAN ELEMENTS	4
2.1	I. IDENTIFY AND PROTECT INSTREAM FLOWS (HABITAT MANAGEMENT)	4
2.2	II. RESTORE AND PROTECT HABITAT (HABITAT DEVELOPMENT AND MAINTENANCE)	6
2.3	III. REDUCE NEGATIVE IMPACTS OF NONNATIVE FISHES AND SPORTFISH MANAGEMENT ACTIVITIES (NONNATIVE AND SPORTFISH MANAGEMENT)	8
2.4	IV. CONSERVE GENETIC INTEGRITY AND AUGMENT OR RESTORE POPULATIONS (STOCKING ENDANGERED FISHES)	9
2.5	V. MONITOR POPULATIONS AND HABITAT AND CONDUCT RESEARCH TO SUPPORT RECOVERY ACTIONS (RESEARCH, MONITORING, AND DATA MANAGEMENT)	11
2.6	VI. INCREASE PUBLIC AWARENESS AND SUPPORT FOR THE ENDANGERED FISHES AND THE RECOVERY PROGRAM (INFORMATION AND EDUCATION)	11
2.7	VII. PROVIDE PROGRAM PLANNING AND SUPPORT (PROGRAM MANAGEMENT)	12
3.0	DISCUSSION OF SUBBASIN RECOVERY PRIORITIES	12
3.1	GREEN RIVER	12
	3.1.1 Importance	12
	3.1.2 Recovery Actions	13
3.2	YAMPA AND LITTLE SNAKE RIVERS	14
	3.2.1 Importance	14
	3.2.2 Recovery Actions	15

3.3	DUCHESNE RIVER	17
3.3.1	Importance	17
3.3.2	Recovery Actions	17
3.4	WHITE RIVER	18
3.4.1	Importance	18
3.4.2	Recovery Actions	18
3.5	COLORADO RIVER	18
3.5.1	Importance	18
3.5.2	Recovery Actions	19
3.6	GUNNISON RIVER	20
3.6.1	Importance	20
3.6.2	Recovery Actions	20
3.7	DOLORES RIVER	21
3.7.1	Importance	21
3.7.2	Recovery Actions	21
4.0	RECOVERY ACTION PLANS	23
4.1	GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN	24
4.2	GREEN RIVER ACTION PLAN: MAINSTEM	29
4.3	GREEN RIVER ACTION PLAN: YAMPA AND LITTLE SNAKE RIVERS	32
4.4	GREEN RIVER ACTION PLAN: DUCHESNE RIVER	35
4.5	GREEN RIVER ACTION PLAN: WHITE RIVER	36
4.6	COLORADO RIVER ACTION PLAN: MAINSTEM	37
4.7	COLORADO RIVER ACTION PLAN: GUNNISON RIVER	43
4.8	COLORADO RIVER ACTION PLAN: DOLORES RIVER	46
5.0	LITERATURE CITED	47
	APPENDIX: CRITICAL HABITAT ANALYSIS	A-1

1.0 INTRODUCTION

1.1 RECOVERY PROGRAM PURPOSE

The purpose of the Recovery Implementation Program for Endangered Fishes in the Upper Colorado River Basin (Recovery Program) is to recover the humpback chub (*Gila cypha*), bonytail (*G. elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), and razorback sucker (*Xyrauchen texanus*) while existing and new water development proceeds in the Upper Basin (i.e., Upper Colorado River Basin upstream of Glen Canyon Dam, excluding the San Juan River; Cooperative Agreement, 1988) in compliance with the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*). Further, the Recovery Program is intended to serve as a reasonable and prudent alternative to avoid the likelihood of jeopardy to the continued existence of the endangered fishes and to avoid the likely destruction or adverse modification of critical habitat in Section 7 consultations on depletion impacts related to new projects and all impacts (except the discharge of pollutants such as trace elements, heavy metals, and pesticides) associated with historic water projects in the Upper Basin.

1.2 SPECIES RECOVERY GOALS

The overall goal for recovery of the four endangered fishes is to achieve naturally self-sustaining populations and to protect the habitat on which those populations depend. Recovery plans for these species have been developed under Section 4(f) of the Endangered Species Act (U.S. Fish and Wildlife Service 1990a, 1990b, 1991, 1998), and the final rule determining critical habitat was published in the *Federal Register* on March 21, 1994 (59 FR 13374; Appendix). The recovery plans provide a biological and research-oriented approach to recovery and include a recommendation for detailed management and site-specific implementation plans. They refer to species recovery in both the Upper and Lower basins, but fail to include specific demographic criteria for self-sustaining, viable populations and site-specific management actions/tasks to minimize or remove threats.

On August 1, 2002, the U.S. Fish and Wildlife Service (Service) approved final recovery goals for the endangered fishes to serve as amendments and supplements to the existing recovery plans (U.S. Fish and Wildlife Service 2002a, 2002b, 2002c, 2002d). According to Section 4(f)(1) of the Endangered Species Act, these recovery goals describe what is necessary for downlisting and delisting each of the species by identifying site-specific management actions/tasks necessary to minimize or remove threats; establishing objective, measurable criteria that consider demographic and genetic needs for self-sustaining, viable populations; and providing estimates of the time to achieve recovery. The Service has begun the process of reviewing and updating the species recovery goals in 2007.

In the context of the recovery goals, recovery of humpback chub, bonytail, and razorback sucker is considered across the Upper and Lower basins (each basin is

treated as a “recovery unit”), with separate recovery criteria developed for each of the two recovery units. Recovery of Colorado pikeminnow is considered necessary only for the Upper Colorado River Basin (including the San Juan River subbasin). The Recovery Program and the San Juan River Basin Recovery Implementation Program provide for the coordinated implementation of management actions/tasks that contribute to recovery in the Upper Basin recovery unit.

1.3 RECOVERY ACTION PLAN PURPOSE

This Recovery Implementation Program Recovery Action Plan (RIPRAP) has been developed using the best, most current information available and the recovery goals for the four endangered fish species. The RIPRAP is intended to provide an operational plan for implementing the Recovery Program, including development of the Recovery Program's annual work plan and future budget needs. Specifically, the RIPRAP identifies the feasible actions that are necessary to recover the endangered fishes, including schedules and budgets for implementing those actions. The RIPRAP also identifies the specific recovery actions that must be accomplished in order for the Recovery Program to serve as a reasonable and prudent alternative to avoid the likelihood of jeopardy to the continued existence of the endangered fishes and to avoid the likely destruction or adverse modification of critical habitat in Section 7 consultations for depletion impacts of new projects and all existing or past impacts related to historic water projects (except impacts from contaminants) in the Upper Basin, in accordance with the October 15, 1993 Section 7 Agreement (Revised March 8, 2000). The RIPRAP was developed in support of that Agreement.

1.4 ESTIMATED COST OF RECOVERY ACTIONS

The estimated total budget for the Recovery Program from FY 2007–FY 2011 is approximately \$54.2 million. Funding for the Recovery Program is expected to come from the following sources:

- a. An annual operating budget of approximately \$6 million, totaling roughly \$32 million from FY 2007–FY 2011 as it is adjusted annually for inflation. The source of these funds will be: Western Area Power Administration and the U.S. Bureau of Reclamation (hydropower revenues); the U.S. Fish and Wildlife Service; and the States of Colorado, Utah, and Wyoming. Additional annual funding will come from water development depletion fees. Under the Recovery Program, proponents of new water projects which undergo Section 7 Endangered Species Act consultation have agreed to pay a one-time depletion fee based on a project's average annual depletion. The rate is adjusted annually for inflation: as of October 1, 2006 it was \$17.24 per acre foot; the rate increases to \$17.79 per acre foot as of October 1, 2007. The actual rate of water development has not been projected.

- b. Approximately \$83.1 million will be spent between FY 1999 and FY 2010 for capital projects, including: acquisition of water and water rights to implement and maintain adequate instream flows for the fish; building fish passages and hatcheries; and restoring flooded bottomlands. P.L. 106-392 authorized this funding in October 2000; P.L. 107-375 extended construction authority from 2005 to 2008; and P.L. 109-183 authorized Federal appropriations through 2010, increased authorized Federal appropriations from \$46 million to \$61 million, and increased the capital funding total from \$62 million to \$77 million plus adjustments for inflation to the Federal portion. The actual cost of any one capital project will depend on final planning, design and budgeting. Costs for individual projects will be modified to more accurately reflect expected costs as the work plans are updated annually.

1.5 MEASURING PROGRESS TOWARD RECOVERY AND SCHEDULING RIPRAP ACTIVITIES

To achieve recovery in the Upper Basin, it will be essential to fully implement all of the actions in the RIPRAP; this will be accomplished only through cooperation by all Program participants. In general, actions will be scheduled such that recovery will be achieved in the most expeditious and cost-effective manner possible. However, decisions associated with ongoing Section 7 consultations may require some adjustment in the schedule to ensure recovery of the endangered fishes while water development continues.

Recovery actions likely to result in a measurable population response, a measurable improvement in habitat for the fishes, legal protection of flows needed for recovery, or a reduction in the threat of immediate extinction have been determined by the Service to be most important in determining the extent to which the Recovery Program provides the reasonable and prudent alternatives to jeopardy for projects undergoing Section 7 consultation. These actions are identified by the caret ">" in the Action Plans. Actions that the Service believes will contribute to the RIPRAP serving as a reasonable and prudent alternative to adverse modification of critical habitat are identified by an asterisk (*). These caret and (or) asterisked actions will generally be given highest priority.

The Recovery Program continually evaluates the outcome of completed RIPRAP actions to determine their effectiveness in helping to achieve recovery. Ultimately, success of recovery efforts will be measured by species response (change in population size, distribution, composition, etc.). However, it may be many years before such responses are evident. In the interim, the Recovery Program also will gage its progress towards recovery by accomplishment of the actions identified in the RIPRAP.

1.6 RECOVERY ACTION PLAN STRUCTURE

The substance of the RIPRAP is in Section 4.0, the Recovery Action Plans. It is here that the specific recovery actions are listed. The first Recovery Action Plan identifies

general recovery program support activities important to the success of the Recovery Program. The following two Recovery Action Plans are for the Green and Colorado rivers and their subbasins in the Upper Basin. Each action plan is arranged by specific activities to be accomplished within the "recovery elements" listed below:

- I. Identify and protect instream flows;
- II. Restore and protect habitat;
- III. Reduce negative impacts of nonnative fishes and sportfish management activities;
- IV. Conserve genetic integrity and augment or restore populations;
- V. Monitor populations and habitat and conduct research to support recovery actions;
- VI. Increase public awareness and support for the endangered fishes and the Recovery Program (in the General Recovery Program Support Action Plan only); and
- VII. Provide program planning and support (in the General Recovery Program Support Action Plan only).

The Recovery Action Plans (Section 4.0) have been formatted as tables for ease of scheduling and tracking activities. A general discussion of activities under each recovery element and of recovery priorities in each subbasin is found in Sections 2.0 and 3.0, respectively. Projected budgets are broken out in Section 5.0.

2.0 DISCUSSION OF RECOVERY ACTION PLAN ELEMENTS

The Recovery Action Plan tables contain only very brief descriptions of recovery actions planned in each subbasin. In this section, recovery activities are explained in more detail, as they apply Upper Basin wide.

2.1 I. IDENTIFY AND PROTECT INSTREAM FLOWS

Recovery cannot be accomplished without securing, protecting, and managing sufficient habitat to support self-sustaining populations of the endangered fishes. Identification and protection of instream flows are key elements in this process. The first step in instream-flow protection is to identify flow regimes needed by the fish. In the Recovery Program, determining flow needs is primarily the responsibility of the Service (in cooperation with other participants). Factors considered in determining flow needs include: flow effects on reproduction and recruitment; flow effects on food supplies and nonnative fishes; and interrelationships between flow and other habitat parameters believed to be important for the fish, such as channel structure, sediment transport, substrate characteristics, vegetative encroachment, and water temperature. Flow recommendations often are made in stages, with initial flow recommendations based on the best available scientific information, historic conditions, and extrapolation from similar reaches. Recommendations then are refined following additional field research.

The contribution of tributaries to recovery was ranked by Tyus and Saunders (2001). A strategic plan was completed in 2003 that identified geomorphology research priorities to refine the flow recommendations and address the Recovery Goals (LaGory et al. 2003).

Flow recommendations have been approved for reaches of the Colorado (Osmundson and Kaeding 1991; McAda 2003), Yampa (Modde and Smith 1995; Modde et al. 1999), Green (Muth et al. 2000), Gunnison (McAda 2003), and Duchesne (Modde and Keleher 2003) rivers. Flows in the Little Snake River after estimated future depletions were identified in the Yampa River Management Plan and Environmental Assessment (Roehm 2004). Interim flow recommendations for the White River were completed in 2004 (Irving et al. 2004) and will be reviewed in 2007. Flow recommendations for the Colorado River below the Green River are pending completion of the Aspinall Unit EIS. Flow recommendations for other rivers or river reaches will be developed as deemed necessary to achieve recovery.

Colorado

Flow protection mechanisms are organized according to their initial or dominant attribute. If a change in the ownership of a water right (by purchase, lease, etc.) is central to flow protection, then flow protection is placed under "Acquire." A change in water right ownership to protect flows will usually be accompanied by a legal proceeding to change the nature or use of the water right, but this proceeding is still considered to be part of the "acquisition" of flow protection. Except for acquisition of conditional water rights in Colorado, such water rights acquisition also will result in physical alteration of flow conditions and will not just protect existing conditions.

Where flow protection involves filing for a new water right, it is placed under "Appropriate." With this mechanism, the ownership of the water right is established in the first instance, rather than being conveyed to a subsequent owner. In Colorado, the appropriation of an instream water right follows a structured process developed by the Colorado Water Conservation Board (CWCB) in 1997. The process begins with a Service flow recommendation, which is reviewed by CWCB and the Colorado Division of Wildlife (CDOW). Then CWCB issues a notice of intent to appropriate, followed by their approval to appropriate. Finally, the Attorney General must make a water court filing to confirm the appropriation and to avoid postponement of the appropriation's priority date. It may take 3 to 4 years from the notice of intent to appropriate to obtain a decree from the water court, depending on the nature of any litigation over the filing. In appropriation, the water right will have a relatively junior priority date (the date CWCB issued the notice of intent to appropriate), and only existing flow conditions can be protected. In most cases, this process has lacked support and thus proven to have limited use in the Recovery Program. Therefore, the Recovery Program adopted a programmatic biological opinion (PBO) approach on the Colorado and Yampa rivers and will apply a similar approach to the Gunnison River. Recovery Program participants anticipate that this process will prove effective in protecting instream flows for the

endangered fishes. The Recovery Program and CWCB will reevaluate the need for instream-flow filings 5 years after each PBO is in place.

Flows also may be protected through the physical alteration of flow conditions by reoperating a reservoir or other component of an existing or new water project. This kind of flow protection is placed under "Deliver" in the Recovery Action Plans and will usually involve both a change of water right ownership, including the lease of storage water, and a change in the legal nature of the water rights. (A management agreement between Federal agencies also may be involved, as in the case of the Aspinall Unit, and compensation will be required where storage water is already under contract.)

Utah

Legal protection of flows in Utah will be achieved differently than in Colorado. Several approaches can be taken under Utah water law to protect instream flows, including: 1) acquiring existing water rights and filing change applications to provide for instream flow purposes; 2) withdrawing unappropriated waters by governor's proclamation; 3) approving presently filed and future applications subject to minimum flow levels; and 4) with proper compensation, preparing and executing contracts and subordinating diversions associated with approved and perfected rights. Although current Utah water law may not fully provide for all aspects of instream-flow protection, Utah does believe they can provide an adequate level of protection.

Utah examined available flow protection approaches and determined that the strategy they will use most commonly will be to condition the approval of presently filed and new applications, making them subject to predetermined streamflow levels. To accomplish this, the State Engineer adds a condition of approval to water-right applications (within the area) filed after the policy is adopted. The condition states that whenever the flow of the Green River (or other streams) drops below the predetermined streamflow level, then diversions associated with water rights approved after the condition is imposed are prohibited. Based on past legal challenges to the State's authority to impose conditions associated with new approvals, it was determined that this is within the authority of the State Engineer. This approach does not specifically recognize an instream-flow right; however, it does protect the flows from being diverted and used by subsequently approved water rights. This approach was adopted as policy by the State Engineer. The policy requires that presently filed and new applications to be approved are subject to the summer and fall flow recommendations. As flow recommendations are finalized and accepted, Utah will review options for protecting the recommended flows.

2.2 II. RESTORE AND PROTECT HABITAT

Important elements of habitat protection include restoring and managing in-channel habitat and historically flooded bottomland areas, restoring passage to historically occupied river reaches, preventing fish entrainment at diversion structures (if

warranted), enhancing water temperatures, and reducing or eliminating the impacts of contaminants.

Historically, Upper Colorado River Basin floodplains were frequently inundated by spring runoff, but today much of the river is channelized by levees, dikes, rip-rap, and tamarisk. Fish access to these flooded bottomlands has been further reduced by decreased peak spring flows due to upstream impoundments. Numerous studies have suggested the importance of seasonal flooding to river productivity, and flooded bottomlands have been shown to contain large numbers of zooplankton and benthic organisms. Floodplain areas inundated and temporarily connected to the main channel by spring flows appear to be important habitats for all life stages of razorback sucker, and the seasonal timing of razorback sucker reproduction suggests an adaptation for utilizing these habitats. Restoring access to these warm and productive habitats would provide the growth and conditioning environments that appear crucial for recovery of self-sustaining razorback sucker populations. In addition, Colorado pikeminnow also use these areas for feeding prior to migrating to spawning areas. Inundation of floodplain habitats, although most important for razorback sucker, would benefit other native fishes by providing growth and conditioning environments and by restoring ecological processes dependent on periodic river-floodplain connections. Restoration of floodplain habitats could be achieved through a combination of increased peak flows, prolonged peak-flow duration, lower bank or levee heights, and constructed inlets. Studies have shown that full utilization of these floodplain habitats has been hampered by the presence of large numbers of predacious and competing nonnative fish. Studies are underway to determine how this interaction may be reduced to enhance use of these habitats by endangered fish. For example, additional evaluation of the floodplain reset theory will be needed to determine if nonnative fish can be reduced or eliminated during low-flow years.

The Recovery Action Plans contain tasks to identify and restore important flooded bottomland habitats. During 1994, the Recovery Program completed an inventory of floodplain habitats for 870 miles of the Colorado, Green, Gunnison, Yampa, and White rivers. From the list of inventoried habitats, high-priority sites were screened for restoration potential. Site acquisition began in 1994 and continued through 2003. Since 2003, the Program has completed the razorback sucker floodplain habitat model and floodplain management plans for the Green and Colorado River sub-basins (subject to revision as new information is gathered). Based on the model and these management plans, the Program has shifted from screening additional floodplain sites for potential restoration/acquisition to focusing on sites already acquired or otherwise available for management. Success will be measured by the response of the endangered fish populations.

The General Recovery Program Support Action Plan contains tasks to develop an issue paper on floodplain restoration and protection. This paper identified legal, institutional, and political strategies to enhance and protect floodplain habitats for the endangered fishes and ameliorate the effects of levees, diking, rip-rap, gravel mining, and other

forms of floodplain development. Phase 1 of the issue paper identified what floodplain restoration and protection is needed for the endangered fishes; Phase 2 determined how to accomplish that restoration and protection. The issue paper evaluated responsibilities of the Recovery Program, Recovery Program participants, and other agencies involved in floodplain development, regulation, and management, and their roles and responsibilities with respect to endangered species.

Passage barriers have fragmented endangered fish populations and their habitats, resulting in confinement of the fishes to 20 percent of their former range. Blockage of Colorado pikeminnow movement by dams and water-diversion structures has been suggested as an important cause of the decline of this species in the Upper Basin (Tyus 1984; U.S. Fish and Wildlife Service 1991). Restoring access to historically occupied habitats via fish passage ways was identified in the Colorado Squawfish [Pikeminnow] Recovery Plan (U.S. Fish and Wildlife Service 1991) and in the recovery goals (U.S. Fish and Wildlife Service 2002c) as one of several means to aid in Colorado pikeminnow recovery.

The Recovery Action Plans contain tasks to assess and make recommendations for fish passage at various dams and diversion structures. The need for passage already has been determined at four sites: Redlands, Grand Valley Irrigation Company (GVIC), Price Stubb, and the Grand Valley Project. Passage has been restored at the Redlands Diversion Dam on the Gunnison River and at the GVIC and GVP diversions on the mainstem Colorado River near Palisade, Colorado. Activities are underway to restore passage at Price-Stubb.

Diversion canals have been found to entrain native and endangered fishes. Construction of fish screens to prevent entrainment of adult and subadult fish is in the planning and design stage at Tusher Wash and construction was completed at the Grand Valley Project and Redlands during 2005. Construction of a screen at the GVIC diversion canal was completed in 2002, but additional improvements to this screen are anticipated. Potential entrainment of Colorado pikeminnow in diversion structures on the Yampa River may be evaluated beginning in 2007.

A number of potentially harmful contaminants (including selenium, petroleum derivatives, heavy metals, ammonia, and uranium) and suspected contaminant "hot spots" have been identified in the Upper Basin. It is the intent of the Recovery Program to support and encourage the activities of entities outside the Recovery Program that are working to identify problem sites, evaluate contaminant impacts, and reduce or eliminate those impacts.

2.3 III. REDUCE NEGATIVE IMPACTS OF NONNATIVE FISHES AND SPORTFISH MANAGEMENT ACTIVITIES

Fifty-two fish species occur in the Upper Basin, but only 13 of those are native species. Many of the nonnative fishes have been successful due to changes in the river system

that favor their survival over that of native fishes. Competition with and predation by nonnative species is widely assumed to have played a role in the decline of the endangered fishes (Tyus and Saunders 1996). However, evidence of direct impacts of introduced species on native fishes is difficult to obtain (Schoenherr 1981) and often is masked by human-caused habitat alterations (Moyle 1976).

In studies on the Green River, researchers documented that young Colorado pikeminnow constituted 5% of the diet of northern pike, even though young Colorado pikeminnow made up a much smaller portion of the available food base in the river (Crowl and Lentsch 1996). Researchers estimated that a single northern pike could consume 100 or more young Colorado pikeminnow per year. Also, northern pike are known to prey on adult Colorado pikeminnow, native roundtail chub (*Gila robusta*), flannelmouth and bluehead suckers, and may also feed on humpback chubs in the Yampa River. Colorado has completed a fisheries management plan for the Yampa River basin (a revision is pending). Smallmouth bass in the Yampa River have rapidly increased in abundance and pose a significant predatory and competitive threat to the endangered fishes.

Recovery Program activities related to nonnative fishes initially focused on identifying impacts/interactions and developing nonnative fish stocking procedures. Nonnative fish control strategies were developed to identify and prioritize options for controlling or removing nonnative fishes from river reaches occupied by the endangered fishes as well as other reaches that serve as production areas for nonnatives that subsequently disperse into occupied habitat (Tyus and Saunders 1996; Lentsch et al. 1996; Hawkins and Nesler 1991). In February 2004, the Recovery Program adopted a nonnative fish management policy that addresses the process of identifying and implementing nonnative fish management actions needed to recover the endangered fishes. Through 2006, emphasis has been focused on the control activities identified in these strategies. All nonnative fish control activities are being evaluated for effectiveness and continued as appropriate.

The States and the Service also have developed final procedures for stocking of nonnative fishes in the Upper Basin (USFWS 1996a, 1996b). The procedures are designed to reduce the impact on native fishes due to stocking of nonnative fishes in the Upper Basin and clarify the role of the States, the Service, and others in the review of stocking proposals. A memorandum of understanding has been signed by the States and the Service implementing the Stocking Procedures. The Stocking Procedures will be reviewed for possible revisions in 2007.

2.4 IV. CONSERVE GENETIC INTEGRITY AND AUGMENT OR RESTORE POPULATIONS

Species recovery depends on protecting and managing species genetic resources. This is a complex activity that includes: determining the genetic diversity of the endangered fishes; protecting species in refugia; planning, developing, and operating propagation

facilities; propagating fish for augmentation or restoration, research, and information and education; and planning, implementing, and evaluating augmentation or restoration of species. Stocking is only an interim tool in the Recovery Program because recovery, by definition, implies that the populations will be self-sustaining in the wild. The success of augmentation and restoration stocking is dependent on prior or concurrent implementation of other recovery actions such as flow protection, habitat restoration, and management of nonnative fishes. This dependency is reflected in the schedule of subbasin-specific actions in Section 4.0.

The Recovery Program has recognized the need to increase augmentation and restoration stocking (primarily for razorback sucker and bonytail), both for recovery of the species and to establish fish in the system to be able to demonstrate that habitat and instream flow activities are having an effect on endangered fish recovery. The Recovery Program is implementing an integrated stocking plan developed for bonytail, Colorado pikeminnow (stocking on hold), and razorback sucker. The Recovery Program continues to evaluate the need for implementing an integrated stocking plan for humpback chub especially for restoring specific stocks thought to be too low for adequate natural recruitment. Humpback chub is not currently being stocked; however, augmentation of existing small populations may become necessary.

Studies to confirm genetic diversity have been vital to genetics management of the endangered fishes. Species are being protected in refugia to develop broodstocks and guard against catastrophe. Representatives of species thought to be in immediate danger of extinction are brought into refugia immediately. Refugia populations of species are developed using paired breeding matrices to maximize genetic variability and maintain genetic integrity.

Most of this work is included under the General Recovery Program Support Action Plan because it applies Upper Basin wide. Subbasin-specific activities of augmenting or restoring species are placed under the subbasin Action Plans. Augmentation or restoration plans are being implemented, fish produced, and river reaches restored and augmented with those fish. The effects of these augmentation efforts need to be monitored and evaluated.

Four basic documents are used to plan, implement, and coordinate genetics management and artificial propagation for the endangered fishes. These are the Genetics Management Guidelines, Genetics Management Plan, Integrated Stocking Plan, and Coordinated Hatchery Facility Plan (Facility Plan). All four of these plans have been developed and will be revised or updated as needed.

The Genetics Management Guidelines document provides the rationale, genetics concepts, and genetic risks to be considered in genetics-management planning and implementation. For example, it indicates that a fish population is the fundamental unit of genetics management and that its definition and characterization, relative to other populations, are important. Genetic surveys have been part of the identification and

characterization process. Further, the prioritization and genetics management required for each population is determined by its relative population status, demographic trends, and genetics data derived from the surveys.

The Genetics Management Plan is the operational document. It tells the "what, who, when, where" of implementation. It identifies specific objectives, tasks, activities, and type of facilities necessary to accomplish Recovery Program goals, i.e., protect population genetic integrity or restore a self-sustaining population in the wild. It is the action plan developed for implementation, directed by the Recovery Program goals, and structured along the format presented in the Genetics Management Planning Guidelines document.

Genetics management requires a great deal of operational activity. Refugia and propagation facilities have been planned, built, and are now operated in a coordinated fashion. The Integrated Stocking Plan (Nesler et al. 2003) provides specific annual numbers of fish and their sizes to be produced at Program hatcheries and stocked into Upper Colorado River Basin river reaches.

Facilities are required to meet long-term (5 years or more) augmentation and restoration stocking needs. The plans for these facilities are the Coordinated Hatchery Facility Plan and the Facilities Plan. These plans, in accordance with the Genetics Management Plan, define facilities required to meet propagation needs, identify fish needs that can be met by existing facilities, and recommend expansion or modification of existing facilities.

2.5 V. MONITOR POPULATIONS AND HABITAT AND CONDUCT RESEARCH TO SUPPORT RECOVERY ACTIONS

This category consists primarily of research and monitoring activities that have application to more than one of the foregoing elements. In the General Recovery Program Support Action Plan, this element includes: monitoring populations and habitat and annually assessing changes in habitat and population parameters (i.e., population estimates); determining gaps in existing life-history information and recommending and conducting research to fill those gaps; and improving scientific research and sampling techniques. Research activities are identified for each subbasin only to the extent that such activities are related to another recovery action in that subbasin. Such identification now, however, does not preclude further research in that subbasin that may be identified later or that is identified in the General Recovery Program Support Action Plan.2.6

VI. INCREASE PUBLIC AWARENESS AND SUPPORT FOR THE ENDANGERED FISHES AND THE RECOVERY PROGRAM

Public information and education is crucial to the Recovery Program's success. A strategic, multi-faceted information and education program is being implemented to:

develop public involvement strategies at the beginning of any and all projects; educate target audiences (including media, the public and elected officials) about endangered fish and increase their understanding of and support for the recovery of these fish at local, state and national levels; provide opportunities for the public to participate in activities that support recovery; and improve communication and cooperation among members of the Recovery Program.

Numerous site-specific activities are undertaken to promote understanding of, and support for, Recovery Program actions and to involve the public in decisions which may impact specific locations in the Upper Basin. These include public meetings, presentations, communications (e-mails, newsletters, etc.), exhibits and distribution of Recovery Program publications.

The information and education program continues to develop a number of products including an annual newsletter; up-to-date fact sheets; interpretive signs and displays; bookmarks; Congressional briefing documents; and a public website. In addition, the Recovery Program actively seeks news media coverage of its activities. Special educational publications are produced as needed.

Because funding for capital construction and ongoing operation and maintenance (O&M) for the Upper Colorado River and San Juan River Basin Recovery Programs is tied together in Federal legislation (public laws 106-392, 107-375 and 109-183) through 2008 for capital projects and 2011 for O&M, an annual publication is produced that highlights accomplishments of both programs. The *Program Highlights* publication serves as a briefing document for the partners' annual visit to Washington, D.C., and is used for numerous other purposes throughout the year.

In 2005, leaders of both Recovery Programs agreed to work more closely in the future to coordinate communication and outreach efforts. This helps ensure that shared audiences receive accurate, consistent information about the endangered fish species and efforts to recover them. It is also more cost-effective by sharing publication production costs and exhibit fees. In 2006, a logo and banner stand were developed for the San Juan River Basin Recovery Implementation Program. In addition, modifications were made to the Upper Colorado River Recovery Program's exhibit to promote both programs and the *Swimming Upstream* newsletter content was integrated. An integrated brochure is planned for 2007.

The Recovery Programs will continue to work with other organizations throughout the Colorado River Basin to ensure that information about the endangered fishes is consistent and accurate.

2.7 VII. PROVIDE PROGRAM PLANNING AND SUPPORT

This work also is placed entirely under the General Recovery Program Support Action Plan. Recovery Program planning and support includes planning and tracking recovery

activities, participation in Recovery Program committees, and managing, directing, and coordinating the overall Recovery Program. Another important program support activity involves securing the funding necessary to implement the Recovery Program.

3.0 DISCUSSION OF SUBBASIN RECOVERY PRIORITIES

Following is a summary of the importance of the various subbasins in the Upper Colorado River Basin to the endangered fishes and a brief discussion of the major actions directed at recovering the endangered fishes in these subbasins. A more detailed accounting of the activities, including funding requirements and schedules is found in Sections 4.0 and 5.0.

3.1 GREEN RIVER

3.1.1 Importance

The Green River system supports populations of humpback chub and Colorado pikeminnow, and it historically supported populations of bonytail and razorback sucker. The importance of the Green River to the endangered fishes has been established by the Recovery Program and recognized by many biologists. The Colorado Squawfish [Pikeminnow] Recovery Plan (U.S. Fish and Wildlife Service 1991) listed the Green River as the highest priority area for recovery of the species, and the recovery goals (U.S. Fish and Wildlife Service 2002c) consider the Green River subbasin as the center of the Upper Basin Colorado pikeminnow metapopulation. Habitat in Desolation and Gray canyons supports a self-sustaining humpback chub population, and the last known riverine concentration of wild bonytail was in the Green River within Dinosaur National Monument (U.S. Fish and Wildlife Service 1990a, 1990b, 2002a, 2002b). Recovery plans for humpback chub (U.S. Fish and Wildlife Service 1990a) and bonytail (U.S. Fish and Wildlife Service 1990b) identified the Green River in Desolation and Gray canyons and in Dinosaur National Monument as important to recovery. Until recently, the Green River supported the last known riverine concentration of wild razorback sucker (Lanigan and Tyus 1989; U.S. Fish and Wildlife Service 1998, 2002d).

3.1.2 Recovery Actions

Recovery actions in the Green River have focused on refining the operation of Flaming Gorge dam to enhance habitat conditions for the endangered fishes. A biological opinion was issued on the operation of Flaming Gorge Dam in 1992. This opinion contained seasonal flow recommendations for the Green River at Jensen, Utah, and called for additional research under a specific set of research flows to collect information needed to refine the flow recommendations (particularly flow recommendations for spring and winter) and to develop flow recommendations for other areas of the Green River. The effects of the test flows on the endangered fishes and their habitat were evaluated through a variety of studies through 1997, and a final report including revised

flow recommendations was completed (Muth et al. 2000). National Environmental Policy Act (NEPA) compliance on reoperation of Flaming Gorge Dam was completed in 2006 with a Record of Decision executed in February. A new biological opinion was completed in 2005. A study plan for the implementation and evaluation of flow and temperature recommendations for endangered fishes in the Green River downstream of Flaming Gorge Dam was completed in 2007 (Green River Study Plan ad hoc Committee 2007).

Flow recommendations also have been developed for some tributaries to the Green River, such as the Yampa, White (interim flow recommendations), and Duchesne rivers. Tributary and mainstem flow recommendations will be carefully coordinated to address recovery needs from an Upper Basin wide perspective.

An element of the 1992 Flaming Gorge Dam biological opinion identified the need to protect dam releases from possible diversion in the occupied habitat of the endangered fishes. The initial focus of this effort was to legally protect Flaming Gorge releases in the Green River down to the confluence of the Duchesne River for the months of July through October. Flow protection for the remainder of the year (November–June) and downstream to Canyonlands National Park will be addressed by Utah now that the final Environmental Impact Statement, Record of Decision, and biological opinion on reoperation of Flaming Gorge Dam have been issued.

Other Green River activities involve restoration of bottomlands adjacent to the Green River that flood in the spring and provide important habitat for razorback sucker and Colorado pikeminnow. Levees have been breached to restore 9 sites (574 acres) and perpetual easements have been acquired on six properties (1008 acres).

Projects to identify nonnative fish control strategies for the Green River have been implemented. Active control of northern pike (*Esox lucius*) began in 2001. Active control of smallmouth bass began in 2004.

Refuge (captive) populations of razorback sucker collected from the Green River are being maintained at the Ouray National Fish Hatchery, Ouray, Utah, with backup broodstock being maintained at Wahweap State Fish hatchery, Big Water, Utah. A plan for augmenting razorback sucker in the Green River using hatchery propagated fish was developed and is currently being implemented. Stocking of bonytail in Lodore Canyon was initiated in 2000 in accordance with a stocking plan developed by the State of Colorado. The integrated stocking plan requires stocking of bonytail and razorback sucker in the Green River near Jensen and Green River, Utah.

Population estimates began in 2001 for Colorado pikeminnow in the entire Green River subbasin (Bestgen et al. 2005). Population estimates for humpback chub in Desolation and Gray canyons were conducted in 2001 and 2002, and expanded in 2003 (Jackson and Hudson 2005).

Contamination of water in Stewart Lake and Ashley Creek near Jensen, Utah, with selenium may adversely affect razorback sucker. The Service, U.S. Environmental Protection Agency, and U.S. Bureau of Reclamation (Reclamation) are actively pursuing clean-up activities in these areas independent of the Recovery Program.

3.2 YAMPA RIVER AND LITTLE SNAKE RIVER

3.2.1 Importance

The Yampa River is the largest remaining essentially unregulated river in the Upper Colorado River Basin, and its inflow into the Green River, 65 miles downstream of Flaming Gorge Dam, ameliorates some effects of dam operation on river flow, sediment load, and temperature (Muth et al. 2000). Holden (1980) concluded that flows from the Yampa River, especially spring peak flows, were crucial to the maintenance of the Green River's "large-river" characteristics and, therefore, very important to maintaining suitable conditions in the Green River downstream of the confluence. The Yampa River supports resident subadult and adult Colorado pikeminnow, contains one of the primary Colorado pikeminnow spawning areas in the Upper Basin and is a major producer of fish for the entire Green River subbasin (Tyus and Karp 1989). A small population of humpback chub exists in the Yampa River in Dinosaur National Monument (Tyus and Karp 1989; U.S. Fish and Wildlife Service 1990a, 2002a). Spawning aggregations of adult razorback sucker were observed near the mouth of the Yampa River, and adult razorback sucker were captured upstream to the mouth of the Little Snake River (Tyus and Karp 1989). The lower portion of the Yampa River was part of the historic range of bonytail and is associated with some of the most recent captures of this very rare fish. The Bonytail Recovery Plan (U.S. Fish and Wildlife Service 1990b) identified the Yampa River within Dinosaur National Monument as a high priority recovery and/or restoration site.

The Little Snake River provides approximately 28% of the Yampa River's flow and 60% of the Yampa River's sediment supply. The sediment supply of the Little Snake River is believed to be important to the maintenance of backwater nursery areas utilized by young Colorado pikeminnow in the Green River (Smith and Green 1991). Adult Colorado pikeminnow have been captured in the Little Snake River upstream to near Baggs, Wyoming, and humpback chub have been captured in the lower 10 miles of the Little Snake River (U.S. Fish and Wildlife Service 2002a, 2002c).

3.2.2 Recovery Actions

Recovery actions in the Yampa River are focused on control of nonnative fishes and maintaining and legally protecting the flow regime required to recover the endangered fishes. To achieve these objectives, the Recovery Program developed the Yampa River Management Plan which identifies management actions necessary to provide and protect the needs of the endangered fishes while existing depletions for human use continue and water resources are developed to serve foreseeable future human needs

in the Yampa River basin (Roehm 2004). The plan proposed to augment Yampa River base flows in accordance with the Yampa River flow recommendations (Modde et al. 1999). Of thirteen alternatives identified and evaluated in the Plan, enlargement of Elkhead Reservoir provided the most reliable water supply at a moderate cost. Construction of the enlargement is complete and water is expected to be provided on a test basis in 2007. The Program funded a 5,000 af pool of permanent storage out of the 12,000 af Elkhead enlargement and may lease up to an additional 2,000 af on an as-needed basis.

Colorado filed for a junior instream-flow water right for the Yampa River between the confluences of the Williams Fork and Little Snake rivers in December 1995. Forty-eight statements of opposition were filed against these filings in State water court.

As a result of concerns expressed by the Service and other Program participants, CWCB withdrew the baseflow and recovery flow instream-flow filings on the Yampa and Colorado rivers. With the approval of the PBO for the upper Colorado River upstream of the Gunnison River confluence, CDOW staff was instructed by CWCB to develop new methodologies and flow recommendations.

A cooperative agreement implementing the Yampa River Management Plan and a PBO were completed for the Yampa River in 2005. In 2009, the Recovery Program and CWCB will review CDOW's flow recommendation methodology and progress of performance under the Yampa PBO. During 2008 (the fourth year of the first 5-year period after completion of the PBO), the Recovery Program and CWCB will develop a process for assessing the need for further instream-flow protection for the endangered fishes in the Yampa River. On completion of this review, a determination will be made regarding the need for additional instream-flow protection for the endangered fishes.

Flows in the Little Snake River after estimated future depletions were identified in the Yampa River Management Plan and Environmental Assessment (Roehm 2004).

The Recovery Program has evaluated several low-head agricultural-water diversion dams on the Yampa River for Colorado pikeminnow passage. A variety of existing diversions between Craig, Colorado, and Dinosaur National Monument were inventoried in 1994–1995. Several diversions were identified as possible barriers to fish migration under certain conditions. However, due to uncertainties about whether these diversions were in fact barriers to Colorado pikeminnow movement during the migration period, a study was conducted to determine threshold flows for adult Colorado pikeminnow passage on the Yampa River between Craig and Dinosaur National Monument. It was determined that these barriers present little if any problem to fish movement during the periods when Colorado pikeminnow migrate to and from spawning habitats downstream. Entrainment of Colorado pikeminnow in larger diversions may be evaluated beginning in 2007.

The Recovery Program began removing nonnative sportfish from certain reaches of the Yampa River and, where feasible, relocating them to more acceptable waters in 1999. Active control of channel catfish in Yampa Canyon began in 2001. This work was discontinued in 2007 (except for incidental removal of very large fish) to focus on smallmouth bass control. In 2004, the Program began tagging northern pike in the Yampa River upstream of the Hayden Bridge to determine if it is a significant source of northern pike moving downstream into critical habitat. Active control of northern pike downstream of Hayden began in 2003. In 2005, CDOW began undertaking work to determine sources of northern pike that may gain access to endangered fish critical habitat in the Yampa River. Active control of smallmouth bass in a 12-mile treatment reach in Little Yampa Canyon, a 5-mile treatment reach in Lily Park, and in the lower Yampa River in Yampa Canyon began in 2004. The 12-mile treatment was expanded to 24 miles in 2006 in order to geographically include the targeted population. Control was also expanded in 2006 to include the South Beach reach immediately upstream of the Little Yampa Canyon treatment reach in order to focus control on concentration areas.

The Program's integrated stocking plan (Nesler et al. 2003) outlines plans for stocking bonytail in the middle Green and Yampa rivers. Stocking bonytail in the Yampa River was initiated in 2000.

3.3 DUCHESNE RIVER

3.3.1 Importance

Colorado pikeminnow and razorback sucker regularly utilize the mouth of the Duchesne River especially during spring runoff. Fishery surveys conducted in 1993 documented the use of the lower 15 miles of the Duchesne River by Colorado pikeminnow and razorback sucker. More recently, fish surveys have been conducted in the lower 33 miles of the Duchesne River and have documented seasonal use by Colorado pikeminnow and razorback sucker.

3.3.2 Recovery Actions

Initial flow recommendations were developed for the Duchesne River in 1995 to address immediate concerns of several proposed water projects being considered in the Duchesne River basin. A follow-up study to evaluate and refine these flow recommendations began in 1997 and was completed in 2003 (Modde and Keleher 2003). A water availability study was completed that identified sources of water to meet the flow recommendations. A coordinated reservoir operations study was completed in 2004. The Duchesne Biological Opinion issued in 1998 was updated in 2005. Agreements will be developed to provide flows in the Duchesne River for the endangered fishes.

Control of nonnative fishes in the Duchesne will be discontinued in 2007. Efforts will be reallocated to smallmouth bass concentration areas in the Green River. A study to determine escapement of nonnative fishes from Starvation Reservoir was begun in 2002; a final report was approved in January 2007. Results suggest that escapement is occurring, but not enough to warrant the installation of screens.

3.4 WHITE RIVER

3.4.1 Importance

Adult Colorado pikeminnow occupy the White River downstream of Taylor Draw Dam near Rangely, Colorado, in relatively high numbers. Adult Colorado pikeminnow resident to the White River spawn in the Green and Yampa rivers. Juvenile and subadult Colorado pikeminnow also utilize the White River on a year-round basis. Incidental captures of razorback sucker have been recorded in the lower White River. Construction of Taylor Draw Dam in 1984 blocked Colorado pikeminnow migration to upper portions of the White River.

3.4.2 Recovery Actions

A work plan for the White River was developed to synthesize current information about the endangered fish and provide recommendations for specific recovery actions, including the merits of providing fish passage at Taylor Draw Dam. Interim flow recommendations for the White River were completed in 2004 (Irving et al. 2004) and will be reviewed in 2007. The availability of data needed to update the flow recommendations will be assessed and a determination made regarding the need for and timing of refinement of the recommendations. Instream-flow filings are on hold pending reevaluation of how flows will be legally protected in Colorado.

3.5 COLORADO RIVER

3.5.1 Importance

The mainstem Colorado River from Rifle, Colorado, to Lake Powell, Utah, supports populations of humpback chub and Colorado pikeminnow, and is recognized as important to the recovery of all four endangered fishes (U.S. Fish and Wildlife Service 1990a, 1990b, 1991, 1998, 2002a, 2002b, 2002c, 2002d). Relatively large and healthy humpback chub populations occur at Black Rocks and Westwater Canyon near the Utah-Colorado state line. A smaller humpback chub population occurs in Cataract Canyon, and some of the last wild bonytail were collected in this river reach. All life stages of Colorado pikeminnow occur in the section of river from Palisade, Colorado, downstream to Lake Powell. Colorado pikeminnow have been translocated and stocked into the upper reach of the Colorado River between Palisade and Rifle, Colorado; natural access to this historic-habitat reach has been blocked since the early 1900's by three diversion dams near Palisade. Razorback sucker populations in the mainstem

Colorado River have declined precipitously in the past 20 years. In 1993, 67 adult razorback sucker were collected from isolated ponds adjacent to the Colorado River near Debeque, Colorado. Since then, only a few wild adult razorback sucker have been captured from the river, and there is no evidence of successful reproduction in the Colorado River.

3.5.2 Recovery Actions

A variety of recovery actions are planned, ongoing, or completed for the Colorado River. Numerous approaches are being taken to restore flows in the 15-mile reach immediately upstream of from the confluence of the Gunnison River to levels recommended by the Service. Reclamation has made available 5,000 acre-feet of water annually plus an additional 5,000 acre-feet in four of every five years from Ruedi Reservoir to augment flows in the 15-mile reach during July, August, and September. In addition, water is available from the lease of 10,825 acre-feet/year of water from Ruedi Reservoir and permanent commitment of 10,825 acre-feet/year from East and West slope water users. The East and West slope commitments were secured in 2000 by Memoranda of Agreement (MOA) with the Colorado River Water Conservation District (CRWCD) and Denver Water for delivery of 5,412 acre-feet of water from Wolford Mountain Reservoir and 5,412 acre-feet from Williams Fork Reservoir, respectively. By 2009, CRWCD and Denver Water will have a plan in place to permanently replace the water now being delivered by Wolford and Williams Fork reservoirs. Additional water is being provided through an MOA with CRWCD for delivery of up to 6,000 acre-feet of water from Wolford Mountain Reservoir.

In 1992, Colorado filed an application in State water court for a 581 cubic feet per second (cfs) instream-flow right in the 15-mile reach for the months of July, August, and September. A final decree was issued in 1997. Colorado filed for a junior instream-flow right for the 15-Mile Reach in December 1995, which was opposed in State water court.

As a result of concerns expressed by the Service and other Recovery Program participants, CWCB withdrew the baseflow and recovery flow instream-flow filings on the Colorado and Yampa rivers. With the approval of the PBO for the upper Colorado River upstream of the Gunnison River confluence, CDOW staff was instructed by CWCB to develop new methodologies and flow recommendations. The Recovery Program and CWCB will reevaluate the need for instream-flow filings 5 years as called for in the PBO.

Flow recommendations and protection for the Colorado River downstream from the confluence of the Gunnison River will be addressed following completion of the Biological Opinion on reoperation of the Aspinall Unit.

Other sources of water for the 15-mile reach include construction of the Grand Valley Water Management Project and operation of Federal and private projects. A study of

options for providing additional water primarily to augment spring peak flows was completed in 2003. Water users are exploring ways to increase participation in the expanded coordinated reservoir operations (CROS) as recommended in the study report and completed a CROS implementation plan in February 2006.

Reclamation has constructed fish passage at the GVIC and GVP diversion dams on the upper Colorado River. Construction of passage at the Price-Stubb diversion dam is scheduled for FY 2007-2008. Successfully providing fish passage at these diversion dams would benefit both Colorado pikeminnow and razorback sucker by providing access to approximately 50 miles of the river that was used historically by these fishes. To prevent entrainment of endangered fishes into diversion canals, fish screens have been constructed at GVIC and at the Grand Valley Project.

To restore floodplain habitats, levees have been breached to at 3 sites (46 acres) and ten properties acquired in perpetual easement or fee title to protect 394 acres.

Active control of smallmouth bass began in 2004. Operation of the fish barrier net at Highline Reservoir has been ongoing since 1999; the net was replaced in March 2006. CDOW began a study to determine the source of centrarchid fishes in 2003.

Razorback sucker and bonytail are being stocked in the Colorado River in accordance with the integrated stocking plan (Nesler et al. 2003).

3.6 GUNNISON RIVER

3.6.1 Importance

The Gunnison River is currently occupied by wild Colorado pikeminnow and is historic habitat for razorback sucker and bonytail. Several adult Colorado pikeminnow were captured in the Gunnison River in fishery surveys conducted in 1992 and 1993. Unrestricted migration of fish has been limited by the 10-foot high Redlands diversion dam located 2 miles upstream from the mouth of the Gunnison River. Several Colorado pikeminnow larvae have been collected in the Gunnison River upstream and downstream of the Redlands diversion dam. Kidd (1977) reported that adult razorback sucker were collected frequently by commercial fishermen near Delta, Colorado, between 1930 and 1950. Wild razorback sucker have not been collected in the Gunnison River in recent times, although the reach near Delta is considered a priority razorback sucker restoration site.

3.6.2 Recovery Actions

Recovery activities on the Gunnison River are focused on operating and evaluating a fish ladder at the Redlands diversion dam, reoperating the Aspinall Unit to improve flow/habitat conditions in the Gunnison River, and restoring flooded bottomland habitats near Delta. Perpetual easements have been acquired on three properties (198 acres).

Construction of a fish ladder at the Redlands diversion dam was completed in 1996 and has provided for passage of Colorado pikeminnow, razorback sucker, and other native fishes (as well as allowing exclusion of nonnative fishes). To prevent entrainment of adult and subadult endangered fish into diversion canals, a fish screen was installed at Redlands in 2005.

A 5-year research plan to evaluate the effects of the Aspinall Unit on the endangered fishes and their habitat was completed in 1997. During this research period, Reclamation and Western Area Power Administration provided test flows. The research culminated with the Service's final flow recommendations in 2003 (McAda 2003). Reclamation has begun the NEPA process and the Service will issue a biological opinion following completion of the EIS. Legal protection of Aspinall releases and State protection of instream flows in the Gunnison River will be addressed as the biological opinion on the Aspinall Unit is developed.

Beginning in 1995, the Service experimentally stocked razorback sucker in the Gunnison River near Delta. Nine razorback sucker have used the Redlands fish ladder since summer 2001 (one of which was stocked in 1996). The State of Colorado stocking plan for razorback sucker was revised in 2001 to stock fewer but larger fish. Larval razorback sucker were collected in the Gunnison River (8 in 2002, 7 in 2003, and 2 in 2005), indicating that stocked fish are reproducing. Stocking of razorback sucker continues in the Gunnison River, in accordance with the integrated stocking plan.

3.7 DOLORES RIVER

3.7.1 Importance

The Dolores River is historic habitat for Colorado pikeminnow; both adult and young-of-the-year fish were captured in the 1950's and 1960's. Valdez et al. (1991) documented the use of the lower 1 mile of river by Colorado pikeminnow. Uranium processing facilities operated during the late 1940's through the 1960's severely impacted the river and may have contributed to the decline of Colorado pikeminnow in the Dolores River drainage. Since 1996, bonytail have been stocked in the Colorado River near the confluence of the Dolores.

3.7.2 Recovery Actions

Recovery actions for the Dolores River drainage have been limited to preventing escapement of nonnative sport fish (e.g., smallmouth bass, yellow perch, and kokanee salmon) from McPhee Reservoir. Environmental contaminant clean-up is being pursued by State and Federal agencies independent of the Recovery Program. Inflows from the Dolores River that may be identified in the future as necessary to recover the endangered fishes on the mainstem of the Colorado River will need to be legally protected. It is unknown if stocked bonytail are using the Dolores River. Use of the

Dolores River by endangered fish, particularly stocked bonytail, will be evaluated by Utah.

4.0 RECOVERY ACTION PLANS

The tasks in these Recovery Action Plans are prioritized by their schedules. Schedules are shown where they have been identified (if all the year columns for an activity are blank, then the activity has not yet been scheduled). If a completion date has been identified, it is shown under the appropriate fiscal year. Where specific dates have not been identified, but an action is ongoing, beginning, or ending in a year, an "X" appears in that year's column. The "who" column identifies the lead responsible agency (listed first) and any cooperating agencies. The status column is used where additional narrative is needed to explain the duration, status, etc. of an activity. Once again, the caret ">" identifies those recovery actions which are expected to result in a measurable population response, a measurable improvement in habitat for the fishes, legal protection of flows needed for recovery, or a reduction in the threat of immediate extinction. An asterisk (*) identifies those activities which will contribute to the RIPRAP serving as a reasonable and prudent alternative to the likely destruction or adverse modification of critical habitat.

The Recovery Action Plans are formatted in stepdown-outline tables. This is reflected in the numbering system and indenting. Some actions which assess options or the feasibility of a recovery action are followed by a subsequent implementation step, and others are not, depending on how feasible the implementation step is considered to be at this time.

The following abbreviations are used to identify lead/cooperating agencies:

BR	U.S. Bureau of Reclamation
CO	State of Colorado
CDA	Colorado Department of Agriculture
CDOPR	Colorado Division of Parks and Outdoor Recreation
CDOW	Colorado Division of Wildlife
CRWCD	Colorado River Water Conservation District
CWCB	Colorado Water Conservation Board
FWS	U.S. Fish and Wildlife Service
	-ES Ecological Services
	-FR Fishery Resources
	-RW Refuges and Wildlife
	-WR Water Resources
LFL	Larval Fish Laboratory
NWCD	Northern Water Conservancy District
PD	Recovery Program Director
TBD	To be determined
UT	State of Utah
UDWR	Utah Division of Wildlife Resources
UTWR	Utah Division of Water Resources
WYGF	Wyoming Game and Fish Department

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT YEARS
I.	PROVIDE AND PROTECT INSTREAM FLOWS (HABITAT MANAGEMENT)									
I.A.	Evaluate methods for defining habitat-flow needs and select methods most appropriate to specific stream reaches.									
I.A.1.	Review instream flow methodologies and assess the technical adequacy of current flow recommendations.	PD	Complete	"Guru II." Center for Public-Private Sector Cooperation, 1993.						
I.A.2.	Develop recommendations for integrating geomorphology and food web studies into Recovery Program.	PD	Complete	Andrews, et al, 1996.						
I.A.3.	Evaluate CDOW's instream flow methodologies and flow recommendations for warmwater native fishes (Anderson) as they relate to flows needed for endangered fish recovery.	FWS/PD	Complete	The Biology Committee reviewed Rick Anderson's report in April 2005, raised numerous questions regarding the application of this methodology to endangered fish flow recommendations, and declined to act on the report. The Service does not support adopting Anderson's methodology as the standard methodology for making flow determinations.						
I.A.4.	Develop strategic plan for geomorphic research and monitoring.	Program	Complete	LaGory et al., 2003.						
I.A.4.a.	Develop strategy and design for studies to address geomorphic research priorities.	Geo. Work Group	Ongoing	X	X					
I.A.4.b.	Conduct needed geomorphic research and monitoring.	Program	Ongoing	X	X	X	X	X		X
I.B.	Develop and select methods for modifiable protection of instream flows in Colorado.									
I.B.1.	Develop, evaluate and select, as appropriate, options for interim protection of instream flows until uncertainty concerning habitat needs and water availability can be resolved.									
I.B.1.a.	Colorado Attorney General review.	CO	Complete	CWCB adopted the Statement of Policy and Procedure Regarding the Appropriation of Instream Flows for the Recovery of Endangered Fishes of the Upper Colorado River Basin on March 9, 1994 and S.B. 96- 064 concerning instream flow appropriations of the CWCB was passed in May '96.						
I.B.1.b.	CWCB approval/recommended action.	CWCB	Complete							
I.B.1.c.	Adopt legislation or regulation, if necessary.	CWCB	Complete							
I.B.2.	Evaluate options for allocating Colorado's compact entitlement among the five subbasins, the implications for water available to recover the endangered fishes, and implications of full protection of recovery flow recommendations on development of Colorado's compact entitlement.	CWCB	Complete	CWCB completed work on water availability study in 1995 after convening subbasin work groups. Scenarios for future development and estimates for future water use were outlined for each basin.						
I.B.3.	Assess need for retirement of senior conditional water rights.	CWCB/FWS	Dropped	Colorado law prohibits conversion of conditional water rights to instream flow water rights.						
I.C.	Develop an enforcement agreement between the Service and appropriate State agencies to protect instream flows acquired under the Recovery Program for the endangered fishes.									
>*	I.C.1. Colorado.	FWS/CWCB	Complete	Agreement with FWS concerning the enforcement and protection of fish recovery flow water rights adopted by CWCB on September 21,1993.						
I.D.	Develop tributary management plans (based in part on the tributary report, see V.F., pg. 23).									
I.D.1.	Assess need for tributary management plans on a site specific basis.	PD	Complete	2004: PD's office determined most tributaries covered by biological opinions (except White and San Rafael rivers), so this item was moved to Green River Action Plan.						
II.	RESTORE HABITAT (HABITAT DEVELOPMENT AND MAINTENANCE)									
II.A.	Restore flooded bottomland habitats.									
II.A.1.	Conduct inventory of flooded bottomland habitat for potential restoration.	FWS-FR	Complete	Inventory completed (see Irving & Burdick, 1995 as primary reference)						
II.A.2.	Screen high-priority sites for potential restoration/acquisition.	PD	Complete	Future acquisition of sites to be determined.						
II.B.	Support actions to reduce or eliminate contaminant impacts. [NOTE: Contaminants remediation (in all reaches) will be conducted independently of and funded outside of the Recovery Program]									
II.B.1.	Evaluate effects of selenium.	FWS-ES	Ongoing	X	X	X	X	X	X	X
II.B.1.a.	If needed for recovery, identify actions to reduce deleterious levels of selenium contamination.	FWS-ES	Ongoing	X	X	X	X	X	X	X
II.B.2.	Identify locations of petroleum-product pipelines and assess need for emergency shut-off valves.	FWS-ES	Ongoing	X						
>*	II.B.2.a. Ensure that all new petroleum product pipelines have emergency shutoff valves.	FWS-ES	Ongoing	X	X	X	X	X	X	X
II.B.3.	Review and recommend modifications to State and Federal hazardous materials spills emergency response programs.	FWS-ES	Ongoing	X						
II.C.	Develop an issue paper on the desirability and practicality of restoring and protecting certain portions of the floodplain for endangered fishes and evaluate the floodplain restoration program.									
II.C.1.	Identify what restoration and protection are needed by addressing: 1) biological merits of restoring the floodplain with emphasis on endangered fish recovery; 2) priority geographic areas; and 3) integration of a broader floodplain restoration initiative into the current Recovery Program floodplain restoration program.	PROGRAM	Complete	Phase 1 floodplain protection issue paper approved by Mgmt. Comm. 1/98 (Nelson 1998). Phase II (Tetra Tech 2000) and synthesis reports left in draft and highest priority work moved into Green and Colorado River floodplain management plans (Valdez and Nelson 2004a,b).						
II.C.2.	Identify how to conduct restoration and protection by addressing: 1) restoration and protection tools/approaches; 2) institutional options for floodplain restoration; 3) costs/funding strategy; and 4) implementation steps and schedule.	PD/CO/UT	Complete	Final draft floodplain issues report given to Mgmt. Comm. 2/00. Phase II (Tetra Tech 2000) and synthesis reports left in draft and highest priority work moved into Green and Colorado River floodplain management plans (Valdez and Nelson 2004a,b).						

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT YEARS	
II.C.3.	Identify viable options and develop specific restoration strategies for selected geographic areas (e.g., Grand Valley, Green River).	PD	Complete	Final draft floodplain issues report given to Mgmt. Comm. 2/00. Phase II and synthesis reports left in draft and highest priority work moved into Green and Colorado River floodplain management plans (Valdez and Nelson 2004 a,b).							
III.	REDUCE NEGATIVE IMPACTS OF NONNATIVE FISHES AND SPORTFISH MANAGEMENT ACTIVITIES (NONNATIVE AND SPORTFISH MANAGEMENT)										
III.A.	Reduce negative interactions between nonnative and endangered fishes.										
III.A.1.	Where not already generally known, identify negative impacts (e.g., predation, competition, hybridization) of problem species.										
III.A.1.a.	Determine role of nonnative fishes as potential competitors with bonytails and determine size-specific vulnerability of bonytails to nonnative fish predators.	UDWR	Complete	Adler and Crowl 1995, Bissonette and Crowl 1995, Lentsch et al. 1996a.							
III.A.1.b.	Assess impact of northern pike predation on Colorado pikeminnow in the Green River.	UDWR	Complete	Crowl and Lentsch 1996.							
III.A.1.c.	Re-evaluate levels of hybridization with white sucker and assess effects on razorback sucker populations. (Program will monitor for evidence of hybridization as razorbacks increase in the system.)	FWS/UDWR/ CSU	Ongoing	X	X	X					
>*	III.A.1.c.(1) If necessary, implement actions to minimize hybridization between white sucker and razorback sucker.	FWS/UDWR/ CSU	Ongoing	X	X	X					
III.A.2.	Identify and implement viable active control measures.										
III.A.2.a.	Identify options (including selective removal) to reduce negative impacts of problem species and assess regulations and options (including harvest) to reduce negative impacts on native fishes from nonnative sportfish.	PD	Complete	Hawkins and Nesler 1991; Lentsch et al. 1996b; Tyus and Saunders 1996.							
III.A.2.b.	Review options and develop agreement with appropriate States on strategies and locations for implementing control options.	FWS/STATES	Complete								
>*	III.A.2.c. Evaluate the effectiveness (e.g., nonnative and native fish response) and develop and implement an integrated, viable active control program.	PD/FWS/ STATES	Ongoing	X	X	X	X	X	X	X	
III.A.2.c.(1)	Synthesize data on each species/river nonnative fish control effort and concomitant native fish response (e.g., smallmouth bass in the Yampa River and native fish response in the Yampa River) (completed by PI's and identified as a task in individual scopes of work).	PI's	Ongoing	X			X			X	
III.A.2.c.(2)	Produce umbrella summary of nonnative fish control projects and native fish response on a subbasin and river level every three years.	PD	Ongoing	X			X			X	
>*	III.A.2.d. Close river reaches to angling where and when angling mortality is determined to be significant. (See specific river reaches.)	STATES	Ongoing, as needed	X	X	X	X	X	X	X	
III.A.2.e.	Increase law enforcement activity to decrease angling mortality.	STATES	Ongoing	X	X	X	X	X	X	X	
>*	III.A.2.f. Develop control program for removal of small nonnative cyprinids in backwaters and other low velocity habitats. (Trammell et al. 2002 and 2005 complete, but development and implementation of a control program is on hold.)	STATES	On hold								
III.B.	Reduce negative impacts to endangered fishes from sportfish management activities.										
III.B.1.	Implementation Committee approval of Interim Nonnative Fish Stocking Procedures	PD	Complete	IC gave proxy in January 1994; States & Service approved in spring of 1994.							
III.B.2.	Implement Interim Nonnative Fish Stocking Procedures.										
III.B.2.a.	Develop scope of work for evaluation of Interim Procedures.	PD	Complete	FY 95 SOW #62 (FWS, CO, UT, WY)							
III.B.2.b.	Evaluate and revise Interim Procedures.	PD	Complete	Procedures for Stocking Nonnative Fish Species in the Upper Colorado River Basin, USFWS 1996.							
III.B.3.	Finalize revised Nonnative Fish Stocking Procedures.										
III.B.3.a.	Complete Biological Opinion/NEPA compliance.	FWS-ES/FR	Complete	FONSI, USFWS 1996.							
III.B.3.b.	Implementation Committee approval of revised Nonnative Fish Stocking Procedures.	PD	Complete	Implementation Committee approval October 2, 1996.							
III.B.3.c.	State wildlife commissions approval, as necessary.	STATES	Complete								
III.B.3.d.	Execute memoranda of agreement between Service and States.	FWS/STATES	Complete	Cooperative agreement for implementation of procedures for stocking of nonnative fish species in the Upper Colorado River Basin. Agreement in 1996 Stocking Procedures.							
III.B.4.	Incorporate final Procedures into State aquaculture permitting process.										
>*	III.B.4.a. Colorado.	CDA/CDOW	Complete	January 1999.							
III.B.4.a.(1)	Evaluate effectiveness of Colorado's stocking regulation.	CDOW	Complete	Martinez & Nibbelink 2004.							
>*	III.B.4.b. Utah.	UDWR	Complete								
>*	III.B.4.c. Wyoming.	WYGF	Complete								
III.B.5.	Explore options for tribal acceptance of Nonnative Fish Stocking Procedures.	FWS-FR	Complete	Tribe verbally accepted Procedures (per memo from Dave Irving to Bob Muth, 2003).							
III.B.6.	Review, evaluate, and revise as needed, the Nonnative Fish Stocking Procedures.	PD/FWS/ STATES	As needed	X							

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT YEARS
III.B.7.	Increase law enforcement activity to prevent illicit stocking.									
III.B.7.a.	Develop plan	STATES	Pending	X	X					
>* III.B.7.b.	Implement plan	STATES	Pending		X	X	X	X	X	X
III.B.8.	Evaluate designation of native fish conservation areas	PROGRAM	Pending	X	X	X				
III.C.	Evaluate sources of nonnative fishes into critical habitat.	CDO	Ongoing	X	X	X				
IV.	MANAGE GENETIC INTEGRITY AND AUGMENT OR RESTORE POPULATIONS (STOCKING ENDANGERED FISHES)									
IV.A.	Genetics Management.									
IV.A.1.	Develop and approve Genetics Management Guidelines.	PD	Complete	Williamson and Wydoski 1994.						
IV.A.2.	Develop and implement Genetics Management Plan for all species and update as needed.	PD	Ongoing (updated 6/99)	X	X	X	X	X	X	X
IV.A.3.	Conduct genetic diversity studies (includes Gila taxonomy studies) and confirm presumptive genetic stocks based on all available information.									
IV.A.3.a.	Razorback sucker.	BR	Complete	Wydoski 1995, Czaplá 1999.						
IV.A.3.b.	Bonytail and humpback chub.									
IV.A.3.b.(1)	Morphological and allozyme analyses. (Draft 4/95)	PD	Draft not accepted. Dropped.	Draft: Douglas 1995.						
IV.A.3.b.(2)	Mitochondrial DNA analysis.	BR	Draft not accepted. Dropped.	Draft: Dowling (No Date).						
IV.A.3.c.	Colorado pikeminnow.	PD	Complete	Williamson et al. 1999.						
> IV.A.4.	Secure and manage the following species in refugia hatcheries (according to the Genetics Management Plan).									
IV.A.4.a.	Razorback sucker.									
IV.A.4.a.(1)	Middle Green	FWS-FR	Ongoing	X	X	X	X	X	X	X
IV.A.4.a.(2)	Upper Colorado River.	FWS-FR	Ongoing	X	X	X	X	X	X	X
IV.A.4.b.	Bonytail	UDWR/CDO	Ongoing	X	X	X	X	X	X	X
IV.A.4.c.	Humpback chub.									
IV.A.4.c.(1)	Black Rocks Canyon. (Broodstock currently represented by wild fish in the river.)	FWS-FR	Ongoing	X	X	X	X	X	X	X
IV.A.4.c.(2)	Westwater Canyon. (Broodstock currently represented by wild fish in the river.)	UDWR	Ongoing	X	X	X	X	X	X	X
IV.A.4.c.(3)	Cataract Canyon. (Broodstock currently represented by wild fish in the river.)	UDWR	Ongoing	X	X	X	X	X	X	X
IV.A.4.c.(4)	Yampa Canyon. (Broodstock currently represented by wild fish in the river; however, population appears to have declined and Recovery Program is exploring the possibility of establishing a refuge stock.)	FWS-FR	Ongoing	X	X	X	X	X	X	X
IV.A.4.c.(5)	Desolation/Gray Canyons. (Broodstock currently represented by wild fish in the river.)	UDWR	Ongoing	X	X	X	X	X	X	X
IV.A.4.d.	Colorado pikeminnow.									
IV.A.4.d.(1)	Upper Colorado River Basin. (Broodstock currently represented at Dexter NFH and by wild fish in the river.)	FWS FWS	Ongoing	X	X	X	X	X	X	X
IV.B.	Conduct annual fish propagation activities.									
IV.B.1.	Identify species needs for refugia, research, augmentation, and information and education.	PD	Annual	12/06	X	X	X	X	X	X
IV.B.2.	Implement integrated stocking plan (Nesler et al. 2003).	FWS, UDWR, CDO	Annual	X	X	X	X	X	X	X
IV.B.3.	Conduct NEPA compliance and develop biological opinion on disposal of excess captive-reared endangered fish.	FWS-ES/FR	Complete	"Disposition of Captive-Reared Endangered CO River Fish," 06/08/95, FONSI.						
IV.C.	Operate and maintain facilities.									
IV.C.1.	Ouray.	FWS-FR	Ongoing	X	X	X	X	X	X	X
IV.C.2.	Grand Valley endangered fish facilities.	FWS-FR	Ongoing	X	X	X	X	X	X	X
IV.C.3.	Wahweap.	UDWR	Ongoing	X	X	X	X	X	X	X
IV.C.4.	Mumma.	CDO	Ongoing	X	X	X	X	X	X	X
IV.D.	Plan, design, and construct needed facilities.									
IV.D.1.	Develop Coordinated Hatchery Facility Plan based on revised State stocking plans.	PD	Complete	Wydoski 1994; revised by Czaplá May 31, 2001. See also chapter 4 of Nesler et al., 2003.						
IV.D.2.	Design and construct appropriate facilities.									
IV.D.2.a.	Ouray.	FWS/BR	Complete	Ouray NFH water reuse system completed in 2002; hatchery fully functional & is producing razorback sucker for stocking & floodplain experiments.						
IV.D.2.b.	Wahweap.	UDWR/BR	Complete							
IV.D.2.c.	Grand Valley endangered fish facilities.	FWS/BR	Complete	Grand Valley hatchery facility expansion completed in 1999.						
IV.D.2.d.	Acquire ponds for growout of endangered fishes.									

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT YEARS
IV.D.2.d.(1)	23 acres of growout ponds in the Green River basin.	FWS/STATES	Complete	As a result of operational changes at Ouray NWR, leased ponds are no longer needed.						
IV.D.2.d.(2)	100 acres of growout ponds in the Colorado River basin.	FWS/STATES	Complete	As a result of revised state stocking plans, growout pond acreage in the Colorado River basin was judged sufficient to meet required number & size of fish as of 2003.						
IV.E.	Conduct monitoring to evaluate effectiveness and continuation of endangered fish stocking.									
IV.E.1.	Assess the monitoring needed to evaluate the contribution to recovery of endangered fish stocking over relevant reaches, life stages, and generations. Assessment addressed in 2002 and 2004 workshops (Upper Colorado River Endangered Fish Recovery Program 2002, 2006); continued assessment ongoing.	LFL/STATES	Ongoing	X	X	X	X	X	X	X
IV.E.2.	Evaluate endangered fish stocking and revise augmentation plans, as needed.	FWS/LFL/ States/PD	Ongoing	X	X	X	X	X	X	X
IV.E.3	Modify stocking plans to ensure successful stocking.	Program	Ongoing	X	X	X	X	X	X	X
V.	MONITOR POPULATIONS AND HABITAT AND CONDUCT RESEARCH TO SUPPORT RECOVERY ACTIONS (RESEARCH, MONITORING, AND DATA MANAGEMENT)									
V.A.	Measure and document population and habitat parameters to determine status and biological response to recovery actions.									
V.A.1.	Conduct interagency data management program to compile, manage, and maintain all research and monitoring data collected by the Recovery Program.	FWS-FR	Annual	X	X	X	X	X	X	X
V.A.2.	Evaluate population estimates.	PD	Ongoing	X	X	X	X	X	X	X
V.A.3.	Collect and submit data according to standard protocol (e.g., location, PIT tag #, length, weight, etc.) on every endangered fish encountered in all field activities in order to provide annual information on population status outside of formal population estimates.	ALL	Ongoing	X	X	X	X	X	X	X
V.B.	Conduct research to acquire needed life history information.									
V.B.1.	Identify significant deficiencies in life history information and needed research.	PD	Ongoing	X	X	X	X	X	X	X
V.B.2.	Conduct appropriate studies to provide needed life history information.	FWS-FR/ STATES	Ongoing	X	X	X	X	X	X	X
V.B.2.a.	Evaluate need for imprinting based on reintroduction plans.	FWS-FR	Complete	Reintroduction plans complete; imprinting not called for.						
V.C.	Develop and enhance scientific techniques required to complete recovery actions.									
V.C.1.	Conduct marking study of young-of-the-year Colorado pikeminnow.	FWS-FR	Complete	Muth and Nesler 1989, Haines and Modde 1996, Haines et al. 1998.						
V.D.	Establish sampling procedures to minimize adverse impacts to endangered fishes.									
V.D.1.	Assess electrofishing injury impacts to endangered fishes.	LFL	Complete	See Snyder 2003.						
V.D.2.	Implement scientific sampling protocols to minimize mortality for all endangered fishes.	FWS-ES/ STATES	Ongoing	X	X	X	X	X	X	X
V.E.	Provide for long-term care, cataloging, and accessibility of preserved specimens.	PROGRAM	Ongoing	X	X	X	X	X	X	X
V.F.	Assess relative biological importance of tributaries and their potential contributions to endangered fish recovery.	Contract	Complete	Tyus and Saunders 2001.						
V.G.	Reevaluate overutilization for commercial, recreational, scientific or educational purposes and identify actions to ensure adequate protection.	FWS-ES	Ongoing	X	X	X	X	X	X	X
V.H.	Reevaluate effects of disease and parasites and identify actions to ensure adequate protection.	FWS-ES	Ongoing	X	X	X	X	X	X	X
VI.	INCREASE PUBLIC AWARENESS AND SUPPORT FOR THE ENDANGERED FISHES AND THE RECOVERY PROGRAM. (Includes integration with San Juan River Recovery Implementation Program.)									
VI.A.	Conduct survey to measure public awareness of and attitudes toward endangered Colorado River fishes and the Recovery Program.	PD	Complete 1995.	Vaske 1995.						
VI.B.	Train Recovery Program managers and researchers in media relations.	PD	Ongoing	X	X	X	X	X	X	X
VI.C.	Plan and implement information and education and public involvement activities for all significant Recovery Program actions (e.g presentations, public meetings, public involvement training, etc.).	PROGRAM	Ongoing	X	X	X	X	X	X	X
VI.D.	Promote technical publication of study results.	PD	Ongoing	X	X	X	X	X	X	X
VI.E.	Produce, distribute, and evaluate information and education products (such as newsletter, brochures, public website, etc); manage media relations, including contacting reporters, producing news releases, fact sheets, etc.	PD	Ongoing	X	X	X	X	X	X	X
VI.F.	Participate in development and circulation of interpretive exhibits about the Recovery Program and the endangered fish.	PD	Ongoing	X	X	X	X	X	X	X
VI.G.	Maintain Recovery Program technical library and library web page.	PD	Ongoing	X	X	X	X	X	X	X
VII.	PROVIDE PROGRAM PLANNING AND SUPPORT (PROGRAM MANAGEMENT)									
VII.A.	Determine actions required for recovery.									
VII.A.1.	Assure consistency of RIPRAP with currently approved recovery plans.	PD	Ongoing	X	X	X	X	X	X	X
VII.A.2.	Recognize the role of the Upper Colorado River Recovery Program in revised recovery plans.	FWS	Ongoing	X	X	X	X	X	X	X
VII.A.3.	Update, refine, and prioritize recovery actions (RIPRAP) annually.	PD	Annual	X	X	X	X	X	X	X

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

	ACTIVITY	WHO	STATUS	FY 07	10/06	FY 08	10/07	FY 09	10/08	FY 10	10/09	FY 11	10/10	FY 12	10/11	OUT YEARS
				9/07	9/08	9/09	9/10	9/11	9/12							
VII.A.4.	Develop Interim Management Objectives (IMOs) for each species and presumptive stock and an index to population status.	PD	Complete	Lentsch et al. 1998.												
VII.A.4.a.	Public and external peer review of IMOs.	FWS	Complete	1998												
VII.A.4.b.	Implementation Committee review and approval of IMOs.	ALL	Complete	September 10, 1998.												
VII.A.5.	Develop specific recovery goals.															
VII.A.5.a.	Convene Recovery Team.	FWS	Complete	1999												
VII.A.5.b.	Develop recommended recovery goals.	PD/Contract	Complete	2000												
VII.A.5.c.	Biology Committee review of recommended recovery goals.	Program	Complete	2000												
VII.A.5.d.	Finalize recovery goals.	FWS/PD	Complete	U.S. Fish and Wildlife Service 2002a, 2002b, 2002c, 2002d.												
VII.A.5.e.	Conduct species status review and update recovery goals at least every 5 years.	FWS/Program	Every 5 years	X		X								X		X
VII.A.6.	Identify elements of conservation plans to ensure long-term management and protection following delisting.	Program	Ongoing	X		X		X		X		X		X		X
VII.A.7.	Monitor and assess Recovery Program accomplishments annually.	PD	Annual	X		X		X		X		X		X		X
VII.A.8.	Develop biennial work plan to address priority needs.	PD	Annual	X		X		X		X		X		X		X
VII.B.	Actively participate in Recovery Program committees and secure funding for annual work plan and larger projects (e.g., water acquisition, capital construction, and long term operation and maintenance) in accordance with the recovery actions and milestones (Utah, Colorado, Wyoming, Bureau of Reclamation, Fish and Wildlife Service, Western Area Power Administration, Water Users, Environmental Groups, Colorado River Energy Distributors Association) and the National Park Service.	PD	Ongoing	X		X		X		X		X		X		X
VII.B.1.	As defined in PL 106-392, prepare joint report with San Juan River RIP on the utilization of power revenues for base funding, including recommendations regarding the need for continued base funding after 2011 that may be required to fulfill the goals of the Recovery Programs. Report is due to the committees of the U.S. Senate and House of Representatives 9/30/08.	Program	Pending			X		X		X		X				
VII.C.	Manage, direct, and coordinate Recovery Program activities.	PD	Ongoing	X		X		X		X		X		X		X
VII.C.1.	Review Information and Education program (Management Committee).	PD	Complete	Management Committee, July 28, 1994.												

GREEN RIVER ACTION PLAN: MAINSTEM

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT- YEARS
I.	PROVIDE AND PROTECT INSTREAM FLOWS (HABITAT MANAGEMENT)									
I.A.	Green River above Duchesne River (Utah only; flows not threatened in Colorado because river is entirely within a National Wildlife Refuge and National Monument.)									
I.A.1.	Initially identify year-round flows needed for recovery while providing experimental flows.									
I.A.1.a.	Summer/fall.	FWS-ES	Complete	USFWS 1992.						
I.A.1.b.	Winter/spring.	FWS-ES	Complete	Muth, et al. 2000.						
I.A.1.c.	Review summer/fall flow recommendation.	FWS-ES	Complete							
I.A.2.	State acceptance of initial flow recommendations.									
I.A.2.a.	Summer/Fall.	UT	Complete	USFWS 1992 and revised in Muth et al. 2000.						
I.A.2.b.	Winter/Spring.									
I.A.2.b.(1)	Review scientific basis.	UT	Complete	Muth et al. 2000.						
I.A.2.b.(2)	Assess legal and physical availability of water.	UT	Complete							
I.A.3.	Deliver identified flows.									
>*	I.A.3.a. Operate Flaming Gorge pursuant to the 1992 Biological Opinion to provide summer and fall flows.	BR	Complete							
>*	I.A.3.b. Operate Flaming Gorge to supply winter and spring test flows for research.	BR	Complete	Muth et al. 2000.						
	I.A.3.c. Complete NEPA on reoperation of Flaming Gorge pursuant to Biological Opinion and Record of Decision.	BR	Complete	ROD issued February 16, 2006: U.S. Bureau of Reclamation 2006.						
>*	I.A.3.d. Operate Flaming Gorge Dam to provide winter and spring flows and revised summer/fall flows, pursuant to the new Biological Opinion and Record of Decision.	BR	Ongoing	X	X	X	X	X	X	X
	I.A.3.d.1. Conduct real-time larval razorback and Colorado pikeminnow sampling to guide Flaming Gorge operations.	LFL/FWS	Ongoing	X	X	X	X	X	X	X
I.A.4.	Legally protect identified flows.									
I.A.4.a.	Protect Summer/Fall flows.									
	I.A.4.a.(1) Hold public meeting to establish future appropriation policy.	UT	Complete 10/94	Utah Division of Water Rights. 1994 (public meetings October 1994; policy November 1994).						
	I.A.4.a.(2) Adopt and implement new policy (new appropriations subject to flow criteria).	UT	Complete 11/94							
>*	I.A.4.a.(3) Prepare and execute contracts with water users as required to subordinate diversions associated with approved and/or perfected rights.	UT	Ongoing	X	X	X	X	X	X	X
	I.A.4.a.(4) Evaluate effectiveness of policy.	UT	Ongoing	X	X	X	X	X	X	X
I.A.4.b.	Protect Winter/Spring flows.									
I.A.4.b.(1)	Hold public meeting to establish future appropriation policy.	UT	Pending	X						
	I.A.4.b.(2) Review policy, and, if needed adopt and implement new policy (new appropriations subject to flow criteria).	UT	Pending	X	X					
>*	I.A.4.b.(3) Prepare and execute contracts with water users as required to subordinate diversions associated with approved and/or perfected rights.	UT	Pending	X	X	X	X	X	X	X
I.B.	Green River below the Duchesne River									
I.B.1.	Initially identify year-round flows needed for recovery while providing experimental flows.	FWS-ES	Complete	Muth et al. 2000.						
I.B.2.	State acceptance of initial flow recommendations (dependent on development of initial flow recommendations).									
I.B.2.a.	Review scientific basis.	UT	Complete	Muth et al. 2000.						
I.B.2.b.	Assess legal and physical availability of water from Green River and tributaries.	UT	Complete	X						
I.B.3.	Legally protect identified flows (dependent on development of initial flow recommendations).									
I.B.3.a.	Hold public meeting to establish future appropriation policy.	UT	Pending	X						
	I.B.3.b. Review policy, and, if needed adopt and implement new policy (new appropriations subject to flow criteria).	UT	Pending	X						
>*	I.B.3.c. Prepare and execute contracts with water users as required to subordinate diversions associated with approved and/or perfected rights.	UT	Pending	X	X	X	X	X	X	X
I.C.	Price River									
I.C.1.	Determine endangered fish spring through autumn use of the Price River.	UT	Complete	Cavalli 1999.						
I.C.2.	Determine winter use and seasonal flow needs for Colorado pikeminnow in the Price River.	UT/FWS	Pending	X						
I.D.	Evaluate and revise as needed, flow regimes to benefit endangered fish populations. See Kitcheyan and Montagne 2005, Bestgen et al. 2006.	FWS/Program	Ongoing	X	X	X	X	X	X	X
I.D.1.	Develop study plan to evaluate flow recommendations.	FWS/BOR/WAPA	Complete	X						

GREEN RIVER ACTION PLAN: MAINSTEM

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT- YEARS
I.D.1.a.	Evaluate survival of young and movement of subadult razorback suckers from floodplains into the mainstem in response to flows.	TBD	New Start		X	X	X	X	X	
I.D.1.b.	Evaluate recent peak flow studies related to floodplain inundation and entrainment of larval razorback suckers.									
I.D.1.b.(1)	Complete final report on entrainment of larval razorback suckers in floodplains.	UDWR/LFL	Ongoing		X					
I.D.1.b.(2)	Monitor changes in the magnitude, timing, and size distribution of sediment	USGS	Ongoing	X	X	X				
I.D.1.b.(3)	Synthesize physical and biological data from recent peak flow studies related to floodplain inundation and entrainment of larval razorback suckers.	TBD	New Start		X	X				
I.D.1.c.	Monitor larval razorback suckers in mainstem, and synthesize information on drift as related to flows and other conditions.									
I.D.1.c.(1)	Conduct annual monitoring of larval razorback suckers and analyze historic monitoring data.	FWS/LFL	Ongoing	X	X	X	X	X	X	X
I.D.1.d.	Determine relationship of backwater development to sediment availability and peak flows in Reach 2.	TBD	New Start		X	X				
I.D.1.e.	Evaluate effect of base flow variability on backwater maintenance and quality.									
I.D.1.e.(1)	Conduct annual monitoring of larval Colorado pikeminnow.	LFL	Ongoing	X	X	X	X	X	X	X
I.D.1.e.(2)	Monitor age-0 Colorado pikeminnow in backwaters.	UDWR	Ongoing	X	X	X	X	X	X	X
I.D.1.e.(3)	Evaluate response of native fish to nonnative predator removal	UDWR	Ongoing	X	X	X	X	X	X	X
I.D.1.e.(4)	Integrate biological and physical data on backwaters.	TBD	New Start		X	X				
I.D.1.f.	Determine influence of flow and temperature recommendations on entire fish community with emphasis on nonnative fish life history in lower Reach 1 and upper Reach 2.	LFL/FWS	Ongoing	X	X	X				
I.D.1.g.	Determine spillway entrainment of nonnative fish at Flaming Gorge Dam.	CDOW/UDWR	Ongoing	X	X	X				
I.D.2.	Integrate and synthesize reports for evaluation and recommended revision of flow and temperature recommendations.	Program	New Start			X	X			X
I.E.1.	Estimate future water demands on San Rafael River.	PD/Utah	Pending	X						
I.E.2.	Develop tributary management plan for San Rafael River.	PD	TBD							
I.E.3.	Conduct appropriate Section 7 and NEPA compliance to implement tributary management plan.	PD/FWS	TBD							
II.	RESTORE HABITAT (HABITAT DEVELOPMENT AND MAINTENANCE)									
II.A.	Restore and manage flooded bottomland habitat.									
II.A.1.	Conduct site restoration.									
II.A.1.a.	Old Charlie Wash.									
>*	II.A.1.a.(1) Construct water control structure and fish kettle.	BR	Complete	Inlet and outlet water control structures repaired and a fish-harvest kettle installed in spring 1995. Inlet structure replaced March 1996. Leaks to outlet structure repaired in 1999.						
	II.A.1.a.(2) Update management plan.	PD	TBD							
	II.A.1.a.(3) Monitor and evaluate success.	FWS-FR/BR	TBD	Need for operational plan TBD pending determination of role of OCW in recovery.						
II.A.2.	Acquire interest in high-priority flooded bottomland habitats between Ouray NWR and Jensen to benefit endangered fish.									
II.A.2.a.	Identify and evaluate sites.	FWS-FR	Complete							
II.A.2.b.	Pre-acquisition planning and identification of acquisition options.	PD	Complete							
II.A.2.c.	Conduct appraisal/NEPA compliance.	PD	Complete							
>*	II.A.2.d. Negotiate acquisition and acquire.	PD	Complete	Six sites acquired (1008.1 acres total). Floodplain acquisition completed and operation, maintenance and evaluation of sites incorporated into Green River Subbasin Floodplain Management Plan (Valdez and Nelson 2004a) (IIA4).						
	II.A.2.e. Evaluate effectiveness of land acquisition activities and provide recommendations.	PD	Complete							
II.A.3.	Implement levee removal strategy at high-priority sites.									
II.A.3.a.	Preconstruction (contaminants screening, floodability assessments, environmental compliance, design, and engineering).	PD/BR	Complete							
>*	II.A.3.b. Construction (levee breaching). [NOTE: Subject to review and approval for depression wetlands.]	BR	Complete	Levees breached at 8 sites (accessing 274 acres). Levee removal completed and operation, maintenance and evaluation of sites incorporated into Green River Subbasin Floodplain Management Plan (Valdez and Nelson 2004a) (IIA4). See also Birchell et al. 2002.						
>*	II.A.3.c. Operate and maintain.	BR/FWS	Complete							
	II.A.3.d. Evaluation.	FWS	Complete							
>*	II.A.4. Develop and implement Green River Subbasin Floodplain Management Plan (Valdez and Nelson 2004a). See also Tetra Tech 2005, Christopherson et al. 2005, Brunson and Christopherson 2005, and Modde and Haines 2005.	Program	Ongoing	X	X	X	X	X	X	X
II.A.4.a.	Validate and refine Green River Subbasin Floodplain Management Plan	Program	Ongoing	X	X	X	X	X	X	X
II.B.	Restore native fish passage at instream barriers.									
II.B.1.	Assess and make recommendations for fish passage at low flows at Tusher Wash.	FWS-FR/ - WR/BR	Complete	Cavalli 2000.						
II.B.2.	Screen Tusher Wash diversion to prevent endangered fish entrainment, if warranted.									
II.B.2.a.	Assess need.	UDWR	Complete	Cavalli 2000, Kitcheyan et al. 2001.						

GREEN RIVER ACTION PLAN: MAINSTEM

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT- YEARS
	II.B.2.b. Design.	BR	Pending	X	X	X				
>*	II.B.2.c. Construct.	BR	Pending		X	X	X			
	II.C. Enhance water temperatures to benefit endangered fishes.									
	II.C.1. Identify options to release warmer water from Flaming Gorge Reservoir to restore native fish habitat in the Green River.	BR	Complete	USBR 2005.						
	II.D. Support actions to reduce or eliminate selenium impacts at Ashley Creek and Stewart Drain. [NOTE: selenium remediation (in all reaches) will be conducted independently of and funded outside of the Recovery Program.]	FWS-ES	Ongoing	X	X	X	X	X	X	X
	III. REDUCE IMPACTS OF NONNATIVE FISHES AND SPORTFISH MANAGEMENT ACTIVITIES (NONNATIVE AND SPORTFISH MANAGEMENT)									
	III.A. Reduce negative impacts to endangered fishes from sportfish management activities.									
	III.A.1. Determine relationship between Flaming Gorge test flows and the fish community in Lodore Canyon..	UDWR	Complete	Bestgen 1997, Bestgen and Crist 2000, F60						
>*	III.A.2. Control escapement of nonnative fishes from Ouray National Wildlife Refuge originating from Pelican Lake.	FWS-RW	Complete	Construction completed prior to spring 1997 runoff.						
>*	III.A.3. Identify and control sources of catfish and centrarchids in the middle Green River.	UDWR	Complete	Jackson and Badame 2002.						
	III.A.4. Develop and implement control programs for nonnative fishes in river reaches occupied by the endangered fishes to identify required levels of control. Each control activity will be evaluated for effectiveness, and then continued as needed. See III.A.2.c.1.& 2. under General Recovery Program Support Action Plan.									
>*	III.A.4.a. Northern pike in the middle Green River.	UDWR/FWS	Ongoing	X	X	X	X	X	X	X
	III.A.4.b. Nonnative cyprinids and centrarchids in nursery habitats.									
>*	III.A.4.b.(1) Small nonnative cyprinids from backwaters and other low-velocity habitats in the lower Green River.	UDWR	On hold	Trammell et al. 2005 report complete; development and implementation of control program on hold.						
>*	III.A.4.b.(2) Smallmouth bass in middle and lower Green River.	UDWR/FWS	Ongoing	X	X	X	X	X	X	X
>*	III.A.4.c. Channel catfish (e.g. Deso./Gray Canyons) to protect humpback chub populations, and in the middle Green River to protect razorback sucker and Colorado pikeminnow. On hold pending development of more efficient techniques.	FWS/UDWR	On hold							
	IV. MANAGE GENETIC INTEGRITY AND AUGMENT OR RESTORE POPULATIONS (STOCKING ENDANGERED FISHES)									
	IV.A. Augment or restore populations as needed, and as guided by the Genetics Management Plan.									
	IV.A.1. Develop integrated stocking plan for the four endangered fishes in the Green River.									
	IV.A.1.a. Prepare plan.	UDWR	Complete	Nesler et al. 2003.						
	IV.A.1.b. Program acceptance.	UDWR	Complete	Nesler et al. 2003.						
>	IV.A.1.c. Implement plan.	UDWR	Ongoing	X	X	X	X	X	X	X
	IV.A.1.c.(1) Conduct high-priority lab/field studies identified in bonytail reintroduction plan.	UDWR	Draft not accepted; dropped.	Crowl and Rivera 2000.						
	IV.A.1.d. Evaluate stocking success as identified in monitoring plan for stocked fish.	LFL/FWS/ STATES/PD	Ongoing	X	X	X	X	X	X	X
	V. MONITOR POPULATIONS AND HABITAT AND CONDUCT RESEARCH TO SUPPORT RECOVERY ACTIONS (RESEARCH, MONITORING, AND DATA MANAGEMENT)									
	V.A. Conduct research to acquire life history information and enhance scientific techniques required to complete recovery actions.									
	V.A.1. Verify additional Colorado pikeminnow spawning areas in lower Green.	UT	Complete	Chart et al. 1999.						
	V.A.2. Identify additional razorback sucker spawning areas in lower Green.	UT	Complete	Chart et al. 1999, Muth et al. 1998.						
	V.B. Conduct population estimate for humpback chub.									
	V.B.1. Desolation/Gray. (Sampling occurs in September and October, overlapping fiscal years. Sampling is conducted for 2 years, followed by no sampling for 2 years, with report write-up in the first year following sampling, then sampling resumes in September of the second year). See Jackson and Hudson 2005.	UDWR	Ongoing	X			X	X	X	X
	V.C. Conduct population estimate for Colorado pikeminnow. Sampling is conducted for 3 years, followed by no sampling for 2 years.									
	V.C.1. Middle Green River (including Yampa and White rivers). See Bestgen et al. 2005.	LFL/UDWR/ FWS	Ongoing	X	X			X	X	X
	V.C.2. Lower Green River. See Bestgen et al. 2005.	LFL/UDWR/ FWS	Ongoing	X	X			X	X	X

GREEN RIVER ACTION PLAN: MAINSTEM

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT- YEARS
V.D.	Conduct population estimate for razorback sucker.	TBD	Pending		X	X	X	X	X	X

GREEN RIVER ACTION PLAN: YAMPA AND LITTLE SNAKE RIVERS

	ACTIVITY	WHO	STATUS	FY 07 10/06-9/07	FY 08 10/07-9/08	FY 09 10/08-9/09	FY 10 10/09-9/10	FY 11 10/10-9/11	FY 12 10/11-9/12	OUT- YEARS
I.	PROVIDE AND PROTECT INSTREAM FLOWS (HABITAT MANAGEMENT)									
I.A.	Basin-wide activities									
I.A.1.	Identify fish habitat and flow needs									
I.A.1.a.	Complete Phase II feasibility study.	CRWCD/ CWCB/BR	Complete	Hydrosphere 1995.						
I.A.1.b.	Revise and update estimates of basin water needs.	CRWCD/FWS	Complete	BBC 1998.						
I.A.1.c.	Evaluate and recommend low flow and passage needs (also relates to restoration of fish passage, if needed -- Recovery Element II).	CDOW/FWS/ CRWCD	Complete	Modde et al. 1999.						
I.A.1.d.	Provide hydrology support to develop and evaluate flow augmentation alternatives.	CWCB	Complete	CWCB provided CRDSS model runs to evaluate augmentation water supply alternatives in 2003.						
I.A.1.e.	Report synthesizing the results of water demand, low flow recommendations and hydrologic analyses.	FWS	Complete	Ayres 1999.						
I.A.1.f.	Install, operate, and/or maintain stream flow monitoring gages.	FWS	Ongoing	X	X	X	X	X	X	X
I.A.1.g.	Install, operate, and/or maintain sediment monitoring gages.		Complete	Final report 1/05.						
I.A.2.	Develop and implement Yampa River management plan.			Roehm 2004.						
I.A.2.a.	Negotiate a Cooperative agreement to implement the Yampa River management plan.	Program	Complete							
I.A.2.a.(1)	Develop a biological assessment for the management plan; initiate intra-Service Section 7 consultation based on the Service intent to enter into the Cooperative Agreement.	FWS	Complete							
I.A.2.a.(1)a	Complete intra-Service consultation, resulting in a programmatic biological opinion (PBO) for the Yampa Basin.	FWS	Complete	January 10, 2005.						
I.A.2.a.(2)	Fulfill NEPA requirements for the management plan.	FWS	Complete	September 2004.						
I.A.2.b.	Sign Cooperative Agreement to implement the management plan.	FWS/Program/ Colorado/ CRWCD	Complete	January 2005.						
I.A.3.	Develop public involvement plan.	FWS/CDOW	Complete	SOW FY 96 and forward.						
I.A.3.a	Implement public involvement plan.	FWS/CDOW	Complete							
I.A.4.	Evaluate and revise as needed flow regimes to benefit endangered fish populations.	FWS/Program	Ongoing	X	X	X	X	X	X	X
I.B.	Yampa River above the Little Snake River									
I.B.1	Initially identify year-round flows needed for recovery.	FWS-FR	Complete	Modde and Smith 1995.						
I.B.2	Provide augmentation of low flows.									
I.B.2.a	Identify and acquire water source(s).									
I.B.2.a.(1)	Steamboat Lake.									
I.B.2.a.(1)(a)	Change decree.	CDPOR	Complete 5/97	Done in 1997.						
>* I.B.2.a.(1)(b)	Lease up to 2,000 af. to augment late summer flows.	FWS-WR	Complete	Water is currently available from Elkhead Reservoir, so water no longer needed from Steamboat Lake.						
I.B.2.a.(1)(c)	Quantify transit losses.	CWCB	Complete	Done in 2000.						
I.B.2.a.(2)	Identify and evaluate water supply alternatives for up to 7,000 af of stream flow augmentation.	Program	Complete	Roehm 2003.						
I.B.2.a.(2)(a)	Complete all necessary administrative, legal, environmental compliance, institutional and financial arrangements needed for development of Elkhead Reservoir enlargement.									
I.B.2.a.(2)(a)i	Complete environmental compliance.	CRWCD	Complete							
I.B.2.a.(2)(a)ii	Complete funding agreement.	CRWCD/CWCB	Complete							
I.B.2.a.(2)(a)iii	Construct	CRWCD	Complete	11/06						
>* I.B.2.a.(2)(b)	Deliver water for endangered fish.	Program	Pending	X	X	X	X	X	X	X
I.B.3.	Evaluate need for instream flow water rights.									
I.B.3.a	Review scientific basis.	CWCB/CDOW	Complete	Approval of Modde et al. 1999.						
I.B.3.b	Assess legal and physical availability of water.	CWCB	Complete	Colorado completed work on a water availability study in early 1995 & the work was used as the basis of the allocation of compact water between the five subbasins.						
I.B.3.c	Assess compact considerations.	CWCB	Complete	Colorado completed work on a water availability study in early 1995 & the work was used as the basis of the allocation of compact water between the five subbasins.						
I.B.3.d	Five-year periodic review of progress under the PBO to determine if instream flow filings are necessary.	CWCB/FWS	Pending			X	X			X
I.B.3.d.(1)	If necessary, evaluate how identified flows will be legally protected.	CWCB	Pending			X	X			X
I.C.	Little Snake River (Colorado and Wyoming)									
I.C.1.	Evaluate importance of Little Snake to endangered fishes and develop management action plan. (Determine if habitat exists to protect under Colorado's instream flow program.)	BR/LFL	Complete	Hawkins et al. 2001; Hawkins and O'Brien 2001.						
I.C.2.	Initially identify year-round flows needed for recovery (needed).									
I.C.2.a.	Develop work plan.	BR/LFL	Complete	Hawkins et al. 2001; Hawkins and O'Brien 2001.						
I.C.2.b.	Identify flows.	FWS-WR	Pending	X						

GREEN RIVER ACTION PLAN: YAMPA AND LITTLE SNAKE RIVERS

	ACTIVITY	WHO	STATUS	FY 07 10/06-9/07	FY 08 10/07-9/08	FY 09 10/08-9/09	FY 10 10/09-9/10	FY 11 10/10-9/11	FY 12 10/11-9/12	OUT- YEARS
I.C.3.	Evaluate need for instream flow water rights.									
I.C.3.a.	Review scientific basis.	CWCB/CDOW	Complete							
I.C.3.b.	Assess legal and physical availability of water.	CWCB	Complete	Colorado completed work on a water availability study in early 1995 & the work was used as the basis of the allocation of compact water between the five subbasins.						
I.C.3.c.	Assess compact considerations.	CWCB	Complete	Colorado completed work on a water availability study in early 1995 & the work was used as the basis of the allocation of compact water between the five subbasins.						
I.C.3.d.	Five-year periodic review of progress under the PBO to determine if instream flow filings are necessary.	CWCB/FWS Wyoming	Pending			X	X			X
I.C.3.d.(1)	If necessary, evaluate how identified flows will be legally protected.	CWCB/ Wyoming	Pending			X	X			X
I.C.4.	Assess Wyoming's current and future water needs.	Wyoming	Complete	Assessment of Wyoming's future water needs is completed (see 2001 RIPRAP assessment)						
I.D.	Yampa River below Little Snake River									
I.D.1.	Initially identify year-round flows needed for recovery.	FWS-FR	Complete	Modde and Smith 1995.						
I.D.1.a.	Modify based on revisions to environmental baseline.	FWS-WR	Complete	Modde and Smith 1995.						
I.D.1.b.	Update flow recommendations to include flows from the Little Snake River.	FWS	Complete	Roehm 2004.						
I.D.2.	Evaluate need for instream flow water rights.									
I.D.2.a.	Review scientific basis.	CWCB/CDOW	Complete							
I.D.2.b.	Assess legal and physical availability of water.	CWCB	Complete	Colorado completed work on a water availability study in early 1995 & the work was used as the basis of the allocation of compact water between the five subbasins						
I.D.2.c.	Assess compact considerations.	CWCB	Complete	Colorado completed work on a water availability study in early 1995 & the work was used as the basis of the allocation of compact water between the five subbasins.						
I.D.2.d.	Five-year periodic review of progress under the PBO to determine if instream flow filings are necessary.	CWCB/FWS	Pending			X	X			X
I.D.2.d.(1)	If necessary, evaluate how identified flows will be legally protected.	CWCB	Pending			X	X			X
II.	RESTORE HABITAT (HABITAT DEVELOPMENT AND MAINTENANCE)									
II.A.	Yampa River from Dinosaur National Monument to Craig, Colorado									
II.A.1.	Restore native fish passage at instream barriers and reduce impacts of maintaining diversion structures.									
II.A.1.a.	Inventory potential barriers.	CRWCD	Complete	Hydrosphere 1995.						
II.A.1.b.	Determine threshold (passage) flows between Craig and Dinosaur National Monument (low- flow dependent).	CDOW/FWS	Complete	Modde et al. 1999.						
II.A.1.c.	Develop guidelines to facilitate fish passage at new diversion structures.	PD/FWS-ES	Complete	Roehm 2003.						
II.A.2.	Reduce/eliminate entrainment of Colorado pikeminnow at diversion structures.									
II.A.2.a.	Identify and evaluate existing diversion structures for entrainment of Colorado pikeminnow	PD/FWS-ES	Ongoing	X	X	X	X	X	X	X
>* II.A.2.b.	Develop and implement remedial measures, as necessary, to reduce or eliminate entrainment.	PD/CDOW/ FWS	Ongoing		X	X	X	X	X	X
II.A.2.c.	Develop guidelines to reduce or eliminate entrainment at new diversion structures, if necessary.	PD/CDOW/ FWS	Complete	Roehm 2003.						
II.A.3.	Review NPS/USGS report to assess potential for negative impacts of elevated pH to endangered fish.	Program	Complete	PD's office reviewed Chafin 2002 and agreed elevated pH is a sampling artifact.						
II.B.	Green River from Ouray to Jensen, Utah (see Green River Action Plan)									
II.B.1	Acquire interest in high-priority flooded bottomland habitats between Ouray NWR and Jensen to benefit endangered fish (see Green River Action Plan : Mainstem II.A.2.)									
II.B.2.	Implement levee removal strategy at high-priority sites (see Green River Action Plan : Mainstem II.A.3.)									
III.	REDUCE NEGATIVE IMPACTS OF NONNATIVE FISHES AND SPORTFISH MANAGEMENT ACTIVITIES (NONNATIVE AND SPORTFISH MANAGEMENT)									
III.A.	Develop aquatic management plan (Colorado) to reduce nonnative fish impacts while providing sportfishing opportunities (also relates to nonnative fish management/control -- Recovery Element III). CDOW 1998.	CDOW	Complete; due for revision	X						
>* III.A.1.	Implement Yampa Basin aquatic wildlife management plan to develop nonnative fish control programs in reaches of the Yampa River occupied by the endangered fishes. Each control activity will be evaluated for effectiveness and then continued as needed. See III.A.2.c.1 & 2. under General Recovery Program Support Action Plan.	CDOW	Ongoing	X	X	X	X	X	X	X
III.A.1.a.	Identify potential conflicts between present fisheries management in existing Elkhead Reservoir and endangered fishes and formulate Elkhead Lake Management Plan.	CDOW	Complete	CDOW 2007.						
III.A.1.a.(1)	Evaluate nonnative fish escapement and control options at Elkhead Reservoir (during and after Elkhead expansion construction). See Miller et al. 2005.	FWS-FR/ CDOW	Ongoing	X	X	X				
>* III.A.1.a.(2)	Implement control measures as needed to control escapement (during and after Elkhead expansion construction).	Program	Ongoing	X	X	X	X	X	X	X
III.A.1.b.	Control northern pike									

GREEN RIVER ACTION PLAN: YAMPA AND LITTLE SNAKE RIVERS

	ACTIVITY	WHO	STATUS	FY 07 10/06-9/07	FY 08 10/07-9/08	FY 09 10/08-9/09	FY 10 10/09-9/10	FY 11 10/10-9/11	FY 12 10/11-9/12	OUT- YEARS
>*	III.A.1.b.(1) Remove and translocate northern pike from Yampa River. See Hawkins et al. 2005.	CDOW/FWS	Ongoing	X	X	X	X	X	X	X
	III.A.1.b.(2) Reduce northern pike reproduction in the Yampa River.									
	III.A.1.b.(2)(a) Identify and evaluate natural and artificial spawning/nursery habitats for northern pike in the Yampa River for exclusion devices.	CDOW	Complete	Hill 2004.						
>*	III.A.1.b.(2)(b) Implement remedial measures to reduce pike reproduction in Yampa River.	CDOW	On hold							
	III.A.1.b.(2)(c) Develop guidelines for new structures to minimize creation of habitat suitable for pike spawning/nursery.	CDOW	On hold							
	III.A.1.b.(3) Identify sources of northern pike and implement remedial measures as needed.	CDOW	Ongoing	X						
	III.A.1.c. Control channel catfish									
>*	III.A.1.c.(1) Remove channel catfish in Yampa Canyon. (Discontinued except for removal of very large individuals incidental to smallmouth bass removal)	FWS	Dis-continued							
>*	III.A.1.c.(2) Remove and translocate channel catfish above Yampa Canyon.	CDOW	On hold							
>*	III.A.1.d. Remove and translocate smallmouth bass.	CDOW	Ongoing	X	X	X	X	X	X	X
	III.A.1.e. Remove bag and possession limits on warmwater nonnative sportfishes within critical habitat in Colorado.	CDOW	Complete	In Colorado fishing regulations.						
IV.	MANAGE GENETIC INTEGRITY AND AUGMENT OR RESTORE POPULATIONS (STOCKING ENDANGERED FISHES)									
	IV.A. Yampa River in Dinosaur National Monument									
	IV.A.1. Augment or restore populations as needed, and as guided by the Genetics Mgmt. Plan.									
	IV.A.1.a. Develop integrated stocking plan for bonytail in the Yampa River.	CDOW	Complete	Nesler et al. 2003						
>	IV.A.1.a.(1) Implement stocking plan.	FWS/CDOW	Ongoing	X	X	X	X	X	X	X
	IV.A.1.b. Research the survivability of young-of-year Gila species in transport and hatcheries.	FWS/CDOW	Ongoing	X	X					
	IV.A.1.b.c Evaluate stocking success as identified in monitoring plan for stocked fish.	LFL/FWS/ States/PD	Ongoing	X	X	X	X	X	X	X
V.	MONITOR POPULATIONS AND HABITAT AND CONDUCT RESEARCH TO SUPPORT RECOVERY ACTIONS (RESEARCH, MONITORING, AND DATA MANAGEMENT)									
	V.A. Conduct population estimate for humpback chub. (Estimate/trend information will be obtained via CPUE during nonnative fish removal passes.)	FWS	Ongoing	X	X			X	X	X

GREEN RIVER ACTION PLAN: DUCHESNE RIVER

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT- YEARS
I.	PROVIDE AND PROTECT INSTREAM FLOWS (HABITAT MANAGEMENT)									
I.A.	Identify initial year-round flows needed for recovery.	FWS-ES	Complete	Initial year-round flow needs for recovery were identified & summarized in a letter to Program Director on 03/09/95 and included in 1998 biological opinion.						
I.A.1.	Conduct hydrology/water availability study.	UT	Complete	CH2MHill 1997.						
I.A.2.	Conduct follow-up study to evaluate and refine flow recommendations.	FWS/UT	Complete	Modde and Keleher 2003.						
I.B.	State acceptance of initial flow recommendations (dependent on development of initial flow recommendations).									
I.B.1.	Review scientific basis.	UT	Complete	Acceptance of Modde and Keleher 2003.						
I.B.2.	Assess legal and physical availability of water.	UT	Pending		12/07					
I.C.	Legally protect and deliver identified flows.									
I.C.1.	Strawberry Valley Project.									
I.C.1.a.	Determine amount of water available from the Strawberry Valley Project for fish use. (BR/CUWCD completed coordinated reservoir operations model in 2003. Task completion part of I.D.1) (This is part of the coordinated reservoir operation in I.D.)	USBR/DOI/PD/ Strawberry Water Users	Ongoing		12/07					
I.C.2.	Management of Daniels Transbasin Diversion.									
I.C.2.a.	Determine the amount of water available from the Daniels Diversion for endangered fish use and pattern and location for delivery. (BR/CUWCD completed coordinated reservoir operations model in 2003. Task completion part of I.D.1)	DOI/IBAT/FWS/ Mitig. Comm./ CUWCD/ UteTribe	Complete							
>* I.C.2.b.	Develop agreements if feasible to deliver and protect water available from the Daniels Diversion.	UT/IBAT /FWS/DOI/ Mitig.Comm./ CUWCD	Ongoing		12/07					
I.D.	Coordinate reservoir operation.									
I.D.1.	Determine feasibility and benefits of coordinated reservoir operation.	BR/CUWCD/ DOI	Complete	Hansen 2004.						
>* I.D.2.	Develop agreements if feasible to coordinate reservoir operations and protect flows to the Green River.	BR/CUWCD/ UT/Ute Tribe	Ongoing	X	12/07					
>* I.D.2.a.	Rehabilitate Myton Town diversion.	BR/CUWCD/ UT/Ute Tribe	Pending	X						
I.E.	Examine the feasibility of other options for obtaining water.	BR/DOI/PD/ UteTribe	Ongoing	X	X	X	X	X	X	X
I.F.	Determine need and feasibility of additional gaging.	BR/FWS/UT	Complete							
I.F.1.	Construct additional gages, as needed.	TBD	Complete							
I.G.	Evaluate and revise as needed, flow regimes to benefit endangered fish populations	FWS/Program	Ongoing	X	X	X	X	X	X	X
III.	REDUCE NEGATIVE IMPACTS OF NONNATIVE FISHES AND SPORTFISH MANAGEMENT ACTIVITIES (NONNATIVE AND SPORTFISH MANAGEMENT)									
III.A.	Reduce negative interactions between nonnative and endangered fishes.									
III.A.1.	Identify most damaging nonnative fishes.	UDWR	Complete	Hawkins and Nesler 1991, Lentsch et al. 1996b, Tyus and Saunders 1996.						
III.A.2.	Assess options to control negative interactions from nonnative fishes from the Duchesne River to benefit Colorado pikeminnow and razorback sucker young-of-the-year.	UDWR	Complete	Tyus and Saunders 1996.						
III.A.3.	Implement and evaluate the effects of viable measures to control negative interactions from nonnative fishes. (See III.A.3. under Green River Mainstem Action Plan.)									
III.A.3.a.	Evaluate feasibility of screen on Bottle Hollow Reservoir to control nonnative fish escapement and explore alternative funding sources.	FWS-FAO/Ute Tribe/BOR	Complete	USFWS 2001.						
>* III.A.3.a.(1)	If feasible and necessary, screen Bottle Hollow Reservoir	Ute Tribe	Complete	Elder's Pond screen (downstream of Bottle Hollow) completed in 2002 (Irving and Montoya 2002).						
III.A.3.b.	Evaluate escapement of nonnative fishes from Starvation Reservoir and the feasibility of screening.	UDWR	Complete	Brunson et al., 2007.						
>≠ III.A.3.b.(1)	If feasible and necessary, screen Starvation Reservoir	N/A	Complete							
>* III.A.3.c.	Remove nonnative fish (smallmouth bass, channel catfish and northern pike). See III.A.2.c.1. & 2. under General Recovery Program Support Action Plan.	FWS-FR	On hold							

GREEN RIVER ACTION PLAN: WHITE RIVER

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT- YEARS
I.	PROVIDE AND PROTECT INSTREAM FLOWS (HABITAT MANAGEMENT)									
I.A.	Assess need for tributary management plan for the White River.	PD	TBD							
I.A.1.	Estimate future water demands on the White River.	TBD	TBD							
I.A.2.	Develop tributary management plan.	PD	TBD							
I.A.3.	Conduct appropriate Section 7 and NEPA compliance to implement tributary management plan.	PD/FWS	TBD							
I.B.	Initially identify year-round flows needed for recovery.									
I.B.1.	Develop work plan.	FWS-FR	Complete	Lentsch et al. 2000.						
I.B.2.	Identify flows.	FWS-FR	TBD	Initial report complete (Irving et al. 2004).						
I.C.	Evaluate how identified flows will be legally protected.	CWCB	Pending							
I.D.	State acceptance of initial flow recommendations (dependent on development of initial flow recommendations).									
I.D.1.	Review scientific basis, dependent on development of flow recommendations by FWS.	UT/CO	Pending							
I.D.2.	Assess legal and physical availability of water.	UT/CO	Complete	No work has been done in Utah on water availability. CO completed work on a water availability study for the White River in early 1995 & the work was used as the basis of the allocation of Compact waters to the White River.						
I.D.3.	Assess compact considerations (in Colorado).	CWCB	Complete	CO completed work on a water availability study for the White River in early 1995 & the work was used as the basis of the allocation of Compact waters to the White River.						
I.D.4.	CWCB notice of intent to appropriate (in Colorado).	CWCB	On hold							
I.E.	Legally protect identified flows (dependent on development of initial flow recommendations).									
I.E.1.	Protect flows in Colorado.									
I.E.1.a	Appropriate.									
I.E.1.a.(1)	CWCB approval to appropriate.	CWCB	On hold							
>* I.E.1.a.(2)	Colorado Attorney Generals Office file date.	CWCB	On hold							
>* I.E.1.a.(3)	Water court adjudication (litigation dependent).	CWCB	On hold							
I.E.2.	Protect flows in Utah.									
I.E.2.a.	Hold public meeting to establish future appropriation policy.	UT	TBD							
I.E.2.b.	Adopt and implement new policy (new appropriations subject to flow criteria).	UT	TBD							
>* I.E.2.c.	Prepare and execute contracts with water users as required to subordinate diversions associated with approved and/or perfected rights.	UT	TBD, as required							
I.F.	Evaluate and revise as needed flow regimes to benefit endangered fish populations.	FWS/Program	Ongoing	X	X	X	X	X	X	X
II.	RESTORE HABITAT (HABITAT DEVELOPMENT AND MAINTENANCE)									
II.A.	Restore native fish passage at instream barriers.									
II.A.1.	Assess and make recommendations for fish passage at Taylor Draw.	PD	Complete	Taylor Draw fish passage recommendations completed in 1997 when Program determined costs exceeded benefits. Irving 1997.						
III.	REDUCE NEGATIVE IMPACTS OF NONNATIVE FISHES AND SPORTFISH MANAGEMENT ACTIVITIES (NONNATIVE AND SPORTFISH MANAGEMENT)									
III.A.	Reduce negative interactions between nonnative and endangered fishes.									
III.A.1.	Monitor escapement of nonnative fishes from Kenney Reservoir (especially black crappie and channel catfish).	CDOW	TBD	Initial assessment completed. If fish stocked in the future, escapement will need to be monitored. Elmsblad 1998.						
III.B.	Reduce negative impacts to endangered fishes from sportfish management activities.									
III.B.1.	Assess adequacy of current regulations and options (including harvest) to reduce negative impacts on native fishes from nonnative sportfish and options to reduce angling mortality on native fishes below Kenney Reservoir.	CDOW	Complete	CDOW completed sportfish regulation/angling regulation changes in 1997 (See Colorado fishing regulations).						
III.B.1.a.	If necessary, assess management options to reduce escapement of black crappie from Kenney Reservoir.	CDOW	Complete	CDOW completed assessment (CDOW 2001).						
V.	MONITOR POPULATIONS AND HABITAT AND CONDUCT RESEARCH TO SUPPORT RECOVERY ACTIONS (RESEARCH, MONITORING, AND DATA MANAGEMENT)									
V.A.	Conduct research to acquire life history information and enhance scientific techniques required to complete recovery actions.									
V.A.1.	Determine relative abundance and fate of Colorado pikeminnow congregation below Kenney Reservoir.	FWS-FR	Complete	Elmsblad 1997.						
V.A.2.	Monitor the White River fish community downstream of Kenney Reservoir to determine long-term effects of mainstream impoundment on the White River.	FWS-FR	Complete	Elmsblad 1997.						

COLORADO RIVER ACTION PLAN: MAINSTEM

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT- YEARS
I.	PROVIDE AND PROTECT INSTREAM FLOWS (HABITAT MANAGEMENT)									
I.A.	Colorado River above Gunnison River									
>*	I.A.1. Develop, issue and implement PBO.	FWS	Complete	USFWS 1999b.						
	I.A.2. Initially identify year-round flows needed for recovery.									
	I.A.2.a. Rifle to Roller Dam.	FWS-FR	Complete	Osmundson 2001.						
	I.A.2.b. Roller Dam to 15-Mile Reach.	FWS-FR	Complete	Osmundson 2001.						
	I.A.2.c. 15-Mile Reach.	FWS-FR	Complete	Osmundson and Kaeding 1991.						
	I.A.3. Provide a depletion accounting report as outlined in the 15-Mile Reach PBO.									
	I.A.3.a. Collect data.	CWCB/FWS-ES/BR	Ongoing	X	X	X	X	X	X	X
	I.A.3.b. Develop consumptive use and losses report with CRDSS model to verify level of depletions.	CWCB	Pending	6/30/07				X	12/31/2011	
	I.A.3.c. Calculate new depletions every 5 years (2016, etc).	CWCB	Pending							X
	I.A.4. Evaluate need for instream flow water rights.									
	I.A.4.a. Rifle to Roller Dam (Dependent on initial flow recommendations).									
	I.A.4.a.(1) Assess legal and physical availability of water.	CWCB	Complete	Colorado completed work on a water availability study in early 1995 & the work was used as the basis of the allocation of compact water between the five subbasins.						
	I.A.4.a.(2) Assess compact considerations.	CWCB	Complete	Colorado completed work on a water availability study in early 1995 & the work was used as the basis of the allocation of compact water between the five subbasins						
	I.A.4.a.(3) Five-year periodic review of progress under the PBO to determine if instream flow filings are necessary.	CWCB/FWS	Ongoing	12/06				X		X
	I.A.4.a.(3)(a) If necessary, evaluate how identified flows will be legally protected.	CWCB	Ongoing	12/06				X		X
	I.A.4.b. Roller Dam to 15-Mile Reach (Dependent on initial flow recommendations).									
	I.A.4.b.(1) Assess legal and physical availability of water.	CWCB	Complete	Colorado completed work on a water availability study in early 1995 & the work was used as the basis of the allocation of compact water between the five subbasins.						
	I.A.4.b.(2) Assess compact considerations.	CWCB	Complete	Colorado completed work on a water availability study in early 1995 & the work was used as the basis of the allocation of compact water between the five subbasins.						
	I.A.4.b.(3) Five-year periodic review of progress under the PBO to determine if instream flow filings are necessary.	CWCB/FWS	Ongoing	12/06				X		X
	I.A.4.b.(3)(a) If necessary, evaluate how identified flows will be legally protected.	CWCB	Ongoing	12/06				X		X
	I.A.4.c. 15-Mile Reach.									
	I.A.4.c.(1) Instream flow water right secured - 581 cfs (July - September).		Complete	On September 2, 1997, instream flow water rights were decreed for 581 and 300 cfs to benefit endangered fishes in the 15-Mile Reach. These water rights have a priority date of the date file which is December 1992 and December 1994 respectively.						
	I.A.4.c.(2) Irrigation season return flows legally protected - 300 cfs.		Complete							
	I.A.5. Provide and legally protect instream flows pursuant to Colorado River PBO.									
>*	I.A.5.a. Pursuant to Ruedi Biological Opinion, deliver 5,000af annually & an additional 5,000af 4 out of 5 years (ongoing and protect by short-term agreement).	BR/CWCB	Ongoing	X	X	X	X	X	X	X
>*	I.A.5.b. Execute long-term lease for 10,825 af from Ruedi Reservoir.	BR/FWS/CWCB	Complete	2012 lease signed June 23, 2003.						
>*	I.A.5.b.(1) Provide water annually pursuant to long-term lease.	BR/CWCB	Ongoing	X	X	X	X	X	X	X
	I.A.5.c. Execute 10-year agreement for delivery of 5,412.5 af by West Slope water users.	CRWCD/FWS	Complete	Pursuant to the 1999 PBO, in 2000, the Service signed a 10-year agreement with the CRWCD for delivery of 5,412 acre-feet of West Slope water from Wolford Mountain Reservoir (in addition to the original commitment of 6,000 acre-feet).						
>*	I.A.5.c.(1) Provide and protect water deliveries by West Slope water users. To provide water when not available from Wolford due to shortage criteria, Reclamation will provide a backup contract for 5,000 af. from Ruedi Reservoir (by 10/06)	CRWCD/CWCB	Ongoing	7/31/07	X	X	X	X	X	X
	I.A.5.d. Execute 10-year agreement for delivery of 5,412.5 af by East Slope water users.	DWD/FWS	Complete	Pursuant to the 1999 PBO, in 2000, the Service signed a 10-year agreement with Denver Water to deliver of 5,412 acre-feet of East Slope water from Williams Fork Reservoir.						
>*	I.A.5.d.(1) Provide and protect water deliveries by East Slope water users.	DWD/CWCB	Ongoing	X	X	X	X	X	X	X
	I.A.5.e. Permanent delivery of 10,825 af of water in late summer/early fall to meet base flow needs.									
	I.A.5.e.(1) Identify options.	CRWCD/NWCD/ Denver Water	Draft	Denver Water and Colorado River Water Conservation District 2002.						
	I.A.5.e.(2) Select preferred alternative for delivery.	CRWCD/NWCD/ Denver Water	Ongoing	X	X					

COLORADO RIVER ACTION PLAN: MAINSTEM

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT- YEARS
I.A.5.e.(3)	Sign agreement(s)	CRWCD/ NWCD/ Denver Water	Pending			X				
I.A.5.e.(4)	Develop projects, if needed.	CRWCD/ NWCD/ Denver Water	Pending				X	X	X	X
>* I.A.5.e.(5)	Deliver and legally protect flows.	CRWCD/ NWCD/ Denver Water	Pending							X
I.A.5.f.	Evaluate options for use of uncommitted Ruedi Reservoir water following Round II sales.	BR	Complete	On May 25, 1995, FWS issued final amendment to BO for Round II water sales. Reclamation agreed to implement a 15-year contract for 21,650 af (in addition to the original 5,000 af + 5,000 af four out of five years). USFWS 1995.						
I.A.5.g.	After Ruedi Round II water sales are completed, or commitments to contracts agreed to, resolve the disposition of remaining uncommitted water from Ruedi Reservoir.	BR/CWCB/ FWS	Complete	1999 amendment to 1995 Ruedi BO. USFWS 1999a.						
>* I.A.5.h.	Pursuant to Wolford Mountain (Muddy Creek) Biological Opinion, deliver up to 6,000 acre-feet of water.	CRWCD/FWS/ CWCB	Ongoing	X	X	X	X	X	X	X
I.A.5.i.	Coordinated reservoir operations.									
I.A.5.i.(1)	Evaluate (final report). Implementation plan finalized 2/28/06.	BR	Complete	Identified as complete in 2000 version of RIPRAP.						
>* I.A.5.i.(2)	If available, deliver additional peak flows, evaluate process & hydrology, and provide annual report.	BR	Ongoing	X	X	X	X	X	X	X
I.A.5.j.	Collbran Project.									
I.A.5.j.(1)	Evaluate.	BR	Complete	Collbran contract could not be implemented as planned due to a number of water rights issues.						
I.A.5.j.(2)	Make recommendations	BR	Complete							
I.A.5.k.	Silt Project.									
I.A.5.k.(1)	Evaluate.	BR	Complete	Not feasible due to water availability.						
I.A.5.k.(2)	Make recommendations.	CDOP/BR	Complete							
I.A.5.l.	Grand Valley Water Management Project.									
I.A.5.l.(1)	Evaluate.	BR	Complete	1996						
I.A.5.l.(2)	Complete Draft Grand Valley Water Management Environmental Assessment. The agreement to deliver Green Mountain Reservoir water to the Grand Valley Power Plant, pursuant to the Orchard Mesa Check Settlement, will also be covered in this draft environmental assessment.	BR	Complete	1997						
>* I.A.5.l.(3)	Design and construct features of the Grand Valley Water Management Project.	BR	Complete							
I.A.5.l.(4)	Execute agreement for delivery of surplus Green Mountain Reservoir water up to the excess capacity of the Grand Valley Power Plant pursuant to the Orchard Mesa Check Settlement.	BR	Complete	July 1999.						
I.A.5.l.(5)	Execute agreement (municipal water contract) to deliver additional Orchard Mesa Check Settlement water and Grand Valley Water Management Plan water to benefit endangered fish.	BR/City of Grand Jct.	Complete; needs renewal	In 2000, Reclamation entered a 5-year contract to deliver Green Mountain surplus water to the city of Grand Junction for municipal/recreational purposes. Needs to be renewed in 2006						
I.A.5.l.(6)	Assess options and legally protect only additional Orchard Mesa Check Settlement water and Grand Valley Water Management Plan water.	BR	Complete	1999						
I.A.5.m.	Water Division 5 Coordinated Facilities Study.									
I.A.5.m.(1)	Evaluate options for providing and protecting additional peak flows to the 15-Mile Reach.	CWCB	Complete	Brown and Caldwell 2003.						
>* I.A.5.m.(2)	Deliver additional peak flows as determined feasible in the evaluation.	TBD	Ongoing	X	X	X	X	X	X	X
I.A.6.	Review implementation of RIPRAP items to determine timely compliance with applicable schedules (every 2 yrs. Beginning in 2003).	FWS	Ongoing	X		X		X	X	X
I.B.	Colorado River from the Gunnison to the Colorado-Utah State line (Includes the 18-Mile Reach (Flow recommendation needed; expected with completion of Aspinall Unit biological opinion.)									
I.B.1.	Initially identify year-round flows needed for recovery.	FWS-FR	Complete	McAda 2003.						
I.B.2.	Evaluate how identified flows will be legally protected.	CWCB	On hold							
I.B.3.	State acceptance of initial flow recommendations.									
I.B.3.a.	Review scientific basis, dependent on development of flow recommendations by FWS.	CWCB/CDOW	Pending							
I.B.3.b.	Assess legal and physical availability of water.	CWCB	Complete	Colorado completed work on a water availability study in early 1995 & the work was used as the basis of the allocation of compact water between the five subbasins.						
I.B.3.c.	Assess compact considerations.	CWCB	Complete	Colorado completed work on a water availability study in early 1995 & the work was used as the basis of the allocation of compact water between the five subbasins.						
I.B.3.d.	CWCB notice of intent to appropriate (in Colorado).	CWCB	On hold							
I.B.4.	Legally protect identified flows.									
>* I.B.4.a.	Acquire (see Colorado River above Gunnison and Gunnison River).									
I.B.4.b.	Appropriate.									

COLORADO RIVER ACTION PLAN: MAINSTEM

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT- YEARS
	I.B.4.b.(1) CWCB approval to appropriate.	CWCB	On hold							
>*	I.B.4.b.(2) Colorado Attorney Generals Office file date.	CWCB	On hold							
>*	I.B.4.b.(3) Water court adjudication (litigation dependent).	CWCB	On hold							
	I.B.4.c. Deliver and legally protect flows from Aspinall (see Colorado River above Gunnison and Gunnison River).									
>*	I.B.4.c.(1) Operate Aspinall to provide test flows.	BR	Complete	Test flows provided through 1997; synthesis report and flow recommendations report completed in 2003 (McAda 2003).						
>*	I.B.4.c.(2) Continue annual coordination (meeting 3 times/year) of Aspinall operation until biological opinion complete.	BR	Ongoing	X	X	X	X	X	X	X
	I.B.4.c.(3) Operate Aspinall to provide flows pursuant to biological opinion.									
	I.B.4.c.(3)(a) Determine if change in water right and/or contract is needed.	BR	Pending							
	I.B.4.c.(3)(b) Enter into contract if needed.	BR	Pending							
>*	I.B.4.c.(3)(c) Deliver flows.	BR	Pending							
	I.C. Colorado River from Colorado-Utah State line to Green River (Flow recommendations needed.)									
	I.C.1. Initially identify year-round flows needed for recovery.	FWS-FR	Complete	McAda 2003.						
	I.C.2. State acceptance of initial flow recommendations.									
	I.C.2.a. Review scientific basis.	UT	Pending							
	I.C.2.b. Assess legal and physical availability of water.	UT	Pending							
	I.C.3. Legally protect identified flows.									
	I.C.3.a. Hold public meeting to establish future appropriation policy.	UT	Pending							
	I.C.3.b. Adopt and implement new policy (new appropriations subject to flow criteria).	UT	Pending							
>*	I.C.3.c. Prepare and execute contracts with water users as required to subordinate diversions associated with approved and/or perfected rights.	UT	Pending							
	I.D. Colorado River below Green River									
	I.D.1. Initially identify year-round flows needed for recovery.	FWS	Pending							
	I.D.2. Assess adequacy of combined flows from Colorado and Green rivers to provide fish habitat (and meet recovery goals) in the Cataract Canyon reach of the Colorado River.	FWS	Pending							
	I.E. Evaluate and revise as needed flow regimes to benefit endangered fish populations.	FWS/Program	Ongoing	X	X	X	X	X	X	X
	II. RESTORE HABITAT (HABITAT DEVELOPMENT AND MAINTENANCE)									
	II.A. Restore and manage flooded bottomland habitat.									
	II.A.1. 29-5/8 Road Gravel Pit (became part of larger "Hot Spot Complex" in 2003.)									
	II.A.1.a. Develop and approve management plans.	FWS-FR	Complete	Burdick 1994.						
	II.A.1.b. Site design/complete environmental compliance.	BR	Complete	Levee initially breached in December 1995. To enhance post-runoff drainability, site topography was re-contoured in March 1998.						
>*	II.A.1.c. Construct.	BR	Complete							
>*	II.A.1.d. Operate and maintain.	BR	TBD, revisit as needed	Burdick 2002. Operation, maintenance and evaluation of sites incorporated into Colorado River Subbasin Floodplain Management Plan (Valdez and Nelson 2004b) (IIA6).						
	II.A.1.e. Monitor and evaluate success; modify as needed.	FWS-FR	TBD, revisit as needed							
	II.A.2. Adobe Creek.									
	II.A.2.a. Develop and approve management plans.	FWS-FR	Complete	Earthen dikes and water control structures completed in spring 1995.						
	II.A.2.b. Site design/complete environmental compliance.	BR	Complete							
>*	II.A.2.c. Construct.	BR	Complete							
>*	II.A.2.d. Operate and maintain.	BR	TBD, revisit as needed	Hamilton et al. 1996, 1997, 2003. Operation, maintenance and evaluation of sites incorporated into Colorado River Subbasin Floodplain Management Plan (Valdez and Nelson 2004b) (IIA6).						
	II.A.2.e. Monitor and evaluate success; modify as needed.	FWS-FR	TBD, revisit as needed							
	II.A.3. Walter Walker.									
	II.A.3.a. Develop and approve management plans.	FWS-FR	Complete	1994						
	II.A.3.b. Site design/complete environmental compliance.	BR	Complete	Initial construction was completed during FY 95.						
>*	II.A.3.c. Construct.	BR	Complete	75 cfs inlet control structure to flush selenium was completed December 1996 (Hamilton et al 2003).						

COLORADO RIVER ACTION PLAN: MAINSTEM

	ACTIVITY	WHO	STATUS	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12	OUT-YEARS	
				10/06 9/07	10/07 9/08	10/08 9/09	10/09 9/10	10/10 9/11	10/11 9/12		
>*	II.A.3.d. Operate and maintain.	BR/FWS/ CDOW	TBD, revisit as needed	Operation, maintenance and evaluation of sites incorporated into Colorado River Subbasin Floodplain Management Plan (Valdez and Nelson 2004b) (IIA6).							
	II.A.3.e. Monitor and evaluate success; modify as needed.	FWS-FR	TBD, revisit as needed	Hamilton et al. 1996, 1997, 2003, Scheer 1998.							
	II.A.4. Develop and implement levee removal strategy at high-priority sites.										
	II.A.4.a. Preconstruction (contaminants screening, floodability assessments, environmental compliance, design & engineering.	BR/FWS	Complete	Burdick 2002. Levees breached at two sites (19.5 acres total). Levee removal completed and operation, maintenance and evaluation of sites incorporated into Colorado River Subbasin Floodplain Management Plan (Valdez and Nelson 2004b) (IIA6).							
>*	II.A.4.b. Construction (levee breaching) [NOTE: Subject to review and approval for depression wetlands.]	BR	Complete								
>*	II.A.4.c. Operate and maintain.	BR/FWS	Complete								
	II.A.4.d. Evaluation	FWS	Complete								
	II.A.5. Acquire interest in high-priority flooded bottomland habitats.										
	II.A.5.a. Identify and evaluate sites.	FWS	Complete	Acquired 10 sites (394 acres total). Operation, maintenance and evaluation of sites incorporated into Colorado River Subbasin Floodplain Management Plan (Valdez and Nelson 2004b) (IIA6).							
	II.A.5.b. Pre-acquisition planning and identification of acquisition options.	PD	Complete								
	II.A.5.c. Conduct appraisal/NEPA compliance.	PD	Complete								
>*	II.A.5.d. Negotiate and acquire.	PD	Complete								
	II.A.5.e. Evaluate effectiveness of land acquisition activities and provide recommendations	PD	Complete								
>*	II.A.6. Develop and implement Colorado River Subbasin Floodplain Management Plan (Valdez and Nelson 2004b).	Program	Ongoing	X	X	X	X	X	X	X	
	II.A.6.a. Validate and refine Colorado River Subbasin Floodplain Management Plan	Program	Ongoing	X	X	X	X	X	X	X	
	II.B. Restore native fish passage at instream barriers.										
	II.B.1. Restore passage at Grand Valley Irrigation Co. Diversion Dam (Palisade)										
	II.B.1.a. Evaluate and implement viable options to restore fish passage.	BR/FWS	Complete	1997							
	II.B.1.a.(1) Obtain landowner consent/agreement.	BR	Complete	Preconstruction activities complete 1997.							
	II.B.1.a.(2) Site design/environmental compliance.	BR	Complete	Preconstruction activities complete 1997.							
>*	II.B.1.a.(3) Construct.	BR	Complete	GVIC passage construction completed in 01/98.							
>*	II.B.1.a.(4) Operate and maintain.	FWS-FR/BR	Ongoing	X	X	X	X	X	X	X	
	II.B.1.a.(5) Monitor and evaluate success.	FWS-FR/BR	Complete	Burdick 1999.							
	II.B.1.b. Screen GVIC diversion to prevent endangered fish entrainment, if warranted.										
	II.B.1.b.(1) Design.	BR	Complete	1999							
>*	II.B.1.b.(2) Construct.	BR	Complete	GVIC diversion canal fish screen completed in 05/02, modifications completed March 2004.							
>*	II.B.1.b(3) Operate and maintain.	FWS-FR/BR	Ongoing	X	X	X	X	X	X	X	
	II.B.2. Restore fish passage at Price Stubb.										
	II.B.2.a. Evaluate and implement viable options.										
	II.B.2.a.(1) Obtain landowner consent/agreement.	BR	Complete								
	II.B.2.a.(2) Site design/environmental compliance.	BR	Complete								
>*	II.B.2.a.(3) Construct.	BR	Pending	X	X						
>*	II.B.2.a.(4) Operate and maintain.	TBD	Pending		X	X	X	X	X	X	
	II.B.2.a.(5) Monitor and evaluate success.	FWS-FR/BR	Pending		X	X					
	II.B.3. Restore fish passage at Government Highline (Roller Dam).										
	II.B.3.a. Evaluate and implement viable options.										
	II.B.3.a.(1) Site design/environmental compliance.	BR	Complete	2003							
>*	II.B.3.a.(2) Construct.	BR	Complete								
>*	II.B.3.a.(3) Operate and maintain.	BR	Ongoing	X	X	X	X	X	X	X	
	II.B.3.a.(4) Monitor and evaluate success.	FWS-FR/BR	Ongoing	X	X	X					
	II.B.3.b. Screen Government Highline diversion to prevent endangered fish entrainment										
	II.B.3.b.(1) Design.	BR	Complete	2002							
>*	II.B.3.b.(2) Construct.	BR	Complete	August 2005.							
	II.B.3.b.(3) Evaluate screening.	FWS-FR/BR	Ongoing	X							
	II.C. Support actions to reduce or eliminate contaminant impacts. [NOTE: Contaminants remediation (in all reaches) will be conducted independently of and funded outside of the Recovery Program.]										
	II.C.1. Support actions to reduce or eliminate contaminant impacts of selenium in the Grand Valley.	FWS-ES	Ongoing	X	X	X	X	X	X	X	
	II.C.2. Support remediation of groundwater contamination at the Atlas Mill tailings site.	FWS-ES	Ongoing	X	X	X	X	X	X	X	
	II.C.3. Identify measures to minimize risk of hazardous materials spills in Black Rocks and Westwater Canyon from transport along the adjacent railway to protect humpback chub populations.	FWS-ES	Ongoing	X	X	X	X	X	X	X	

COLORADO RIVER ACTION PLAN: MAINSTEM

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT- YEARS
III.	REDUCE NEGATIVE IMPACTS OF NONNATIVE FISHES AND SPORTFISH MANAGEMENT ACTIVITIES (NONNATIVE AND SPORTFISH MANAGEMENT)									
III.A.	Develop and implement control programs in reaches of the Colorado River occupied by endangered fishes. Each control activity will be evaluated for effectiveness and then continued as needed. See III.A.2.c.1.& 2. under General Recovery Program Support Action Plan.									
III.A.1.	Determine relationship between Aspinall test flows and nonnative fish abundance.	UDWR/ FWS-FR	Complete	McAda & Ryel 1999.						
>*	III.A.2. Reclaim ponds in critical habitat.	CDOW	Complete	Martinez 2004.						
	III.A.2.a. Evaluate and make recommendations.	CDOW	Complete							
	III.A.3. Nonnative cyprinids and centrarchids in nursery habitats.									
	III.A.3.a. Remove small nonnative cyprinids from backwaters and other low velocity habitats.	CDOW/UDWR	Complete	Trammell et al. 2002. Report completed; development and implementation of control program on hold.						
	III.A.3.b. Remove nonnative centrarchids from backwaters and other low velocity habitats.	FWS	Complete	Osmundson 2003. Report completed; development and implementation of control program on hold.						
	III.A.4. Preclude escapement from ponds in critical habitat as needed and feasible.									
	III.A.4.a. Evaluate sources of nonnative fishes and make recommendations.	CDOW/FWS	Ongoing	X						
>*	III.A.5. Develop and implement program to identify required level of channel catfish control.	FWS	On hold	Smallmouth bass considered higher priority (2004).						
>*	III.A.6. Develop and implement program to identify required level of smallmouth bass control.	FWS	Ongoing	X	X	X	X	X	X	X
	III.B. Reduce negative impacts to endangered fishes from sportfish management activities.									
>*	III.B.1. Evaluate control options and implement measures to control nonnative fish escapement from Highline Reservoir.	CDOW/ CRWCD	Complete	Fish barrier net installed in Highline Reservoir 8/99; replaced in 2005.						
	III.B.1.a. Operate and maintain Highline Reservoir net.	CDOPR	Ongoing	X	X	X	X	X	X	X
	III.B.1.b. Evaluate Highline Reservoir net.	CDOW	Complete	Martinez 2002.						
	III.B.2. Remove bag and possession limits on warmwater nonnative sportfishes within critical habitat in Colorado.	CDOW	Complete	See Colorado fishing regulations.						
	III.B.4. Develop basinwide aquatic management plan to reduce nonnative fish impacts while providing sportfishing opportunities.	CDOW	Complete	CDOW 2003a.						
>*	III.B.4.a. Implement CDOW's Colorado River Aquatic Management Plan.	CDOW	Ongoing	X	X	X	X	X	X	X
IV.	MANAGE GENETIC INTEGRITY AND AUGMENT OR RESTORE POPULATIONS (STOCKING ENDANGERED FISHES)									
IV.A.	Augment or restore populations as needed, and as guided by the Genetics Management Plan.									
IV.A.1.	Razorback sucker.									
	IV.A.1.a. Develop experimental augmentation plan and seek Program acceptance.	FWS-FR	Complete	Burdick et al. 1995.						
	IV.A.1.b. Implement experimental augmentation plan.									
>	IV.A.1.b.(1) Stock fish.	FWS-FR	Complete	Burdick 2003.						
	IV.A.1.b.(2) Monitor and evaluate results; make recommendations regarding further augmentation.	FWS-FR	Complete	Burdick 2003.						
	IV.A.2. Monitor the fish community in the upper Colorado River (above Palisade) and develop management action plan, including recommendations for Colorado pikeminnow and razorback sucker augmentation.	CDOW	Complete	Anderson 1997.						
	IV.A.3. Develop integrated stocking plan for razorbacks in the Colorado River in Colorado.	CDOW/PD	Complete	Nesler et al. 2003.						
	IV.A.3.a. Program acceptance.	CDOW/PD	Complete	Nesler et al. 2003.						
>	IV.A.3.b. Implement razorback sucker integrated stocking plan.	CDOW/PD	Ongoing	X	X	X	X	X	X	X
	IV.A.3.b. Evaluate stocking success as identified in monitoring plan for stocked fish.	Program	Ongoing	X	X	X	X	X	X	X
	IV.A.4. Develop integrated stocking plan for Colorado pikeminnow in the Colorado River in Colorado	CDOW/PD	Complete	Nesler et al. 2003.						
	IV.A.4.a. Program acceptance.	CDOW/PD	Complete	Nesler et al. 2003.						
>	IV.A.4.b. Implement Colorado pikeminnow integrated stocking plan.	CDOW/PD	On hold	X	X	X	X	X	X	X
	IV.A.4.c. Evaluate stocking success as identified in monitoring plan for stocked fish.	Program	Ongoing	X	X	X	X	X	X	X
	IV.A.5. Develop integrated stocking plan for bonytail in the Colorado River from Palisade to Loma	CDOW	Complete	Nesler et al. 2003.						
	IV.A.5.a. Program acceptance.	CDOW/PD	Complete	Nesler et al. 2003.						
>	IV.A.5.b. Implement bonytail integrated stocking plan.	FWS/CDOW	Ongoing	X	X	X	X	X	X	X
	IV.A.5.c. Evaluate stocking success as identified in monitoring plan for stocked fish.	Program	Ongoing	X	X	X	X	X	X	X
	IV.A.6. Develop integrated stocking plan for the four endangered fish in the Colorado River in Utah.									
	IV.A.6.a. Prepare plan.	UDWR	Complete	Nesler et al. 2003.						
	IV.A.6.b. Program acceptance.	UDWR	Complete	Nesler et al. 2003.						
>	IV.A.6.c. Implement plan.	UDWR	Ongoing	X	X	X	X	X	X	X
	IV.A.6.d. Evaluate stocking success as identified in monitoring plan for stocked fish.	LFL/FWS/ STATES	Ongoing	X	X	X	X	X	X	X

COLORADO RIVER ACTION PLAN: MAINSTEM

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT- YEARS
V.	MONITOR POPULATIONS AND HABITAT AND CONDUCT RESEARCH TO SUPPORT RECOVERY ACTIONS (RESEARCH, MONITORING, AND DATA MANAGEMENT)									
V.A.	Conduct research to acquire life history information and enhance scientific techniques required to complete recovery actions.									
V.A.1.	Determine Colorado pikeminnow larval drift into Lake Powell.	NPS	Complete	Muth and Wick 1996, 1997.						
V.B.	Monitor populations per requirements in the 15-Mile Reach PBO.									
V.B.1.	Determine initial baselines and indices for Colorado pikeminnow and humpback chub.	PD	Complete	Appendix to biological opinion (USFWS 1999a) and recovery goals (USFWS 2002a, 2002c).						
V.B.1.a.	Evaluate population response, per 15-Mile Reach PBO (every 5 years beginning in FY 05).	FWS	Ongoing	X	X	X	X	X	X	X
V.B.2.	Determine initial baselines and indices for razorback sucker and bonytail.	PD	Complete	See recovery goals, USFWS 2002b, 2002d.						
V.B.2.a.	Evaluate population response, per 15-Mile Reach PBO (every 5 years beginning in FY 05).	FWS	Ongoing	X	X	X	X	X	X	X
V.B.3.	Revise population indices to conform to recovery goals.	FWS	Complete	2003 PBO evaluation (in concert with 2003 RIPRAP assessment).						
V.B.4.	Monitor incidental take.									
V.B.4.a.	Develop plan to monitor incidental take of endangered fishes in diversion structures.	FWS	Complete	"Plan" completed in that fish are being retrieved from canals until the canals are screened and screens are fully functional (anticipated in FY 05). Screens will prevent entrainment of adult, subadult, and juvenile fish (preventing entrainment of adult and subadult fish required is by recovery goals) because they are 3/32 mesh.						
V.B.4.b.	Implement plan to monitor incidental take of endangered fish in diversion structures.	FWS	Ongoing							
V.C.	Estimate humpback chub populations. (Sampling occurs in September and October, overlapping fiscal years.)									
V.C.1.	Black Rocks. See McAda 2002.	FWS	Ongoing	X	X			X	X	X
V.C.2.	Westwater. See Hudson and Jackson 2003.	UDWR	Ongoing	X	X			X	X	X
V.C.3.	Cataract Canyon	UDWR/Valdez	Ongoing	X	X			X	X	X
V.D.	Estimate pikeminnow populations in the upper Colorado River (including Gunnison River). Three years sampling (e.g., FY 03, 04, 05) followed by two years no sampling; data analysis and report write-up in first year of no sampling (e.g., FY 06).	FWS	Ongoing		X	X	X			X

COLORADO RIVER ACTION PLAN: GUNNISON RIVER

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT- YEARS
I.	PROVIDE AND PROTECT INSTREAM FLOWS (HABITAT MANAGEMENT)									
I.A.	Identify fish habitat and flow needs.									
I.A.1.	Initially identify year-round flows needed for recovery (Flow recommendations will be provided upon completion of Aspinall Unit studies.)									
I.A.1.a.	Complete draft technical synthesis report.	FWS	Complete	McAda 2000.						
I.A.1.b.	Complete draft biological assessment.	BR	Pending		X					
I.A.1.c.	Complete final technical synthesis report.	FWS	Complete	McAda 2003.						
I.A.1.d.	Complete final biological assessment.	BR	Pending		X					
I.A.1.e.	Complete draft biological opinion.	FWS	Pending			X				
I.A.1.f.	Complete draft NEPA document .	BR	Pending		X					
I.A.1.g.	Complete final biological opinion (FWS) and NEPA document (BR).	FWS/BR	Pending			X				
I.A.1.h.	Complete ESA Section 7 consultation resulting in a programmatic biological opinion (PBO) for the Gunnison Basin.	FWS/BR/WAPA	Pending							X
I.B.	State acceptance of initial flow recommendations (Flow recommendations will be provided upon completion of Aspinall Unit studies.)									
I.B.1.	Review scientific basis, dependent on development of flow recommendations by FWS.	CWCB/CDOW	Complete	Complete with acceptance of McAda 2003.						
I.B.2.	Assess legal and physical availability of water.	CWCB	Complete	Colorado completed work on a water availability study in early 1995 & the work was used as the basis of the allocation of compact water between the five subbasins.						
I.B.3.	Assess compact considerations.	CWCB	Complete	Colorado completed work on a water availability study in early 1995 & the work was used as the basis of the allocation of compact water between the five subbasins.						
I.B.4.	CWCB notice of intent to appropriate (in Colorado).	CWCB	On hold							
I.C.	Legally protect identified flows.									
I.C.1.	Acquire (flow recommendations will be provided upon completion of Aspinall Unit studies.)									
I.C.1.a.	Assess, acquire and convert water rights to instream flows.	CWCB	On hold							
I.C.2.	Appropriate (flow recommendations will be provided upon completion of Aspinall Unit studies.)									
I.C.2.a.	CWCB approval to appropriate.	CWCB	On hold							
>* I.C.2.b.	Colorado Attorney General's Office file date.	CWCB	On hold							
>* I.C.2.c.	Water court adjudication (litigation dependent).	CWCB	On hold							
I.C.3.	Deliver.									
>* I.C.3.a.	Aspinall Unit supplemental releases to maintain 2,000 cfs minimum flow at Colorado-Utah state line 9 out of 10 years. Provide annual report.	BR	Through 01							
I.C.3.b.	Flows from Aspinall Unit for research studies.									
>* I.C.3.b.(1)	Deliver flows.	BR	Complete							
>* I.C.3.b.(2)	Protect research flows.	FWS/BR/ CWCB	Complete	An interim contact is in place between Reclamation, Service & CWCB. Long term legal protection of Gunnison River flows will occur after completion of Aspinall biological opinion (BR 04/95-FY96).						
>* I.C.3.c.	Continue annual coordination (meeting 3 times/year) of Aspinall operation until biological opinion complete.	BR	Ongoing							
I.C.3.d.	Flows from Paonia Reservoir in accordance with FWS Horsethief Biological Opinion.									
>* I.C.3.d.(1)	Deliver flows.	BR	Ongoing	X	X	X	X	X	X	X
I.C.3.e.	Flows from Aspinall Unit pursuant to Aspinall Biological Opinion.									
I.C.3.e.(1)	Determine if change in water right and/or contract is needed.	BR	Pending							
I.C.3.e.(2)	Enter into contract if needed.	BR	Pending							
>* I.C.3.e.(3)	Deliver flows.	BR	Pending							
I.C.3.e.(3)(a)	Study Gunnison River return flows to determine consumptive use to be charged against flow deliveries.	USGS	Complete	Kuhn and Williams 2004.						
I.D.	Evaluate and revise as needed flow regimes to benefit endangered fish populations.	FWS/Program	Ongoing	X	X	X	X	X	X	X
I.E.	Initiate investigations of the feasibility of modifying releases from Aspinall Unit dams to increase water temperatures that would allow for upstream expansion of Colorado pikeminnow in the Gunnison River.	BR/Contract	Complete	Boyer and Cutler 2004.						
II.	RESTORE HABITAT (HABITAT DEVELOPMENT AND MAINTENANCE)									
II.A.	Restore and manage flooded bottomland habitat.									
II.A.1.	Develop management plan for Escalante State Wildlife Area.		Complete 5/94	Burdick 1994.						

COLORADO RIVER ACTION PLAN: GUNNISON RIVER

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT- YEARS
II.A.2.	Develop and implement levee removal strategy at high-priority sites.									
II.A.2.a.	Preconstruction (contaminants screening, floodability assessments, environmental compliance, design & engineering).	BR	Complete							
>* II.A.2.b.	Construction (levee removal)	BR	Complete							
II.A.2.c.	Operate and maintain.	BR/FWS	Complete							
II.A.2.d.	Evaluation.	FWS	Complete							
II.A.3.	Acquire interest in high-priority flooded bottomland habitats.									
II.A.3.a.	Identify and evaluate sites.	FWS	Complete							
II.A.3.b.	Pre-acquisition planning and identification of acquisition options.	PD	Complete							
II.A.3.c.	Conduct appraisal/NEPA compliance.	PD	Complete							
>* II.A.3.d.	Negotiate & acquire.	PD	Complete							
II.A.3.e.	Evaluate effectiveness of land acquisition activities and provide recommendations.	PD	Complete							
>* II.A.3.	Develop and implement Colorado River Subbasin Floodplain Management Plan (Valdez and Nelson 2004b).	Program	Ongoing	X	X	X	X	X	X	X
II.B.	Restore native fish passage at instream barriers.									
II.B.1.	Restore passage at Redlands.									
II.B.1.a.	Assess and make recommendations for fish passage.	FWS	Complete							Burdick and Kaeding 1990.
II.B.1.b.	Implement viable options to restore fish passage.									
II.B.1.b.(1)	Design passage, conduct NEPA compliance.	BR	Complete							1996 RR; Passage under construction as of 11/20/95, to be completed by 04/96, 96status.as
>* II.B.1.b.(2)	Construct fish ladder.	BR	Complete							Construction completed in June 1996 (Burdick 2001).
>* II.B.1.c.	Operate and maintain fish ladder.	FWS-FR/BR	Ongoing	X	X	X	X	X	X	X
II.B.1.d.	Monitor and evaluate success.	FWS-FR/BR	Complete							Burdick 2001.
II.B.1.e.	Identify minimum flows below Redlands Diversion Dam.	FWS-FR	Complete							Burdick 1997.
>* II.B.1.f.	Deliver flows below Redlands.	BR	Ongoing	X	X	X	X	X	X	X
II.B.1.g.	Screen Redlands diversion structure to prevent endangered fish entrainment									
II.B.1.g.(1)	Design.	BR	Complete							2003
>* II.B.1.g.(2)	Construct.	BR	Complete							August 2005.
>* II.B.1.h.	Operate and maintain fish screen.	Redlands	Ongoing	X	X	X	X	X	X	X
II.B.2.	Restore passage at Hartland.									
II.B.2.a.	Assess and make recommendations for fish passage. (Passage at Hartland not identified as necessary for recovery in species' recovery goals).	FWS-FR	Complete							Burdick and Pfeifer 1996.
II.B.2.b.	Evaluate viable options to restore fish passage.	BR	Complete							Burdick and Pfeifer 1996. Tetra Tech 2000 (evaluated 3 design options for passage and 3 options for screens).
II.B.2.c.	Support local interests in efforts to pursue removal of the Hartland Diversion dam. [NOTE: These efforts will be conducted independently of and funded outside of the Recovery Program]	BR/FWS/PD	Ongoing							
II.B.2.d.	Screen Hartland diversion to prevent endangered fish entrainment, if warranted.									
II.B.2.d.(1)	Assess need.	BR/FWS/PD	Complete							
III.	REDUCE NEGATIVE IMPACTS OF NONNATIVE FISHES AND SPORTFISH MANAGEMENT ACTIVITIES (NONNATIVE AND SPORTFISH MANAGEMENT)									
III.A.	Reduce negative interactions between nonnative and endangered fishes.									
>* III.A.1.	Reclaim ponds in critical habitat	CDOW	Complete							
III.A.1.a.	Evaluate and make recommendations.	CDOW	Complete							Martinez 2004.
III.A.2.	Develop basinwide aquatic management plan to reduce nonnative fish impacts while providing sportfishing opportunities.	CDOW	Complete							CDOW 2003b.
>* III.A.2.a.	Implement CDOW's Gunnison River Aquatic Management Plan.	CDOW	Ongoing	X	X	X	X	X	X	X
IV.	MANAGE GENETIC INTEGRITY AND AUGMENT OR RESTORE POPULATIONS (STOCKING ENDANGERED FISHES)									
IV.A.	Augment or restore populations as needed and as guided by the Genetics Management Plan.									
IV.A.1.	Razorback sucker.									
IV.A.1.a.	Develop experimental augmentation plan and seek Program acceptance.	FWS-FR	Complete							Burdick et al 1995.
IV.A.1.b.	Implement experimental augmentation plan. (Goal: 10 adults/river mile.)									
> IV.A.1.b.(1)	Stock fish.	FWS-FR	Complete							Burdick 2003.
IV.A.1.b.(2)	Monitor and evaluate results; make recommendations regarding further augmentation	FWS-FR	Complete							Burdick 2003.
IV.A.2.	Develop integrated stocking plan for Colorado pikeminnow in the Gunnison River.									
IV.A.2.a.	Program acceptance.		Complete							Nesler et al 2003.

COLORADO RIVER ACTION PLAN: GUNNISON RIVER

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT- YEARS
>	IV.A.2.b. Implement Colorado pikeminnow integrated stocking plan.	CDOF/FWS	On hold							
	IV.A.2.c. Evaluate stocking success as identified in monitoring plan for stocked fish.	FWS/CDOF	On hold							
	IV.A.3. Develop integrated stocking plan for razorback sucker in the Gunnison River.									
	IV.A.3.a. Program acceptance.		Complete	Nesler et al 2003.						
>	IV.A.3.b. Implement razorback sucker integrated stocking plan.	CDOF/FWS	Ongoing	X	X	X	X	X	X	X
	IV.A.3.c. Evaluate stocking success as identified in monitoring plan for stocked fish.	LFL/FWS/STATE S/PD	Ongoing	X	X	X	X	X	X	X
V.	MONITOR POPULATIONS AND HABITAT AND CONDUCT RESEARCH TO SUPPORT RECOVERY ACTIONS (RESEARCH, MONITORING, AND DATA MANAGEMENT)									
	V.A. Conduct research to acquire life history information and enhance scientific techniques required to complete recovery actions.									
	V.A.1. Conduct Colorado pikeminnow and razorback sucker inventory in Gunnison River above Redlands.	FWS-FR	Complete	Burdick 1995.						
	V.A.2. Identify additional spawning sites of endangered fishes on the Gunnison River.	FWS-FR	Ongoing	X	X					
	V.A.3. Conduct survey for endangered fish	FWS-FR	Ongoing	X	X					

COLORADO RIVER ACTION PLAN: DOLORES RIVER

	ACTIVITY	WHO	STATUS	FY 07 10/06 9/07	FY 08 10/07 9/08	FY 09 10/08 9/09	FY 10 10/09 9/10	FY 11 10/10 9/11	FY 12 10/11 9/12	OUT- YEARS
III.	REDUCE NEGATIVE IMPACTS OF NONNATIVE FISHES AND SPORTFISH MANAGEMENT ACTIVITIES (NONNATIVE AND SPORTFISH MANAGEMENT)									
III.A.	Reduce negative interactions between nonnative and endangered fishes.									
III.A.1.	Assess need and options to control nonnative fish escapement from McPhee Reservoir.	BR	Complete	McPhee Reservoir management plan was prepared by CDOW & accepted by the Service on 05/25/95.						
III.B.	Reduce negative impacts to endangered fishes from sportfish management activities.									
III.B.1.	Identify potential conflicts between present fish management practices in McPhee Reservoir and endangered fishes and formulate an alternative management plan.	CDOW	Complete	McPhee Reservoir management plan was prepared by CDOW & accepted by the Service on 05/25/95.						
V.	MONITOR POPULATIONS AND HABITAT AND CONDUCT RESEARCH TO SUPPORT RECOVERY ACTIONS (RESEARCH, MONITORING, AND DATA MANAGEMENT)									
V.A.	Survey native and nonnative fish in Dolores River (UDWR funding outside of Program). <i>BC: UDWR did fish community survey on Dolores on 2006.</i>	UDWR	Complete							

5.0 LITERATURE CITED

Alder, L.H., and T.A. Crowl. 1995. The role of introduced fishes in the Green River: Exotic predators in nursery habitats of the endangered Colorado squawfish. Honors Thesis, Utah State University, Logan.

Anderson, R.M. 1997. An Evaluation of Fish Community Structure and Habitat Potential for Colorado Squawfish and Razorback Sucker in the Unoccupied Reach (Palisade to Rifle) of the Colorado River, 1993-1995. Final Report of Colorado Division of Wildlife, Fort Collins, Colorado to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Andrews, E. D., et al. (1996). Highlights of a Peer review and Roundtable Discussion on the Relationship of Streamflow, Geomorphology, and Food Web Studies in Recovery of the Endangered Fishes in the Upper Colorado River Basin, Grand Junction, Colorado, February 6-7, 1995. Final Report.

Ayres Associates. 1999. Yampa River research final synthesis report. Project No. 34-0683.00. Fort Collins, CO.

BBC Research & Consulting. 1998. Yampa Valley water demand study, final report. Prepared for Recovery Program for Endangered Fishes of the Upper Colorado River, Denver.

Bestgen, K.R. 1997. Interacting effects of physical and biological processes on recruitment of Colorado squawfish. Colorado State University Doctoral Dissertation to Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Bestgen, K.R., and L.W. Crist. 2000. Response of the Green River fish community to construction and re-regulation of Flaming Gorge Dam, 1962–1996. Final Report of Colorado State University Larval Fish Laboratory to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Bestgen, K. R., J. A. Hawkins, G. C. White, K. Chrisopherson, M. Hudson, M. H. Fuller, D. C. Kitcheyan, R. Brunson, P. Badame, G. B. Haines, J. Jackson, C. D. Walford, T. A. Sorensen, and T. B. Williams. 2005. Population status of Colorado pikeminnow in the Green River Basin, Utah and Colorado. Final Report of Larval Fish Laboratory, Colorado State University to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Bestgen, K. R., K. A. Zelasko, and R. I Compton. 2006. Response of the Green River Fish Community to Changes in Flow and Temperature Regimes from Flaming Gorge Dam since 1996 based on sampling conducted from 2002 to 2004. Final Report of Larval Fish Laboratory, Colorado State University to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Birchell et al. 2002. The levee removal project: assessment of floodplain habitat restoration in the middle Green River. Final Report of Levee Removal Evaluation Group to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Bissonette, G., and T. A. Crowl. 1995. Habitat preference of juvenile bonytail (*Gila elegans*) and spatial competition with the exotic red shiner. Honors Thesis, Utah State University, Logan.

Boyer, J. M. and A. Cutler. 2004. Gunnison River/Aspinall Unit Temperature Study - Phase II. Final Report of Hydrosphere Resource Consultants and U.S. Bureau of Reclamation to Upper Colorado River Endangered Fish Recovery Program.

Brown and Caldwell. 2003. Phase 2 coordinated facilities water availability study for the endangered fishes of the Upper Colorado River. Final Report. Prepared for the Colorado Water Conservation Board. Denver.

Brunson, R.E., and K.D. Christopherson. 2005. Larval razorback sucker and bonytail survival and growth in the presence of nonnative fish in the Baeser floodplain wetland of the middle Green River. Final Report of Utah Division of Wildlife Resources, Vernal, to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Brunson, R.E., K.D. Christopherson, and T.N. Hedrick. 2007. Evaluation of nonnative fish escapement from Starvation Reservoir. Final Report of Utah Division of Wildlife Resources to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Burdick, B.D. 1994. Conceptual management plan for habitat enhancement in flooded bottomlands: Escalante State Wildlife Area, Gunnison River downstream of Delta, Colorado. U.S. Fish and Wildlife Service Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Burdick, B.D. 1994. Conceptual management plan for habitat enhancement in flooded bottomlands: gravel pit at 29-5/8 Road near Grand Junction, Colorado. U.S. Fish and Wildlife Service Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Burdick, B.D. 1995. Ichthyofaunal studies of the Gunnison River, Colorado, 1992–1994. Final Report of U.S. Fish and Wildlife Service, Grand Junction, Colorado to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Burdick, B.D. 1997. Minimum flow recommendation for passage of Colorado squawfish and razorback sucker in the 2.3-mile reach of the lower Gunnison River: Redlands Diversion Dam to the Colorado River confluence.

Burdick, B.D. 1999. Evaluation of fish passage at the Grand Valley Irrigation Company Diversion Dam on the Colorado River near Palisade, Colorado. U.S. Fish and Wildlife Service Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Burdick, B. D. 2001. Five-year evaluation of fish passage at the Redlands Diversion Dam on the Gunnison River near Grand Junction, Colorado: 1996-2000. U. S. Fish and Wildlife Service Project Number CAP-4b Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Burdick, B.D. 2002. Evaluating the use of sloped gravel-pit ponds by listed and non-listed native fishes and removal of nonnative fishes from sloped gravel-pit ponds in the upper Colorado River near Grand Junction, Colorado. U.S. Fish and Wildlife Service Project Number C-6-GP Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Burdick, B.D. 2003. Monitoring and evaluating various sizes of domestic-reared razorback sucker stocked in the Upper Colorado and Gunnison rivers: 1995–2001. Final Report of U.S. Fish and Wildlife Service, Grand Junction, Colorado to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Burdick, B.D., and L.R. Kaeding. 1990. Biological merits of fish passage as part of recovery of Colorado squawfish in the upper Colorado River basin. U.S. Fish and Wildlife Service Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Burdick, B.D., and F.K. Pfeifer. 1996. Discussion of the merits for fish passage at Hartland Diversion Dam on the Gunnison River near Delta, Colorado. U.S. Fish and Wildlife Service Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Burdick, B.D., R.S. Wydoski, and C.W. McAda. 1995. Stocking plan for razorback sucker in the Upper Colorado and Gunnison rivers. Final Report of U.S. Fish and Wildlife Service, Grand Junction, Colorado to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Cavalli, P. A. (1999). Fish community investigations in the lower Price River, 1996-1997. Utah Division of Wildlife Resources: 53. Salt Lake City.

Cavalli, P.A. 2000. An evaluation of the effects of Tusher Wash Diversion Dam on movement and survival of juvenile and subadult native fish. Utah Division of Wildlife Resources Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

- CDOW. 1998. Aquatic wildlife management plan: Yampa River basin, Colorado. Colorado Division of Wildlife, Denver, Colorado.
- CDOW. 2002. Draft Upper Colorado River Basin aquatic wildlife management plan. Colorado Division of Wildlife Draft Report, Denver, Colorado.
- CDOW. 2003a. Colorado River Basin aquatic wildlife management plan. Colorado Division of Wildlife, Denver.
- CDOW. 2003b. Gunnison River Basin aquatic wildlife management plan. Colorado Division of Wildlife, Denver.
- CDOW. 2007. Elkhead Reservoir Final Lake Management Plan. Colorado Division of Wildlife, Grand Junction, Colorado.
- CH2MHill. 1997. Duchesne River hydrology and water availability study. Report to the Upper Colorado River Endangered Fish Recovery Program. U.S. Fish and Wildlife Service. Denver.
- Chafin, D.T. 2002. Evaluation of trends in pH in the Yampa River, northwestern Colorado, 1950–2000. U.S. Geological Survey Water Resources Investigation Report 02–4038, Denver, Colorado.
- Chart, T.E., D.P. Svendsen, and L. Lentsch. 1999. Investigation of Potential Razorback Sucker (*Xyrauchen texanus*) and Colorado Pikeminnow (*Ptychocheilus lucius*): Spawning in the Lower Green River, 1994 and 1995. Final Report of Utah Division of Wildlife Resources to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.
- Christopherson, K.D., G.J. Birchell, and T. Modde. 2004. Larval razorback sucker and bonytail survival and growth in the presence of nonnative fish in the Stirrup floodplain. Final Report of Utah Division of Wildlife Resources, Salt Lake City, to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.
- Crowl, T.A., and L. Lentsch. 1996. Estimating northern pike predation on Colorado squawfish in the middle Green River: A bioenergetics approach. Project Number F-47-R Final Report of Utah State University and Utah Division of Wildlife Resources to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.
- Crowl, T.A., and S. Rivera. 2000. The importance of flow training for the successful stocking of bonytail. Chapter 4, Draft 1998 Annual Report, February 2000, Ecology Center, Department of Fisheries and Wildlife, Utah State University, Logan, Utah.
- Czapla, T.E. 1999. Genetics management plan. Upper Colorado River Endangered Recovery Program, Denver, Colorado.

Denver Water and Colorado River Water Conservation District. 2002. Comparison of water supply alternatives associated with the Upper Colorado River Endangered Fish Recovery Program. Draft report.

Douglas, M.E. 1995. Gila Taxonomy Project - Morphology. Draft Final Report of Arizona State University to Bureau of Reclamation, Salt Lake City, Utah.

Dowling, T.E. No Date. Genetic diversity of the Gila complex as determined by analysis of mitochondrial DNA. Draft Final Report of Arizona State University to Bureau of Reclamation, Salt Lake City, Utah.

Elmblad, W.R. 1997. The outcome of an experimental stocking of Colorado squawfish in Kenney Reservoir near Rangely, Colorado. Final Report of Colorado Division of Wildlife to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Elmblad, W. R. (1998). Evaluation of Stocking Channel Catfish in Kenney Reservoir, Colorado. Grand Junction, CO, Colorado Division of Wildlife: 29.

Green River Study Plan ad hoc Committee. 2007. Study plan for the implementation and evaluation of flow and temperature recommendations for endangered fishes in the Green River downstream of Flaming Gorge Dam. Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Haines, G.B., D.W. Beyers, and T. Modde. 1998. Estimation of winter survival, movement and dispersal of young Colorado squawfish in the Green River, Utah. Final Report of U.S. Fish and Wildlife Service to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Haines, G. B. and T. Modde (1996). "Evaluation of Marking Techniques to Estimate Population Size and First-Year Survival of Colorado Squawfish." North American Journal of Fisheries Management 16: 905-912.

Hamilton, S.J., K.M. Holley, K.J. Buhl, F.A. Bullard, L.K. Weston, and S.F. McDonald. 1996. The evaluation of contaminant impacts on razorback sucker held in flooded bottomland sites near Grand Junction, Colorado - 1996. Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Hamilton, S.J., K.M. Holley, K.J. Buhl, F.A. Bullard, L.K. Weston, and S.F. McDonald. 1997. The evaluation of contaminant impacts on razorback sucker held in flooded bottomland sites near Grand Junction, Colorado - 1997. Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Hamilton, S.J., K.M. Holley, K.J. Buhl, F.A. Bullard, L.K. Weston, and S.F. McDonald. 2003. Evaluation of flushing of a backwater channel: concentrations of selenium and other inorganic elements in water, sediment, invertebrates, forage fish, and Colorado pikeminnow. Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Hansen, J.D. 2004. Duchesne River coordinated reservoir operations. Bureau of Reclamation, Provo, Utah.

Hawkins, J., T. Modde, and J. Bundy. 2001. Ichthyofauna of the Little Snake River, Colorado, 1995 with notes on movements of humpback chub. Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver.

Hawkins, J.A., and T.P. Nesler. 1991. Nonnative fishes of the upper Colorado River basin: an issue paper. Final Report of Colorado State University Larval Fish Laboratory to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Hawkins, J. A., and J. O'Brien. 2001. Research plan for developing flow recommendations in the Little Snake River, Colorado and Wyoming, for endangered fishes of the Colorado River Basin. Colorado State University, Larval Fish Laboratory, final report to the Upper Colorado River Endangered Fish Recovery Program. Denver.

Hawkins, J., C. Walford, and T. Sorensen. 2005. Northern pike management studies in the Yampa River, Colorado, 1999–2002. Final Report of Colorado State University to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Hill, C. G. 2004. Dynamics of northern pike spawning and nursery habitat in the Yampa River, Colorado. Colorado State University final report of project C-31 to the Upper Colorado River Endangered Fish Recovery Program.

Holden, P.B. 1980. The relationship between flows in the Yampa River and success of rare fish populations in the Green River system. Final Report of BIO/WEST, Inc., to U.S. National Park Service, Denver, Colorado.

Hydrosphere. 1995. Reconnaissance evaluation of Yampa River diversions structures: River mile 53 to river mile 179. Hydrosphere Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Hydrosphere Resource Consultants. 1995. Yampa River Basin recommended alternative detailed feasibility study. Final Report. Boulder, CO.

Irving, D.B. 1997. A discussion of providing fish passage for adult Colorado squawfish at Taylor Draw Dam on the White River, Colorado. U.S. Fish and Wildlife Service Project Number 32 Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Irving, D. 2003. Northern Ute Indian Tribe's nonnative stocking policy. Memo to Bob Muth, Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Irving, D., B. Haines, and T. Modde. 2004. White River base flow study, Colorado and Utah, 1995–1996. U.S. Fish and Wildlife Service, Project Number 5D Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Jackson, J. A., and P. V. Badame. 2002. Centrarchid and channel catfish control in the middle and lower Green River; 1997 and 1998. Utah Division of Wildlife Resources Project #59 to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Jackson, J.A., and J.M. Hudson. 2005. Population Estimate for Humpback Chub (*Gila cypha*) in Desolation and Gray Canyons, Green River, Utah 2001-2003. Final Report of Utah Division of Wildlife Resources to Upper Colorado River Endangered Fish Recovery Program.

Irving, D. B. and B. D. Burdick. 1995. Reconnaissance inventory and prioritization of existing and potential bottomlands in the upper Colorado River basin, 1993-1994. Final report of U.S. Fish and Wildlife Service to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Irving, D., and M. Montoya. 2002. Bottle Hollow Reservoir nonnative fish control structure. FY-02 Annual Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Kidd, G. T. 1977. An investigation of endangered and threatened fish species in the upper Colorado River as related to Bureau of Reclamation projects. Final Report to U.S. Bureau of Reclamation, Northwest Fishery Research, Clifton, Colorado.

Kitcheyan, D. C., G.B. Haines, M.H. Fuller, and D.R. Beers. 2001. The presence of non-native and native fishes in the raceway and Green River canal below the Tusher Wash Diversion Dam. U.S. Fish and Wildlife Service Final Report

Kitcheyan, D.C., and M. Montagne. 2005. Movement, Migration, and Habitat Use by Colorado Pikeminnow (*Ptychocheilus lucius*) in a Regulated River below Flaming Gorge Dam, Utah. Draft Final Report of U.S. Fish and Wildlife Service to Dinosaur National Monument and Central Utah Project.

Kuhn, G. And C. A. Williams. 2004. Evaluation of streamflow losses along the Gunnison River from Whitewater downstream to the Redlands Canal Diversion Dam, near Grand Junction, Colorado, water years 1995–2003. U.S.G.S. Scientific Investigations Report 2004-5095.

LaGory, K. E.; J. W. Hayse; and D. Tomasko. 2003. Recommended priorities for geomorphology research in endangered fish habitats of the Upper Colorado River

Basin. Final Report. Upper Colorado River Endangered Fish Recovery Program Project 134. Argonne National Laboratory. Argonne, IL.

Lanigan, S.H., and H.M. Tyus. 1989. Population size and status of razorback sucker in the Green River basin, Utah and Colorado. *North American Journal of Fisheries Management* 9:68–73.

Lentsch, L.D., Y. Converse, P.D. Thompson, T.A. Crowl, and C.A. Toline. 1996a. Bonytail reintroduction plan for the upper Colorado River basin. Project Number 25 Final Report to Upper Colorado Endangered Fish Recovery Program.

Lentsch, L.D., L.M. Lubomudrov and B.G. Hoskins. 2000. The White River and endangered fish recovery: a hydrological, physical and biological synopsis. Final Report 1998, updated and edited 2000, to the Upper Colorado River Endangered Fish Recovery Program. Project No. 21. Utah Division of Wildlife Resources, Publication No. 00-37. Salt Lake City.

Lentsch, L.D., R.T. Muth, P.D. Thompson, B.G. Hoskins, and T.A. Crowl. 1996b. Options for selective control of nonnative fishes in the upper Colorado River basin. Utah Division of Wildlife Resources Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Lentsch, L.D., C.A. Toline, T.A. Crowl, and Y. Converse. 1998. Endangered fish interim management objectives for the Upper Colorado River Basin Recovery and Implementation Program. Final Report of Utah Division of Wildlife Resources to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Martinez, A.M. 2004. An evaluation of nonnative fish control treatments in ponds along the Colorado and Gunnison rivers. Project Number C-18/19 Final Draft Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Martinez, P.J. 2002. Westslope warmwater fisheries. Colorado Division of Wildlife Federal Aid Project F-325-R7, Job 1, Segment Objective 2, Grand Junction, Colorado.

Martinez, P.J., and N.P. Nibbelink. 2004. Colorado nonnative fish stocking regulation evaluation. Final Report of Colorado Division of Wildlife and Wyoming Geographic Information Science Center to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

McAda, C. W. 2000. Flow recommendations to benefit endangered fishes in the Colorado and Gunnison rivers. Draft Report to the Upper Colorado River Endangered Fish Recovery Program. Colorado River Fishery Project: 54. U.S. Fish and Wildlife Service, Grand Junction, CO.

McAda, C. W. 2003. Flow recommendations to benefit endangered fishes in the Colorado and Gunnison rivers. Final Report to the Upper Colorado River Endangered Fish Recovery Program. Colorado River Fishery Project: 54. U.S. Fish and Wildlife Service, Grand Junction, CO.

McAda, C.W., and R.J. Ryel. 1999. Distribution, relative abundance, and environmental correlates for age-0 Colorado pikeminnow and sympatric fishes in the Colorado River. Project Number 45 Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Miller, W.J., D.E. Rees, and J.A. Ptacek. 2005. Investigation of nonnative fish escapement from Elkhead Reservoir. Miller Ecological Consultants, Inc., Fort Collins, Colorado.

Modde, T., and G.B. Haines. 2005. Survival and growth of stocked razorback sucker and bonytail in multiple floodplain wetlands of the middle Green River under reset conditions. Final Report of U.S. Fish and Wildlife Service, Vernal, Utah, to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Modde, T. and C. Keleher. 2003. Flow recommendations for the Duchesne River with a synopsis of information regarding endangered fishes. Report to the Upper Colorado River Endangered Fish Recovery Program, Project No. 84-1. U.S. Fish and Wildlife Service. Vernal, Utah.

Modde, T., W. J. Miller, and R. Anderson. 1999. Determination of habitat availability, habitat use, and flow needs of endangered fishes in the Yampa River between August and October. Final Report to Upper Colorado River Endangered Fish Recovery Program. Denver.

Modde, T. and G. Smith. 1995. Flow recommendations for endangered fish in the Yampa River. Final report of the U.S. Fish and Wildlife Service to the Upper Colorado River Endangered Fish Recovery Program. Denver.

Moyle, P.B. 1976. Fish introductions in California: history and impact on native fishes. *Biological Conservation* 9:101–118.

Muth, R.T., L.W. Crist, K.E. LaGory, J.W. Hayse, K.R. Bestgen, T.P. Ryan, J.K. Lyons, R.A. Valdez. 2000. Flow and temperature recommendations for endangered fishes in the Green River downstream of Flaming Gorge Dam. Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Muth, R. T., G. B. Haines, S. M. Meismer, E. J. Wick, T. E. Chart, D. E. Snyder, and J. M. Bundy. 1998. Reproduction and early life history of razorback sucker in the Green River, Utah and Colorado, 1992–1996. Final Report of Colorado State University Larval

Fish Laboratory to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Muth, R. T. and T. P. Nesler (1989). "Marking Colorado Squawfish Embryos and Newly Hatched Larvae With Tetracycline." *The Southwestern Naturalist* 34: 431-436.

Muth, R.T., and E.J. Wick. 1996. Sampling for juvenile Colorado squawfish in the Colorado River inflow to Lake Powell, 1995 and 1996. Final Report of Colorado State University Larval Fish Laboratory to the U.S. National Parks Service, Fort Collins, Colorado.

Muth, R.T., and E.J. Wick. 1997. Sampling for larval razorback sucker in the lower Green and Colorado rivers (Canyonlands National Park) and Colorado inflow to Lake Powell (Glen Canyon Dam Recreation Area), 1993–1995. Final Report of Colorado State University Larval Fish Laboratory to the U.S. National Parks Service, Fort Collins, Colorado.

Nelson, P. 1998. Floodplain protection issue paper - Phase 1. Colorado River Recovery Program Project No. 75. Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Nesler, T.P., K. Christopherson, J.M. Hudson, C.W. McAda, F. Pfeifer, and T.E. Czapla. 2003. An integrated stocking plan for razorback sucker, bonytail, and Colorado pikeminnow for the Upper Colorado River Endangered Fish Recovery Program (Addendum to State Stocking Plans). Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Osmundson, D. B. 2001. Flow regimes for restoration and maintenance of sufficient habitat to recover endangered razorback sucker and Colorado pikeminnow in the Upper Colorado River. Colorado River Fishery Project: 63. U.S. Fish and Wildlife Service, Grand Junction, CO.

Osmundson, D.B. 2003. Removal of non-native centrarchids from upper Colorado River backwaters, 1999–2001: summary of results. U.S. Fish and Wildlife Service Project Number 89 Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Osmundson, D. B. and L. R. Kaeding. 1991. Recommendations for flows in the 15-mile reach during October-June for maintenance and enhancement of endangered fish populations in the Upper Colorado River. Colorado River Fishery Project: 82. U.S. Fish and Wildlife, Grand Junction, CO.

Roehm, G.W. 2004. Management plan for endangered fishes in the Yampa River Basin and environmental assessment. U.S. Fish and Wildlife Service, Mountain-Prairie Region. Denver.

Scheer, B.K. 1998. Walter Walker State Wildlife Area ichthyofaunal survey, 1994–1998. U.S. Fish and Wildlife Service Final Report, Grand Junction, Colorado.

Schoenherr, A.A. 1981. The role of competition in the replacement of native species by introduced species. Pages 173–203 *in* R.J. Naiman and D.L. Soltz, eds. *Fishes in North American deserts*. John Wiley and Sons. New York.

Smith, G.R., and R.G. Green. 1991. Flaming Gorge consolidated hydrology report. U.S. Fish and Wildlife Service, Division of Water Resources, Denver, Colorado.

Snyder, D.E. 2003. Electrofishing and its harmful effects on fish. Information and Technology Report USGS/BRD/ITR-2003-0002: U.S. Government Printing Office, Denver, Colorado.

Tetra Tech. 2000. Concept development report: Hartland Diversion Dam fish passage structure, Delta, Colorado. Draft Report prepared for U.S.B.R., Grand Junction.

Tetra Tech. 2000. Floodplain protection issue paper - Phase II. Colorado River Recovery Program Project No. 75. Final Draft Report of Tetra Tech ISG Engineering, Inc., to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Tetra Tech. 2005. Floodplain habitat restoration 2005 monitoring final report, Green River, Utah. Final Report of Tetra Tech, Inc., Breckenridge, Colorado, to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Trammell, M., S. Meismer, and D. Speas. 2005. Nonnative cyprinid removal in the lower Green and Colorado rivers, Utah. Utah Division of Wildlife Resources Project Number 87a Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Trammell, M., R. Valdez, H. Johnstone, and L. Jonas. 2002. Nonnative fish control in backwater habitats in the Colorado River. SWCA, Inc., Project Number 87b Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Tyus, H.M. 1984. Loss of stream passage as a factor in the decline of the endangered Colorado squawfish. Pages 138–144 *in* *Issues and technology in the management of impacted western wildlife*. Proceedings of a National Symposium. Thorne Ecological Institute Technical Publication Number 14, Boulder, Colorado.

Tyus, H.M., and C.A. Karp. 1989. Habitat use and streamflow needs of rare and endangered fishes, Yampa River, Colorado and Utah. U.S. Fish and Wildlife Service Biological Report 89:1–27.

Tyus, H. M., and I. James F. Saunders. 1996. Nonnative fishes in the upper Colorado River basin and a strategic plan for their control. Final Report of the University of Colorado Center for Limnology to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Tyus, H.M. and J.F. Saunders, III. 2001. An evaluation of the role of tributary streams for recovery of endangered fishes in the Upper Colorado River Basin, with recommendations for future actions. Draft report to the Upper Colorado River Endangered Fish Recovery Program. Center for Limnology, University of Colorado at Boulder.

Upper Colorado River Endangered Fish Recovery Program. 2002. Protocols for Colorado pikeminnow and humpback chub population estimates. Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Upper Colorado River Endangered Fish Recovery Program. 2006. Evaluation of population estimates for Colorado pikeminnow and humpback chub in the Upper Colorado River Basin. Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

U.S. Bureau of Reclamation. 2005. Operation of Flaming Gorge Dam Environmental Impact Statement. U.S. Bureau of Reclamation, Provo, Utah.

U.S. Bureau of Reclamation. 2006. Record of Decision, Operation of Flaming Gorge Dam, Final Environmental Impact Statement.

U.S. Fish and Wildlife Service. 1990a. Humpback chub recovery plan. U. S. Fish and Wildlife Service, Denver, Colorado. 43 pp.

U.S. Fish and Wildlife Service. 1990b. Bonytail chub recovery plan. U. S. Fish and Wildlife Service, Denver, Colorado.

U.S. Fish and Wildlife Service. 1991. Colorado squawfish recovery plan. U. S. Fish and Wildlife Service, Denver, Colorado.

U.S. Fish and Wildlife Service. 1992. Final biological opinion on operation of Flaming Gorge Dam. U.S. Fish and Wildlife Service, Mountain-Prairie Region. Denver.

U.S. Fish and Wildlife Service. 1995. Final biological opinion – round II water sale from Ruedi Reservoir. U.S. Fish and Wildlife Service, Mountain-Prairie Region. Denver.

U.S. Fish and Wildlife Service. 1996a. Procedures for stocking nonnative fish species in the Upper Colorado River Basin. Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado. Also Finding of no significant impact *in* 1996 Stocking Procedures.

U.S. Fish and Wildlife Service. 1996b. Final Environmental Assessment for Procedures for stocking nonnative fish species in the Upper Colorado River Basin. U.S. Fish and Wildlife Service, Ecological Services, Grand Junction, Colorado.

U.S. Fish and Wildlife Service. 1998. Razorback sucker recovery plan. U. S. Fish and Wildlife Service, Denver, Colorado.

U.S. Fish and Wildlife Service. 1999a. Final amendment to the biological opinion – round II water sale from Ruedi Reservoir. U.S. Fish and Wildlife Service, Mountain-Prairie Region. Denver.

U.S. Fish and Wildlife Service. 1999b. Final programmatic biological opinion for Bureau of Reclamation's operations and depletions, other depletions, and funding and implementation of Recovery Program actions in the Upper Colorado River above the confluence with the Gunnison River, December 1999. Mountain-Prairie Region, Denver.

U.S. Fish and Wildlife Service. 2001. Ute Tribal Elder fishing pond construction and Bottle Hollow Reservoir fish screen installation. Draft Environmental Assessment prepared for the Uintah and Ouray Indian Reservation Ute Tribe Fish and Wildlife Department, Fort Duchesne, Utah.

U.S. Fish and Wildlife Service. 2002a. Humpback chub (*Gila cypha*) recovery goals: amendment and supplement to the Humpback Chub Recovery Plan. U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.

U.S. Fish and Wildlife Service. 2002b. Bonytail (*Gila elegans*) recovery goals: amendment and supplement to the Bonytail Chub Recovery Plan. U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.

U.S. Fish and Wildlife Service. 2002c. Colorado pikeminnow (*Ptychocheilus lucius*) recovery goals: amendment and supplement to the Colorado Squawfish Recovery Plan. U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.

U.S. Fish and Wildlife Service. 2002d. Razorback sucker (*Xyrauchen texanus*) recovery goals: amendment and supplement to the Razorback Sucker Recovery Plan. U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.

Utah Division of Water Rights. 1994. Policy regarding applications to appropriate water and change applications which divert water from the Green River between Flaming Gorge Dam, downstream to the Duchesne River. Policy adopted on November 30, 1994, State Water Engineer, Robert L. Morgan.

Valdez, R.A., W.J. Masslich, and A. Wasowicz. 1991. Dolores River native fish habitat suitability study: Annual Summary Report, 1990. BIO/WEST Inc., Logan, Utah.

Valdez, R.A., and P. Nelson. 2004a. Green River Subbasin Floodplain Management Plan. Final Report of R.A. Valdez and Associates, Inc., to Upper Colorado Endangered Fish Recovery Program.

Valdez, R.A., and P. Nelson. 2004b. Colorado River Subbasin Floodplain Management Plan. Final Report of R.A. Valdez and Associates, Inc., to Upper Colorado Endangered Fish Recovery Program.

Vaske, J. J. (1995). Knowledge, Beliefs, and Attitudes Toward the Endangered Fish of the Upper Colorado River Basin. Ft. Collins, Colorado State University: 91.

Williamson, J.H., D.C. Morizot, and G.J. Carmichael. 1999. Biochemical genetics of endangered Colorado pikeminnow from the Green, Yampa, Colorado, and San Juan rivers. Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Williamson, J.H., and R.S. Wydoski. 1994. Genetic Management Guidelines. Upper Colorado River Endangered Recovery Program, Denver, Colorado.

Wydoski, R. S. 1994. Coordinated Hatchery Facility Plan: Need for Captive-Reared Endangered Fish and Propagation Facilities. Denver, CO, US Fish and Wildlife Service.

Wydoski, R.S. 1995. Genetics management plan. Upper Colorado River Endangered Recovery Program, Denver, Colorado.

APPENDIX: CRITICAL HABITAT ANALYSIS
September 8, 1994

BACKGROUND

The final rule determining critical habitat for the four endangered fishes was published in the Federal Register on March 21, 1994, and the final designation became effective on April 20, 1994. As stated in the Section 7 Agreement and in the RIPRAP, the Recovery Program is intended to serve as the reasonable and prudent alternative to avoid the likely destruction or adverse modification of critical habitat, as well as to avoid the likelihood of jeopardy to the continued existence of the endangered fishes resulting from depletion impacts of new projects and all existing or past impacts related to historic water projects with the exception of the discharge by historic projects of pollutants such as trace elements, heavy metals, and pesticides. Once critical habitat was designated, the Service reviewed the RIPRAP, and in coordination with the Recovery Program's Management Committee, developed modifications to fulfill this intent.

The Service's review concluded that many of the actions in the existing RIPRAP would not only contribute to allowing the Recovery Program to continue to serve as the reasonable and prudent alternative to avoid the likelihood of jeopardy to the continued existence of the endangered fishes, but also would avoid the likely destruction or adverse modification of critical habitat for the endangered fishes. Specifically, the RIPRAP already included several of the following kinds of habitat-related actions for each subbasin (except the Dolores River): instream-flow acquisition, legal protection, and delivery from modified reservoir operations; fish passage restoration; and flooded bottomland restoration. Thus, the critical habitat modifications to the RIPRAP were not extensive. They were primarily intended to provide further definition to recovery actions already in the RIPRAP and to provide increased certainty that the Recovery Program can continue to serve as the reasonable and prudent alternative for projects subject to Section 7 consultations. Since many historic projects will be required to reinitiate Section 7 consultation with the Service due to the critical habitat designation, the Service encouraged Recovery Program participants to complete these RIPRAP actions as quickly as possible to facilitate fish recovery.

Destruction or adverse modification of critical habitat is defined at 50 CFR 402.02 as a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Section 7 consultation is initiated by a Federal agency when its action may affect critical habitat by impacting any of the primary constituent elements or reducing the potential of critical habitat to develop those elements. The primary constituent elements defined in the final rule as necessary for survival and recovery of the four Colorado River endangered fishes include, but are not limited to, 1) water (quantity and quality), 2) physical habitat (areas inhabited or potentially habitable, including river channel, bottom lands, side channels, secondary channels, oxbows, backwaters, and other areas); and 3) biological environment (food

supply, predation, and competition). The Service reviewed the RIPRAP to determine if it addressed these constituent elements and to identify existing and new actions that will contribute to the RIPRAP serving as a reasonable and prudent alternative to the likely destruction or adverse modification of critical habitat. Then, in coordination with the Management Committee, the Service recommended additions needed to address all of the constituent elements, to better define the expected result of the recovery action, and to increase the certainty that the constituent elements of critical habitat would be protected.

MODIFICATIONS

1. Instream Flow Protection: Modifications were made under this recovery element to protect the water quantity constituent element.
 - a. Adjudication of the instream-flow appropriations to be filed by the Colorado Water Conservation Board (on the Yampa, Little Snake, White, Colorado, and Gunnison rivers) was added since these instream-flow appropriation filings will not be legally protected until they are adjudicated in water court. Adjudication may take up to three years after filing, depending on the amount of litigation.
 - b. To provide more immediate habitat improvements in the Grand Valley area via instream flows, a modification was made under water acquisition for the 15-mile reach to enter into an interim agreement for uncommitted water remaining in Ruedi Reservoir after Round II water sales are completed or commitments to contracts are agreed to. If flow recommendations for the 15-mile reach are met from other sources during this interim agreement (thereby causing the additional water from Ruedi to exceed the flow recommendations), Ruedi would be relieved of this additional obligation. At the end of the interim agreement (whether the flow recommendations have been met or not), Reclamation may pursue additional water sales; however, these sales would be subject to review under Section 7 of the Endangered Species Act.
2. Habitat Restoration: Modifications were made under this recovery element to protect the physical habitat constituent element.
 - a. Access to historically inundated floodplain habitats is believed to be very important to recovery of the razorback sucker and Colorado pikeminnow. Although the Recovery Program has begun a program to evaluate and restore flooded bottomland areas, the fish's riverine habitat has been and continues to be so channelized by levees, dikes, rip-rap, and tamarisk, that broader floodplain restoration and protection (e.g., through mechanisms such as landowner incentives, conservation easements, and perhaps zoning) is needed. Recovery Program participants were not sure exactly

how such mechanisms might be implemented, so an issue paper on restoration and protection of the floodplain has been developed. The issue paper first addressed what restoration and protection measures are needed and then how they might be accomplished. After completion of the issue paper, viable options were identified and a restoration strategy developed for selected geographic areas (e.g. Grand Valley and Ashley Valley). Floodplain restoration activities may be implemented by the Recovery Program or by Recovery Program participants individually. Responsibilities of other agencies were identified in the issue paper, and actions were implemented consistent with authorities outside the Recovery Program.

- b. The Recovery Program has been evaluating agricultural diversion structures in the Yampa River and has discovered that although not all of these structures impede Colorado pikeminnow passage, annual bulldozing in critical habitat in the river required to maintain many of these structures may destroy or adversely modify fish habitat. Upgrading these structures so that they are more secure would eliminate the need for annual bulldozing and consequent adverse modification of critical habitat.
 - c. Fish passage structures are planned for a number of diversion dams in the Upper Basin in the current RIPRAP. However, without screens or "entrainment preclusion structures," adult fish, especially razorback sucker, may go into the diversion canals. To keep fish in the more secure river habitat, a modification was made to include an entrainment preclusion structure on the proposed passage structure at the Grand Valley Project diversion (Roller Dam). Also, the need for an entrainment preclusion structure at Redlands diversion dam will be evaluated after construction of the fish ladder there.
3. Reduction of Negative Impacts of Nonnative Fishes and Sportfish Management Activities: Modifications were made under this recovery element to protect the constituent element of the fishes biological environment.
- a. Competition with and predation by introduced species is widely assumed to have played a role in the decline of the endangered fishes. The Recovery Program has been and continues to assess options to reduce negative impacts of problematic nonnative species, sportfish management, and angling mortality. Although we cannot yet fully predict the results of implementing some of these management options, we need to begin to implement the most viable ones. Therefore, actions have been added to implement (in cooperation with the States) viable measures which will decrease negative impacts of certain nonnative fishes, sportfish management, and angling mortality. Specific actions were added to selectively remove northern pike from the Yampa River and northern pike and centrarchids from the Gunnison River and possibly Paonia Reservoir.