Central Utah Project Completion Program

Chapter 4

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UTAH RECLAMATION
MITIGATION
AND CONSERVATION
COMMISSION

Chapter 4

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Attachment A

Central Utah Project Completion Program

Attachment A

October 2004

UTAH RECLAMATION
MITIGATION
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COMMISSION

ATTACHMENT A

1980 STREAM FLOW AGREEMENT

AGREEMENT

THIS AGREEMENT is made and entered into in Salt Lake City, Utah, this 27 day of ~~January~~ Feb., 1980, by and among the UNITED STATES OF AMERICA, acting through the Secretary of Interior, and pursuant to Federal Reclamation laws, and the Fish and Wildlife Coordination Act, hereinafter called "United States", STATE OF UTAH, by and through its Governor, hereinafter called "Utah", and CENTRAL UTAH WATER CONSERVANCY DISTRICT, a water conservancy district organized and existing pursuant to the laws of the State of Utah, hereinafter called "District",

RECITALS:

The United States and the District have heretofore entered into a Repayment Contract (Contract No. 14-06-400-4286), dated December 28, 1965. This contract acknowledged that Congress, on April 11, 1956 (70 Stat. 105) authorized the construction, operation and maintenance of the Initial Phase of the Central Utah Project. This is a participating project of the Colorado River Storage Project. The Bonneville Unit, the subject of this agreement, is a part thereof. Said Repayment Contract describes the facilities to be constructed, the project water supply to be developed, and contains provisions for the repayment by the District of the reimbursable costs of constructing the Bonneville Unit.

The Bonneville Unit has a number of features, specifically including the Strawberry Aqueduct and Collection system, the enlarged Strawberry Reservoir, a transbasin diversion of waters from the Colorado River Basin to the Bonneville and Sevier Basins, and the construction of other features in the Bonneville and Sevier Basins. The Strawberry Aqueduct and Collection system is a series of reservoirs, aqueducts and tunnels some 37 miles in total length, which intercept a number of streams flowing on national forest lands of the Uinta Mountains, and into the Duchesne River. The water thus intercepted will be taken through the Strawberry Aqueduct and Collection system to the enlarged Strawberry Reservoir. The Soldier Creek Dam, which was designed

to enlarge the Strawberry Reservoir, has been completed. Some features of the Strawberry Aqueduct and Collection system are completed, and some water is being intercepted thereby, and is currently being stored.

The Bonneville Unit, as described in the above noted Repayment Contract, contemplates the average annual development of 313,000 acre-feet of water for consumptive and other uses. Of this total, the present project plan contemplates the transbasin diversion of 136,600 acre-feet of water through what is known as the Syar Tunnel and Diamond Fork Power System, to a reregulating reservoir known as the Hayes Dam and Reservoir, and thence the water will be utilized in the Bonneville and Sevier Basins for municipal, industrial, irrigation and other uses.

In the planning, and through the ensuing construction of the Bonneville Unit, there has been a continuing concern for the preservation of minimum stream flows, to maintain fisheries in the streams in the Uintah Basin on which some of the project works are being constructed.

On April 12, 1965, a resolution dealing with minimum stream flows and water for fisheries was adopted and signed by the Utah State Department of Fish & Game and the Utah Water & Power Board, with the Governor of Utah concurring therein. This resolution requested the United States Bureau of Reclamation to amend the Definite Plan Report for the Bonneville Unit of the Central Utah Project, to incorporate provisions of the resolution relating to certain fish, wildlife and recreation proposals. The parties hereto acknowledge that they are familiar with the resolution and its contents, and a copy thereof is attached hereto and incorporated herein by reference. Par. 4 of that resolution specifically provided:

> 4. That 6,500 acre-feet of water be made available annually for fishery releases as provided below:
>
> > a. That flows of Rock Creek as measured at the north boundary of the Uintah-Ouray Indian Reservation be not less than 25 c.f.s. To accomplish this minimum flow, spills at the Upper Stillwater Dam, bypasses for downstream irrigation and natural inflow, will be augmented by not more than 3,500 acre-feet of stored water annually.

b. That 3,000 acre-feet of stored water plus any unused portion of the 3,500 acre-foot storage allocation for Rock Creek be available annually for release to the Strawberry River below Soldier Creek Dam.

Construction on the Bonneville Unit facilities started May 31, 1967, and although the project has encountered many delays, construction has continued. In connection with that construction, the then Bureau of Reclamation (now the Water and Power Resources Service), has applied to the Corps of Army Engineers for what are commonly referred to as Dredge and Fill Permits, under Sec. 404 of the Federal Water Pollution Control Act, (23 U.S.C.A. 1344). Protests have been filed by a number of state and federal agencies to the issuance of those permits, primarily on the grounds that the provision made for minimum stream flows in the April 12, 1965, resolution, is inadequate.

The parties to this agreement, and those concurring herein, have reexamined the minimum stream flow and fishery problem, in an effort to arrive at a mutually acceptable solution thereof. It is mutually acknowledged that it is desirable and necessary that more water be made available for these purposes than the 6,500 acre-feet provided for in the resolution of April 12, 1965, and it is also mutually acknowledged that the project itself must maintain an adequate cost-benefit ratio, and that reductions in the annual transbasin diversion of 136,600 acre-feet of water will adversely affect the power generating facilities, and reduce the supply of water available for municipal, industrial and irrigation uses in the Bonneville and Sevier Basins.

The parties jointly agree to acquire additional water through all available means, including, but not limited to, the development through appropriation and construction; conservation through such things as additional canal linings, reduction of evaporation losses and similar conservation practices, (and an appropriation where possible of the water thus saved); through cloud seeding; and through the purchase of existing rights, so that, to the extent possible, the 313,000 acre-feet of water developed by the Bonneville Unit will not be impaired, and yet additional amounts of water above the 6,500 acre-feet can be made available for minimum stream flows and fisheries.

It is agreed and acknowledged that the 6,500 acre-feet committed by the April 12, 1965, resolution will remain available. It is intended that the District will provide 15,800 acre-feet, either from the project (thus to that extent reducing the 313,000 acre-foot project water supply) and/or from conservation and purchase, etc., as set forth above. The other parties hereto, and the agencies concurring herein, will endeavor to acquire at least an additional 22,100 acre-feet. Water acquired solely by or for the Utah Division of Wildlife Resources and/or the U.S. Fish and Wildlife Service for instream flows shall not be used as a credit to offset the 15,800 acre-feet provided by the District. This additional water is intended to go beyond the initial 22,300 acre-feet, in order to achieve the goal of 44,400 acre-feet for instream flows. The District will cooperate in such acquisition, but without expense to the District.

The parties also mutually acknowledge that many of the project works are not yet completed, and, the transbasin diversion of 136,600 acre-feet is not possible today, and will not be possible for several years. The parties also acknowledge that although the Soldier Creek Dam is complete, and water can now be stored in the enlarged Strawberry Reservoir, there is a degree of flexibility in the time for filling the reservoir. Upper Stillwater and Jordanelle Reservoirs have not yet been constructed. Operating criteria will, as a part of this agreement, be developed, so that as facilities become available, (a) existing demands for project water can be met; (b) up to 44,400 acre-feet of water can be made available for minimum stream flow and fishery purposes; and (c) water can be placed in storage in the Strawberry Reservoir, and the other reservoirs as they are constructed under these filling criteria at an annual rate, which will reasonably assure that the reservoirs will be full when project facilities are suffiently completed to implement project deliveries to meet project needs, estimated to be about 1994.

NOW, THEREFORE, it is mutually agreed as follows:

1. The parties hereto mutually agree that operating and reservoir filling criteria will be developed, so that between the

date hereof and the date the Strawberry Aqueduct and Collection System, and transbasin diversion facilities are completed, the water supply can accomplish the following:

(a) As features of the project are completed, making it possible to supply water to meet demands, water can be sold and delivered by the District for all contemplated project uses, as they develop, and in accordance with the agreement.

(b) Water can be placed in storage in the project reservoirs on a schedule which will reasonably assure that the project reservoirs (Strawberry, Jordanelle, and the Upper Stillwater Reservoirs) will be full by the time the transmountain diversion facilities are completed and available for use.

(c) Water will be released or bypassed to provide 44,400 acre-feet annually for fisheries, so long as the filling of the reservoirs is in accord with the filling schedule and current project water use demands are being met.

(d) A minimum of 22,300 acre-feet (which includes the 6,500 acre-feet set aside by the resolution of April 12, 1965), will be released or bypassed for fisheries, in the event filling of the reservoir is behind the filling schedule, or current project water use demands are not being met.

2. It is agreed that the water provided hereby and released hereunder will stay in the streams above the confluence of the Strawberry and Duchesne Rivers, to maintain minimum stream flows. However, at any given time water released or bypassed from the reservoir may fulfill multiple roles of project use, meeting prior rights, and of providing minimum stream flows between the point of release and the point of rediversion. Other water may be released only for maintaining stream flow. To the extent possible, the agreed minimum quantities provided for herein will be available, on an annual basis, to maintain minimum flows. It is mutually acknowledged that the minimum and the desired stream flows are to be reflected in cubic feet per second. At any given

point on each stream, the water available may consist of natural flows, water released or bypassed for project use, or to provide water for prior rights, and water released or bypassed for minimum stream flows, as provided for herein. The objective is to provide enough stream flow to retain 50% of the historic adult trout habitat in Strawberry River, Rock Creek, West Fork Duchesne River and Currant Creek, as shown in the report of May 1979 entitled "Summary of Analyses of Alternate Stream Flows." This report was prepared by representatives of Utah Division of Wildlife Resources, U. S. Fish and Wildlife Service, U. S. Forest Service and the Water and Power Resources Service. Gauging stations will be established immediately below each reservoir or diversion facility, and at appropriate downstream points. Schedules will be developed, showing the desired and minimum flows at the various gauging stations, and the 22,300 acre-feet provided hereby will be utilized to maintain the minimums, and any additional water acquired within the 44,400 acre-feet total will be utilized to attain the more desirable levels to meet 50% of the historic stream habitat. Below the confluence of the Duchesne and Strawberry Rivers, it is agreed that water released for augmenting stream flows may be rediverted by the District and used for such uses as are consistent with the water rights comprising the same. Thus, water acquired by the District, or released as project water by the District to comprise the 15,800 acre-feet provided for herein, may be rediverted below this point. Thus, project water, or other acquired water, may be released or bypassed from project works, which may serve the dual role of (a) stream maintenance, and (b) project and other uses, and yet may be be credited against said 15,800 acre-feet allocation, if the point of rediversion is downstream from said point of confluence.

3. During the interim period before construction is completed, the following specific conditions shall govern project operation, and shall be a part of the operation and reservoir filling criteria, to be developed in accordance with par. 1 hereof:

(a) The District will insert in all long-term contracts for the sale and delivery of Bonneville Unit water, specific provisions, which will enable it, notwithstanding said sales contracts, to assure that it can supply 15,800 acre-feet of water for maintenance of minimum stream flows and fisheries. This 15,800 acre-feet, when added to the committment of 6,500 acre-feet, will assure 22,300 acre-feet of water for such purposes. Such provisions shall be contained in all future water allotment and sales contracts (allotting or selling any part of the 313,000 acre-feet of project water supply). No firm contract will be made which will have the effect of preventing the District and the United States from providing the agreed 15,800 acre-feet of project water, if needed in accordance herewith.

(b) Operation of project facilities during the interim period, including the bypass of water and deliveries of project water by the Water and Power Resources Service, in cooperation with the District, shall take into account all stream flow forecasting information capabilities available in keeping with the advanced "state of the art".

(c) The Water and Power Resources Service shall utilize information provided by the Utah Division of Water Resources and Water Rights, and shall be directed by the U. S. Fish and Wildlife Service, in cooperation with the Utah Division of Wildlife Resources and U. S. Forest Serive to provide optimum distribution of available releases.

4. When the Strawberry Aqueduct and Collection system and the transbasin diversion facilities are completed, so that the project water supply can be used, water will be provided as follows:

(a) The 6,500 acre-feet committed by the April 12, 1965 resolution will remain available for the uses specified in that resolution.

(b) The District will provide, at its expense, an additional 15,800 acre-feet of water annually for minimum stream flows. To obtain such additional water, the District

will first endeavor to develop or acquire water through conservation measures, construction of facilities, appropriation, purchase of existing water rights, or other lawful means, or any combination thereof. Any part of said 15,800 acre-feet of water that is not obtained by the District through the measures mentioned above will be provided from the project water supply.

(c) Additional quantities of water, up to at least 22,100 acre-feet (making a total of 44,400 acre-feet) will be provided, so far as possible, through additional conservation, construction and appropriation, or through acquisition, purchase or otherwise, by the parties to this agreement other than the District. The District will cooperate in such additional acquisition, but without expense to the District.

5. The parties, in seeking water supplies for instream flows, will give due consideration to the impact of various alternatives on existing water rights, and will work toward viable solutions - including such items as earmarking stored water for downstream releases, and the seeking of legislative action, if necessary, to guarantee against preemption of such instream waters by present or potential downstream water rights.

6. The United States, through the Water & Power Resources Service, shall immediately complete all applications needed for 404 Permits for all features of the Strawberry Aqueduct and Collection system. Those applications will be filed, and the parties hereto and all agencies who have concurred herein, will cooperate in securing the issuance of all such 404 Permits. The parties hereto and those concurring herein further agree that they will not raise the minimum stream flow problems related to the Strawberry Aqueduct and Collection System, as a basis for opposing any other feature of the Bonneville Unit of the project. All protests heretofore made to the issuance of any pending 404 Permit, by any of the parties hereto or concurring herein, will be withdrawn, and the parties hereto and the parties concurring herein will recommend that the Corps of Army Engineers issue all

of the 404 Permits needed for all features of the Strawberry Aqueduct and Collection system. Such joint effort for issuance of such permits shall not await the processing of all of them, but the parties shall seek the approval of such permits as are now pending, so that individually and collectively these permits can be obtained as rapidly as possible, since it is mutually acknowledged that the absence of said permits is delaying the construction of Bonneville Unit facilities.

7. The District may provide the agreed 15,800 acre-feet, by utilizing its own funds to purchase existing rights and move them to the project reservoirs by change application. Once said water has been bypassed for minimum stream flow purposes through the agreed critical stretches of the streams, it will remain the District's water, and may be rediverted for any proper use below the confluence of the Duchesne and Strawberry Rivers. The District may also discharge its obligation in conjunction with the United States through new construction, using reimbursable (Sec. 5) funds. Under such an arrangement the United States will do the necessary development and construction work, and the District will pay the required reimbursable costs. In that event, the water will be project water, belonging to the United States. If the District discharges its obligation to provide water for minimum stream flows, in whole or in part, with project water from the original 313,000 acre-feet, the project facilities will necessarily be used to provide the water, and the costs allocated to the water will be reallocated by the United States in accordance with Federal Reclamation Law. In this regard it is recognized that project water developed for minimum stream flows and fisheries is nonreimbursable, and the District shall not be required to reimburse the United States for moneys expended therefor. All other parties hereto, and those concurring herein will cooperate, without expense to them, in the acquisition by the District of the water.

8. Beyond the acquisition of the 22,300 acre-feet of water, (comprised of the 15,800 acre-feet noted above and the 6,500 acre-feet provided under the April 12, 1965 resolution), all of

the parties hereto will cooperate with each other in acquiring additional water, with the goal and intent of acquiring a minimum of 44,400 acre feet. The District shall not be required to share in the cost thereof. If the United States participates therein, it will be with non-reimbursable funds. Water made available by conservation practices may have to be appropriated in accordance with State law under a savings type application, and where necessary and proper, this will be done.

9. The parties will cooperate with each other in getting any water hereafter developed or purchased or made available by conservation practices transferred into the project reservoirs by change or exchange applications, or otherwise, so that the water will be in storage and available on call to meet minimum stream flows and fishery needs. The 6,500 acre-feet reserved under the resolution of April 12, 1965, is to be delivered through the project works. To the extent, if at all, the 15,800 acre-feet additional minimum must come from project water, it too will be in the project reservoirs and on call. The Utah Division of Wildlife Resources and U. S. Fish and Wildlife Service, in consultation with the U. S. Forest Service and the Utah Division of Water Resources, shall jointly have the ultimate determination as to where the water reserved for stream flows and fisheries will be utilized. Some streams may be better habitats than others, some may have better public access than others, and the Utah Division of Wildlife Resources and Fish & Wildlife Services are to have broad discretion as to the releases, so that they can optimize the benefits therefrom.

10. Those federal and state agencies which have responsibility for fishery resources will make a diligent examination of things which may be done to improve the streams themselves, so that the maximum benefits can be realized for the fishery habitats from the water to be released, as provided for herein. All of the parties to this agreement, and those concurring herein, will cooperate in the completion of the Bonneville Unit of the Central Utah Project, and will seek to avoid delays and impediments to the completion of the project.

11. In supplying the 15,800 acre-feet of water (whether from purchase of existing rights, new appropriations, salvage of water, project releases, or some combination thereof) it is acknowledged that the District intends to make said water available for minimum stream flows and fisheries, but that below the confluence of the Duchesne and Strawberry Rivers, the District intends to provide uses and points of rediversion, so that the District can endeavor to recoup the cost of acquisition. Efforts will be made, as aforesaid, to move any additionally acquired water into the project reservoirs, where it can be released to the streams from the reservoir and/or to other streams by exchange, to provide the needed minimum flows. Once these waters are so changed and committed, the ability on the part of the District to move that water to other streams is limited, and the District's obligation in regard to said 15,800 acre-feet shall not be enlarged by the fishery interests shifting emphasis to some other stream where such purchased water may not thereafter be moved. However, the District will endeavor to develop and acquire such additional water at such places and in such amounts so that releases for minimum stream flows will be available for a reasonable allocation, division or apportionment to augment critical stretches of Rock Creek, Currant Creek, Strawberry and West Fork of the Duchesne River. It is contemplated that uses for such released water will develop below the points of confluence of the Strawberry and Duchesne Rivers, and that at least part of the water released to meet the fishery obligations will occur at times when the water can be rediverted and reused under the water rights for other district and project uses, and if the water stays in the stream from the point of release or bypass to a point below said confluence, credit shall be given therefor, even though the water thus serves a dual purpose and is to be rediverted and reused.

12. The parties will annually consult with each other in regard to all of the problems related to the administration of the project, to maximize the benefits through coordinated efforts.

13. Water reserved for maintaining minimum stream flows will be administered on a water year basis, and if any of such reserved water is not utilized by October 1 (the end of the water year) the water will simply become a part of the common project pool. The agreed minimum of 22,300 acre-feet will be available, and may be called upon, both to maintain the agreed minimum flows, and to attain, to the extent possible, the desired flows.

14. Where there are reservoirs located on the streams, water can be released from the reservoir or bypassed through the facilities, for the purpose of augmenting stream flows. Also, the aqueduct can bring water from Upper Stillwater, and releases can be made therefrom into some of the streams. However, on some of the streams, such as the West Fork of the Duchesne River, the aqueduct is substantially below the stream bed, and it may not be economically feasible to release water therefrom. Facilities will be constructed, so that the natural flow can be bypassed, but the obligation to augment the natural flow from reservoir releases will be dependent upon facilities for so doing, and there is no commitment on the part of the District to construct or pay for special facilities for making releases, where those facilities are not presently planned in the project.

15. To the extent required by Utah law, appropriate filings will be made with the Utah Division of Water Rights for any proposed appropriation, transfer, change or exchange for the use of water.

16. It is expressly understood by the parties to this agreement that any activity carried out by the United States, pursuant to this agreement that may require appropriation of money by the Congress of the United States or the allotment of funds shall be contingent upon such appropriation or allotment being made. No liability shall accrue to the United States in case such funds are not appropriated or allotted.

IN WITNESS WHEREOF, the parties hereto have executed this

agreement the day and year first above written.

UNITED STATES OF AMERICA,

By _____
Its

STATE OF UTAH

By _____
Governor

CENTRAL UTAH WATER CONSERVANCY DISTRICT

Attest:

_____
Secretary

By _____
Its President

The following concur in and agree to the foregoing.

UTAH DIVISION OF WATER RESOURCES

By _____

UTAH DEPARTMENT OF NATURAL RESOURCES

By _____

UTAH DIVISION OF WILDLIFE RESOURCES

By _____

U. S. FISH & WILDLIFE RESOURCES

By _____

U. S. FOREST SERVICE

By _____

Central Utah Project Completion Program

Attachment B

October 2004

UTAH RECLAMATION
MITIGATION
AND CONSERVATION
COMMISSION

Attachment B

ATTACHMENT B

1987 WILDLIFE MITIGATION PLAN

Terrestrial January 1987

WILDLIFE MITIGATION PLAN
FOR
STRAWBERRY COLLECTION SYSTEM, MUNICIPAL AND INDUSTRIAL SYSTEM

AND DIAMOND FORK POWER SYSTEM, BONNEVILLE UNIT,

CENTRAL UTAH PROJECT

We, the undersigned, agree that the items present herein constitute adequate and full compensation for impacts to terrestrial wildlife resources from construction and operation of the Strawberry Collection System, Municipal and Industrial System, the Diamond Fork Power System, Bonneville Unit, Central Utah Project.

We also agree that the plan should be fully accomplished on a schedule consistent with project construction and operation.

A. Plan Components

1. Remaining Emory Smith Property - 9,461 acres. Requires specialized management. Presently owned by the United States under the administration of the Bureau of Reclamation. Consistent with the Inter-Agency Agreement concerning the Management of Currant Creek Mountain lands, dated October 31, 1986, title to this property would be conveyed to the U.S. Forest Service. Should this conveyance default as per the October 31, 1986 agreement, title would be conveyed to the Utah Division of Wildlife Resources. Funding for developments to be obtained by the Bureau of Reclamation.

2. Deer Creek Reservoir Property - 2,000 acres. Requires habitat improvement and specialized management. Fifteen hundred acres owned by the United States under the administration of the Bureau of Reclamation. Five hundred acres owned by Utah Division of Wildlife Resource. Title to the United States lands will be conveyed to the Utah Division of Wildlife Resources. Funding for habitat improvement to be obtained by the Bureau of Reclamation.

3. Moon Property - 945 acres. Requires specialized management. Presently owned by the United States under the administration of the Bureau of Reclamation. Title will be conveyed to the Utah Division of Wildlife Resources.

4. Camelot Property - 2,832 acres. Requires specialized management. Presently privately owned. Will be purchased by the Division of Wildlife Resources. Funds expended will be reimbursed by the Bureau of Reclamation. Lands to be managed by the Utah Division of Wildlife Resources.

5. Coal Mine Hollow Property - 1,212 acres. Requires specialized management. Presently all but about 80 acres in private ownership. Purchase by Reclamation initiated in fiscal year 1985. Additional purchases scheduled for fiscal year 1986 and fiscal year 1987. Title to be conveyed to the U.S. Forest Service.

6. Redford Property - 617 acres. Requires habitat imorovement and specialized management. Presently owned by the United States under the administration of the U.S. Forest Service. Funding for habitat improvement to be obtained by the Bureau of Reclamation. Allowance for mitigation contingent on acquistion of Coal Mine Hollow Property.

7. Diamond Property - 591 acres. Requires habitat improvement and specialized management. Presently owned by the United States under the administration of the Bureau of Reclamation. Title to be conveyed to the U.S. Forest Service. Funding for habitat improvement to be obtained by the Bureau of Reclamation.

8. Jordanelle Property - 720 acres. Location outside the management boundary of Jordanelle Reservoir. Requires specialized management. Presently privately owned. Title to be conveyed to the Utah Division of Wildlife Resources.

9. Riparian Compensation and Development - 630 acres. Specialized management and protection of 165 acres of riparian habitat located within the Moon Property, (Number 3), and 237 acres located within the Camelot Property, (Number 4). At Jordanelle Reservoir, approximately 228 acres of riparian habitat will be developed. The 228 acres around Jordanelle Reservoir are presently privately owned. Title to be retained by the Bureau of Reclamation. A management agreement with the State of Utah will be implemented.

Items 1 through 9 are further described in attached Exhibit 1.

B. Agency Commitments

1. Bureau of Reclamation: (a) Program sufficient funding in a timely manner to acquire the privately-owned lands and facilitate required habitat improvements necessary to implement the plan; (b) Program sufficient funding in a timely manner to reimburse the Utah Division of Wildlife Resources for its purchase of the Camelot Property; (c) Convey titles of acquired properties to the Utah Division of Wildlife Resources or the U.S. Forest Service in accordance with plans developed by these agencies; (d) Prepare and implement the Riparian Habitat Development Plan within the management boundary around Jordanelle Reservoir; (e) Complete requirements for compliance with National Environmental Policy Act.

2. U.S. Forest Service: (a) Prepare and implement habitat improvement and/or management plans for mitigation lands under its jurisdiction; (b) Submit management plans to the Bureau of Reclamation and U.S. Fish and Wildlife Service prior to receiving title to properties, or funding for habitat improvements; and (c) Provide for sufficient operation and maintenance to maintain the wildlife values attributable to each mitigation property.

3. Utah Division of Wildlife Resources: (a) Purchase the Camelot Property; (b) Prepare and implement habitat and/or management plans for mitigation lands under its jurisdiction; (c) Submit management plans to the Bureau of Reclamation and the U.S. Fish and Wildlife Service prior to receiving reimbursement funding for the Camelot Property, title to properties, or funding for habitat improvements; and (d) Provide for sufficient operation and maintenance to maintain the wildlife values attributable to each mitigation property.

4. U.S. Fish and Wildlife Service: (a) Provides guidance and assurance that the mitigation plan, if fully implemented, constitutes compensation for terrestrial wildlife losses associated with Bonneville Unit construction excluding the I&D System. (b) Participate with the Bureau of Reclamation in approving the required habitat management plans; and (c) Provide the leadership and coordination needed to execute this agreement.

5. All of the signatory agencies will consult and cooperate as needed to determine the most effective and efficient sequence of property acquisition, habitat improvement, and management implementation.

C. Flexibility

1. Additional lands may be added to be the properties identified herein only if a significant portion of the plan cannot be implemented. As soon as a deficiency is identified, the agencies shall confer to determine whether or not a substitute should be added to the plan.

2. The land acquisition process for Jordanelle Dam and Reservoir may necessitate that the Bureau of Reclamation purchase more lands than required for project purposes. If this occurs, the agencies shall consult to ascertain whether or not the excess lands should be included in the mitigation plan.

D. Signatures

BUREAU OF RECLAMATION

1/22/87

Regional Director Date

U.S. FISH AND WILDLIFE SERVICE

Acting Regional Director 1/29/87 Date

UTAH DIVISION OF WILDLIFE RESOURCES

1-13-87

Director Date

U.S. FOREST SERVICE

1/14/87

Regional Forester Date

SUPPORT DATA FOR THE TERRESTRIAL WILDLIFE MITIGATION PLAN
FOR
STRAWBERRY COLLECTION SYSTEM, DIAMOND FORK POWER SYSTEM, AND M & I SYSTEM
BONNEVILLE UNIT - CENTRAL UTAH PROJECT

INTRODUCTION

The status of the Bonneville Unit terrestrial wildlife mitigation plans is outlined in Table 1. For the Strawberry Collection, Diamond Fork Power and M & I Systems alone, the current mitigation plans call for acquisition of 21,548 acres of land followed by management and habitat improvements for wildlife as follows.

Collection System	14,315 Acres	w/ habitat management.
M & I System	2,600 Acres	w/ habitat management and
	630 Acres	w/ riparian development.
Diamond Fork Power System	4,003 Acres	w/ habitat improvements and management.

	21,548 Acres	

The above mitigation plans are those biologically preferred options which have been prepared by interagency wildlife mitigation teams and are those supported by the most recent Fish and Wildlife Coordination Act reports and NEPA documents. To date approximately 14,161 of the 21,548 acres have been acquired leaving 7,387 acres unacquired.

Recently, a group of optional and excess lands have also been evaluated to determine their potential for off-setting the terrestrial wildlife mitigation needs of the three Bonneville Unit Systems. This lands are as follows.

* Emory Smith Banking Lands	9,461 Acres	w/ management and water developments.
** Deer Creek Reservoir Lands	2,000 Acres	w/ habitat improvements and management.
* Moon Lands	945 Acres	w/ management.
Camelot Lands	2,832 Acres	w/ management.
Coal Mine Hollow Lands	572 Acres	w/ management.
* Redford Lands	617 Acres	w/ habitat improvements and management.

	16,427 Acres	

* = Lands already under Federal ownership.
** = Lands already under Federal and State Ownership.

As shown, the Smith, Deer Creek, Moon, and Redford lands (a total of 13,023 acres) are already in public ownership. This leaves a total of 3,404 acres of the optional lands which would have to be acquired if they were to be utilized for mitigation purposes. The Moon and Camelot lands also have fisherman access benefits. These benefits will be addressed in a separate evaluation.

TABLE 1. STATUS OF BONNEVILLE UNIT TERRESTRIAL WILDLIFE MITIGATION

BONNEVILLE UNIT FEATURES	CURRENT RECOMMENDED MITIGATION PLAN	PORTION OF PLAN COMPLETED	AMOUNT NOT COMPLETED
STARVATION RESERVOIR	1200 AC/WINTER RANGE WITH HABITAT IMPROV.	1200 AC	ALL COMPLETED
STRAWBERRY COLLECTION SYSTEM	14315 AC WITH HABITAT MGMT.	13570 AC	745 AC
	1. SMITH/13490 AC	1. 13490 AC	1. 0 AC
	2. COAL MINE/440 AC	2. 80 AC	2. 360 AC
	3. WEST FORK/65 AC	3. NO ACTION	3. 65 AC
	4. ROCK CREEK/120 AC	4. NO ACTION	4. 120 AC
JORDANELLE DAM AND RESERVOIR	2600 AC BIG GAME/BLACK GROUSE WITH HABITAT MGMT. 630 AC RIPARIAN DEVELOPMENT*	NO ACTION	2600 AC + 630 AC Riparian -------- 3230 AC
* Recent recommendation from Fish and Wildlife Service			
DIAMOND FORK POWER SYSTEM	4003 AC * DEER WINTER RANGE WITH HABITAT IMPROV.	591 AC/DIAMOND W/NO IMPROV.	3412 AC *
* Requirement may be less with new power system plan			
I & D SYSTEM	PLAN NOT COMPLETED	PLAN NOT COMPLETED	PLAN NOT COMPLETED
BIA ACTIVITIES	6600 AC/WETLANDS, DEVELOP 6 PARCELS	NO ACTION	6600 AC
DUCHESNE RIVER CANALS	200 AC/RIPARIAN DEVELOPMENT	PILOT STUDY INITIATED	200 AC

DESCRIPTION OF THE MITIGATION PLAN

Table 2 shows how the optional lands would be used to satisfy the remaining mitigation needs for the three Bonneville Unit systems. The plan is based on previous analyses conducted by interagency wildlife mitigation teams and is, therefore, biologically based. Although the plan would mitigate for the biological losses, it would be mostly off-site (out of place) compensation. In the plan, lands already acquired for mitigation (the 14,161 acres listed in Table 1) are used to offset the initial mitigation needs. The excess and optional lands, in addition to some onsite lands, were used to fulfill the remaining mitigation needs. A map showing the relative locations of the various land parcels is attached.

Strawberry Collection System

For the Collection System, the Smith lands and Coal Mine Hollow Lands which were in the original mitigation plan (Fish and Wildlife Service 1978) are also included in this plan. The remaining 185 acres were satisfied by substituting the value of 185 acres of the Moon lands (already purchased) on an acre-for-acre basis in place of the West Fork and Rock Creek lands. The total 14,315 acres is exactly the same as in the original plan and would have the same mitigation equivalent.

Municipal and Industrial System

The portion of the plan which would mitigate for the M & I System (Jordanelle Reservoir) has recently been analyzed and presented in a report by [illegible] interagency wildlife mitigation team as an Out of Kind, Out of Place option (Fish and Wildlife Service 1985a). The original justification for Reclamation's purchase of the Emory Smith banking lands was based on using these lands to offset mitigation needs at Jordanelle as analyzed previously by an interagency team (Fish and Wildlife Service 1980). The plan would include 9,461 acres of Smith banking lands with some water developments to partially compensate for indirect losses of deer, elk and sagegrouse and provide replacement for direct habitat losses from inundation. Acquisition of an additional 720 acres at Jordanelle would be needed to safeguard a golden eagle nesting territory and a sage grouse breeding area. Habitat improvement on about 970 acres of the Deer Creek lands would also be needed to provide full compensation for mule deer. Riparian habitat credits would be obtained on an acre-for-acre basis for riparian acquisitions in the Moon and Caselot properties plus riparian development either at Jordanelle Reservoir or possibly on the Moon and White properties at Lower Stillwater.

Some other mitigation needs included in the most recent biological plan and incorporated into this plan include (1) management of the lands within the Jordanelle Reservoir management boundary to preserve wildlife habitats and (2) placement of big game warning reflectors along the relocated highways (U. S. 189 and the new county road). The total of 11,781 acres along with the other needs as explained above would provide a mitigation equivalent equal to the 3,230 acres in the original plan. It would also compensate for about 3,000 acres of direct habitat losses (at Jordanelle Reservoir) not directly compensated for in the original mitigation plan.

Diamond Fork Power System

For the Diamond Fork Power Sytem, the plan utilizes the remaining portions of the optional lands (not assigned as mitigation to the other two systems) in addition to the Diamond properties already purchased as mitigation lands. The Deer Creek, Diamond and Redford lands would all require some habitat improvements to satisfy compensation needs. If some of the optional lands are not aquired in full, then possibly other lands previously considered in the Sixth Water Flow Through Mitigation Plan (Fish and Wildlife Service 1984) could be considered. The total acreage attributable to the power system mitigation would be about 6,000 acres. This would equal about 4,009 acres in mitigation equivalents which is only 6 acres more than the original plan (Table 1).

TABLE 2. TERRESTRIAL WILDLIFE MITIGATION PLAN BASED ON THE UTILIZATION OF EXCESS AND/OR OPTIONAL LAND PARCELS.

(The number of acres of each land parcel are listed as they apply to each system of the Bonneville Unit. Mitigation equivalent acreages (*) are included in parentheses.)

	BONNEVILLE UNIT SYSTEMS			
MITIGATION LANDS	COLLECTION SYSTEM	M & I SYSTEM JORDANELLE	DIAMOND FORK POWER SYSTEM	TOTALS
SMITH **	13490 (13490)	9461(1310)***	NA	22,951
COAL MINE HOLLOW	640 (640)	NA	572 (220)	1,212
MOON **	185 (185)	165 (165) RIPARIAN	595 (228)	945
CAMELOT	NA	237 (237) RIPARIAN	~~2595 (1653)~~ 1407 (896	2,832
DEER CREEK **	NA	1148 (757) 970 (757)	1030 (700)	2,000
JORDANELLE	NA	720 (533)	NA	720
RIPARIAN **** DEVELOPMENT	NA	228 (228) RIPARIAN	NA	228
DIAMOND **	NA	NA	591 (591)	591
REDFORD **	NA	NA	617 (617)	617.
DIAMOND FORK	NA	NA	*****	*****
TOTALS	14,315 (14315)	11,781 (3230)	6,000 (4009)	32,096 (21,554) RATIO = 1.5 : (1)

* = MITIGATION EQUIVALENT ACREAGE () IS THE NUMBER OF ACRES OF THE ORIGINAL ONSITE OR IN-KIND MITIGATION LAND THAT IS ROUGHLY EQUIVALENT IN MITIGATIVE VALUE TO THE NEWLY PROPOSED ACREAGES.

** = LANDS ALREADY UNDER FEDERAL OR STATE OWNERSHIP.

*** = THE SMITH BANKING LANDS WOULD PROVIDE COMPENSATION FOR ABOUT 3,000 ACRES OF DIRECT HABITAT LOSSES AT JORDANELLE AS WELL AS EQUIVALENT MITIGATION FOR THE 1310 ACRES OF THE ORIGINAL MITIGATION PLAN.

**** = RIPARIAN DEVELOPMENT COULD BE ACCOMPLISHED WITHIN THE JORDANELLE RESERVOIR MANAGEMENT BOUNDARY OR ON THE MOON/WHITE PROPERTY AT LOWER STILLWATER (315 ACRES).

***** = ADDITIONAL LANDS IN DIAMOND FORK MAY BE REQUIRED IF SOME OF THE OTHER LANDS ARE NOT OBTAINABLE.

BACKUP ANALYSIS FOR THE MITIGATION PLAN

Strawberry Collection System

The only change in the mitigation plan for the Collection System from that outlined in Table 1 and described in mitigation teams report (Fish and Wildlife Service 1978), is the substitution of 185 acres of the Moon property in place of the West Fork (Witherspoon/Wittemore) and the Rock Creek (Robins Ranch) parcels. The Moon property along Currant Creek has important habitat values for deer (spring, summer and fall use), moose, sagegrouse (winter use), raptors and furbearers as outlined in the attached "Team Notes." These are the same types of habitat values found on the West Fork and Rock Creek lands, as documented in the 1978 report. Therefore, it is reasonable to attribute an acre-for-acre tradeoff to the Moon property. The end result, as shown in Table 2, is the same acreage (14,315 acres) for the Collection System terrestrial wildlife mitigation plan.

Municipal And Industrial System

The mitigation plan for the M & I System is one which was analyzed and presented in the mitigation teams most recent evaluation (Fish and Wildlife Service 1985a) of Jordanelle Reservoir and the associated highway relocations. This plan utilizes a total of about 11,781 acres consisting of the Emory Smith mitigation banking lands, about half of the Deer Creek Reservoir lands 1/ and some inplace lands to compensate for wildlife losses, most of which are a result of indirect barrier or habitat loss effects of the reservoir and road relocations. The banking lands would also help offset direct losses of about 3,000 acres at the Jordanelle Reservoir, a loss which has not been directly compensated for in any of the mitigation plans (Refer to Utah Division of Wildlife Resources 1980).

Riparian habitat losses are compensated by attributing an acre-for-acre value to acquiring, protecting, and managing riparian habitats in the Moon and Camelot properties as well as development of similar habitats within the management boundary of Jordanelle Reservoir and/or within the Moon/White properties currently being utilized as sand and aggregate sources for construction of Upper Stillwater Dam.

A brief outline of this mitigation plan is presented below:

IMPACTS AND MITIGATION OF JORDANELLE RESERVOIR AND HIGHWAY RELOCATIONS:

A. LOSSES - 194 MULE DEER
- 3 ELK
- 109 SAGE GROUSE
- 630 ACRES RIPARIAN HABITAT
- 3000 ACRES DIRECT HABITAT LOSS
- INDIRECT IMPACTS ON GOLDEN EAGLE NESTING AND HUNTING HABITAT.

1/ The 2,000 acres of Deer Creek Lands consist of about 1,500 acres of Reclamation lands and 500 acres of UDWR lands. In the 1985 team's report the 500 acres were mistakenly identified as BLM lands. Under this proposal the total 2,000 acres would still receive habitat improvements as described in the team's report.

B. MITIGATION VALUES:

1. SMITH BANKING LANDS - 9461 ACRES
   + 104 MULE DEER
   + 3 ELK
   + 52 SAGEGROUSE (WITH WATER DEVELOPMENTS)
   + 3000 ACRES COMPENSATION OF DIRECT HABITAT LOSS

2. DEER CREEK RESERVOIR LANDS - 970 ACRES
   + 90 MULE DEER (WITH HABITAT IMPROVEMENTS)

3. IN PLACE LANDS AT JORDANELLE - 720 ACRES
   + 57 SAGEGROUSE
   + PROTECTION OF EAGLE NESTING TERRITORY

4. LANDS WITHIN RESERVOIR MANAGEMENT BOUNDARY - 4000 ACRES
   + MANAGE TO PRESERVE EXISTING WILDLIFE HABITAT AND PREVENT FURTHER IMPACTS

5. PLACEMENT OF BIG GAME WARNING REFLECTORS ALONG RELOCATED HIGHWAYS (U.S. 189 AND NEW COUNTY ROAD) TO MINIMIZE HIGHWAY MORTALITY OF DEER AND ELK

6. RIPARIAN HABITAT COMPENSATION
   + 165 ACRES OF MOON PROPERTY
   + 237 ACRES OF CAMELOT PROPERTY
   + 228 ACRES RIPARIAN DEVELOPMENT

   + 630 ACRES TOTAL

<u>Diamond Fork Power System</u>

The Diamond Fork Power System mitigation plan would utilize those portions of the excess and optional lands which were not used for compensation of impacts attributable to the Collection system or the M & I System. This includes the extra lands at Coal Mine Hollow; the remaining Moon, Camelot and Deer Creek Reservoir lands; and the Diamond and Redford properties in Diamond Fork, a total of about 6,000 acres as shown in Table 2. The mitigation equivalents of these lands were determined by comparing their relative values (primarily big game range types) with those previously evaluated by the mitigation team for the Sixth Water Flow Through Mitigation Plan (Fish and Wildlife Service 1984). The lands proposed in the 1984 plan were primarily normal and severe winter ranges. Compensation was based on the improvement potential of these lands through management and habitat manipulations. Compensation equivalents from the newly proposed lands were based solely on management and protection from further developments.

The wildlife values of the Coal Mine Hollow, Moon and Camelot lands are outlined in the attached "Team Notes." The values of the Deer Creek, Diamond and Redford properties were documented in previous team reports (Fish and Wildlife Service 1985a, 1985b and 1984). The Coal Mine Hollow Lands are summer range; the Moo lands are spring, summer and fall range; the Deer Creek, Diamond and Redfo lands are primarily normal winter range; and the Camelot lands are severe win range.

A brief numerical analysis of this mitigation plan is included below:

DIAMOND FORK POWER SYSTEM MITIGATION REQUIREMENTS:

I. 1984 MITIGATION PLAN

A. EXISTING VALUES

301 ACRES NONWINTER RANGE	X	.6 HSI*	=	180	HABITAT UNITS
2491 ACRES NORMAL WINTER RA.	X	.7 HSI	=	1744	HABITAT UNITS
1211 ACRES SEVERE WINTER RA.	X	1.0 HSI	=	1211	HABITAT UNITS
---				---	
4003 ACRES				3135	HABITAT UNITS

* = Habitat Suitability Index (0=No Value, 1.0=Optimum Value)

B. VALUES WITH MANAGEMENT AND HABITAT IMPROVEMENTS

WITH MANAGEMENT ONLY, VALUES ARE INCREASED BY 33%.
WITH IMPROVEMENTS AND MANAGEMENT, VALUES ARE INCREASED BY 66%.
THEREFORE, THE COMPENSATION VALUE FOR THE EXISTING PLAN IS:

3135 HABITAT UNITS X 66% = 2070 HABITAT UNITS GAINED ON 4003 ACRES OF LAND.

II. PROPOSED MITIGATION PLAN

A. EXISTING VALUES

COAL MINE HOLLOW	-	572 AC.	X	.6	HSI	=	343	HABITAT UNITS
MOON LANDS	-	595 AC.	X	.6	HSI	=	357	HABITAT UNITS
CAMELOT LANDS	-	2595 AC.	X	1.0	HSI	=	2595	HABITAT UNITS
DEER CREEK LANDS	-	1030 AC.	X	.7	HSI	=	721	HABITAT UNITS

DIAMOND LANDS - (SEE BELOW)
REDFORD LANDS - (SEE BELOW)

B. VALUES WITH MANAGEMENT AND HABITAT IMPROVEMENTS

COAL MINE HOLLOW - W/ MANAGEMENT AND PROTECTION, VALUES ARE EXPECTED TO INCREASE BY 33%.
- 343 HU'S X 33% = 113 HU'S GAINED
- 113/2070 = .055 OF ORIGINAL PLAN
- .055 X 4003 = 220 ACRES EQUIVALENT MITIGATION

MOON LANDS
- W/ MANAGEMENT AND PROTECTION, VALUES ARE EXPECTED TO INCREASE BY 33%.
- 357 HU'S X 33% = 118 HU'S GAINED
- 118/2070 = .057 OF ORIGINAL PLAN

- .057 X 4003 = 228 ACRES EQUIVALENT MITIGATION

CAMELOT LANDS
- W/ MANAGEMENT AND PROTECTION, VALUES ARE EXPECTED TO INCREASE BY 33%.
- 2595 HU'S X 33% = 856 HU'S GAINED
- 856/2070 = .413 OF ORIGINAL PLAN

-.413 X 4003 = 1653 ACRES EQUIVALENT MITIGATION

DEER CREEK LANDS
- W/ MANAGEMENT AND HABITAT IMPROVEMENTS AS PROPOSED IN THE 1985 TEAM REPORT, VALUES ARE EXPECTED TO INCREASE BY 50%.
- 721 HU'S X 50% = 361 HU'S GAINED
- 361/2070 = .174 OF ORIGINAL PLAN

- .174 X 4003 = 700 ACRES EQUIVALENT MITIGATION

DIAMOND LANDS
- W/ MANAGEMENT AND HABITAT IMPROVEMENTS AS PROPOSED IN 1984 PLAN, THESE LANDS WOULD PROVIDE ACRE-FOR-ACRE COMPENSATION.

= 591 ACRES EQUIVALENT MITIGATION

REDFORD LANDS
- W/ MANAGEMENT AND HABITAT IMPROVEMENTS AS PROPOSED IN 1985 TEAM REPORT, THESE LANDS WOULD PROVIDE ACRE-FOR-ACRE COMPENSATION.

= 617 ACRES EQUIVALENT MITIGATION

REFERENCES CITED

Fish and Wildlife Service. 1978. Memorandum (Occber 19, 1978) from the Area Manager to the Regional Director, Bureau of Reclamation, Salt Lake City, Ut. "Section 8 Field Team recommendation for Wildlife Mitigation in the Strawberry Collection System, Partial Bonneville Unit, Central Utah Project."

_____. 1980. Memorandum (January 17, 1980) from Area Manager to Regional Director, Bureau of Reclamation, Salt Lake City, Ut. "Section 8 Mitigation Field Team Evaluation of a Proposed Transfer of Jordanell Reservoir Wildlife Mitigation, Municipal and Industrial System, to Emory C. Smith Land Acquisition."

_____. 1984. Memorandum (December 19, 1984) from Field Supervisor to Regional Director, Bureau of Reclamation, Salt Lake City, Ut. "Evaluation of Fish and Wildlife Resources in Relation to Revised Plans for the Sixth Water Flow Through Alternative, Diamond Fork Power System, Bonneville Unit, Central Utah Project."

_____. 1985a. Memorandum (October 29, 1985) from Field Supervisor to Regional Direcotr, Bureau of Reclamation, Salt Lake City, Ut. "Terrestrial Wildlife Impact Analysis and Mitigation Recommendations for Alternative Relocation Routes of U.S. 189 at Jordanelle Reservoir, Municipal and Industrial System, Bonneville Unit, Central Utah Project."

_____. 1985b. Memorandum (October 29, 1985) from Field Supervisor to Regional Director, Bureau of Reclamation, Salt Lake City, Ut. "Evaluation of Terrestrial Wildlife Mitigation Potential for Redford Property Exchanged with the Uinta National Forest, Diamond Fork Power System, Bonneville Unit, Central Utah Project."

Utah Division of Wildlife Resources. 1980. Letter from Director to Area Manager, Fish and Wildlife Service, Salt Lake City, Ut. Re: Acquisition of Emory C. Smith Property

TEAM NOTES

Rudy Drobnick
UDWR
February 11, 1986

Moon Property - Currant Creek
Tract I = 237 acres
Tract II = 708 acres
Total = 945 acres

Vegetation
Mountain brush = 501 acres
Sagebrush = 279 acres
Riparian = 165 acres
(willow, cottonwood & meadow)

Wildlife
1. Amphibians = toads & frogs; numbers of species & individuals undetermined.
2. Reptiles = snakes & lizards; number of species & individuals undetermined.
3. Birds
   Passerines = numerous, numbers of species & individuals undetermined.
   Raptors = important nesting and feeding area for several species of raptors including the golden eagle, numbers undetermined.
   = important winter perching area for the endangered bald eagle, numbers undetermined.
   Upland Game
   Sage grouse = important sage grouse winter range south of Meeks Canyon, 200 yds. west of Currant Creek; numbers (10+) undetermined.

4. Mammals
   Big Game
   Deer = 945 acres primarily spring, summer and fall range, plus approx. 100 acres severe winter range; plus important east-west deer migration area in deer herd unit 23B, Currant Creek.

$\frac{945 \text{ acres}}{312{,}832 \text{ acres}}$ severe winter range in herd unit 23B = 0.003 or 0.3%

0.003 X 8,276 participating hunters in 1984 = 25 participating hunters annually.

0.003 X 25,462 hunter days in 1984 = 76 hunter days ann.

0.003 X 2,193 deer harvested in 1984 = 7 deer harvested ann.

Moose = estimate one moose X 182 days = 182 moose days ann.

Elk = not presently on property, but near adjacent on higher hillsides.

Moon Property (cont.)

Furbearers

Beaver = equivalent total 3.2 stream miles (Moon property both sides); estimated 1.2% of Duchesne County beaver harvest = 0.012 X 412 = 5 beaver harvested annually.

Mink = estimated 4% of Duchesne County mink harvest = 0.04 X 25 = one mink harvested annually.

Raccoon = estimated 1% of Duchesne County racoon harvest = 0.01 X 183 = 2 raccoons harvested annually.

Bobcat = resident, numbers undetermined.

Gray fox = resident, numbers undetermined.

Badger = resident, numbers undetermined.

Small Game

Cougar = occasional winter visitor, numbers undetermined.

Upland Game

Cottontail rabbit = resident, numbers undetermined.

Snowshoe rabbit = occasional winter visitor, numbers undetermined.

Small Mammals

Uinta ground squirrel = generally high density providing food base for raptors.

Golden mantled squirrel - resident, numbers undetermined.

Rudy Drobnick
UDWR
February 11, 1986

Camelot Property - Strawberry River

Total area of property	= 2,831.60 acres
Ara of vegetation previously mapped	= 2,458.32 acres
Remainder of vegetation to be mapped	= 373.28 acres

Vegetation

Riparian	= 196 acres
Wet meadow	= 78 acres
Sagebrush & mountain brush	= 372 acres
Pinyon-juniper	= 941 acres
Conifer	= 871 acres
Sub-total	2,458.32 acres

Wildlife

1. Amphibians = toads & frogs; numbers of species & individuals undetermined.

2. Reptiles = snakes & lizards; number of species & individuals undetermined; the midget jaded rattlesnake is a resident of the property.

3. Birds
   - Passerines = numerous, numbers of species & individuals undetermined.
   - Raptors = important nesting and feeding area for several species of raptors including the golden eagle, numbers undetermined; minimum 2 golden eagles.
     = important winter perching area for the endangered bald eagle, numbers undetermined, minimum of 2 bald eagles annually.
   - Upland Game
     - Blue grouse = present in conifer habitat; numbers undetermined.

4. Mammals
   - Big Game
     - Deer = 2,211 acres severe winter range; plus additional use by estimated 400 deer in spring season (Mar-Apr-May) plus important east-west and north-south deer migration area in deer herd units 23A, Avintaquin and 23B, Currant Creek, combined.

$\frac{2,211 \text{ acres}}{427,584 \text{ acres}}$ severe winter range in herd units 23A and 23B. = 0.005 or 0.5%

0.005 X 10,715 participating hunters	= 54 participating hunters annually.
0.005 X 32,175 hunter days	= 161 hunter days ann.
0.005 X 2,968 deer harvested	= 15 deer harvested ann.

Because of spring use by additional deer, estimate 2X value increased of habitat:

2 X 54	= 108 participating hunters annually
2 X 161	= 322 hunter days annually
2 X 15	= 30 deer harvested annually

Moose = estimate two moose X 182 days = 364 moose days ann.
(one moose harvested)

Elk = not presently on property, but near adjacent on higher hillsides to the southwest.

Furbearers

Beaver = 8.08 miles Strawberry River; estimated 3% of Duchesne County beaver harvest = 0.03 X 412 = 12 beaver harvested annually.

Mink = estimated 8% of Duchesne County mink harvest = 0.08 X 25 = 2 mink harvested annually.

Raccoon = estimated 2% of Duchesne County racoon harvest = 0.02 X 183 = 4 raccoons harvested annually.

Bobcat = resident, numbers undetermined.

Gray fox = resident, numbers undetermined.

Small Game

Cougar = resident, numbers undetermined.

Upland Game

Cottontail rabbit = resident, numbers undetermined.

Bob Christensen
BR Determination
February 11, 1986

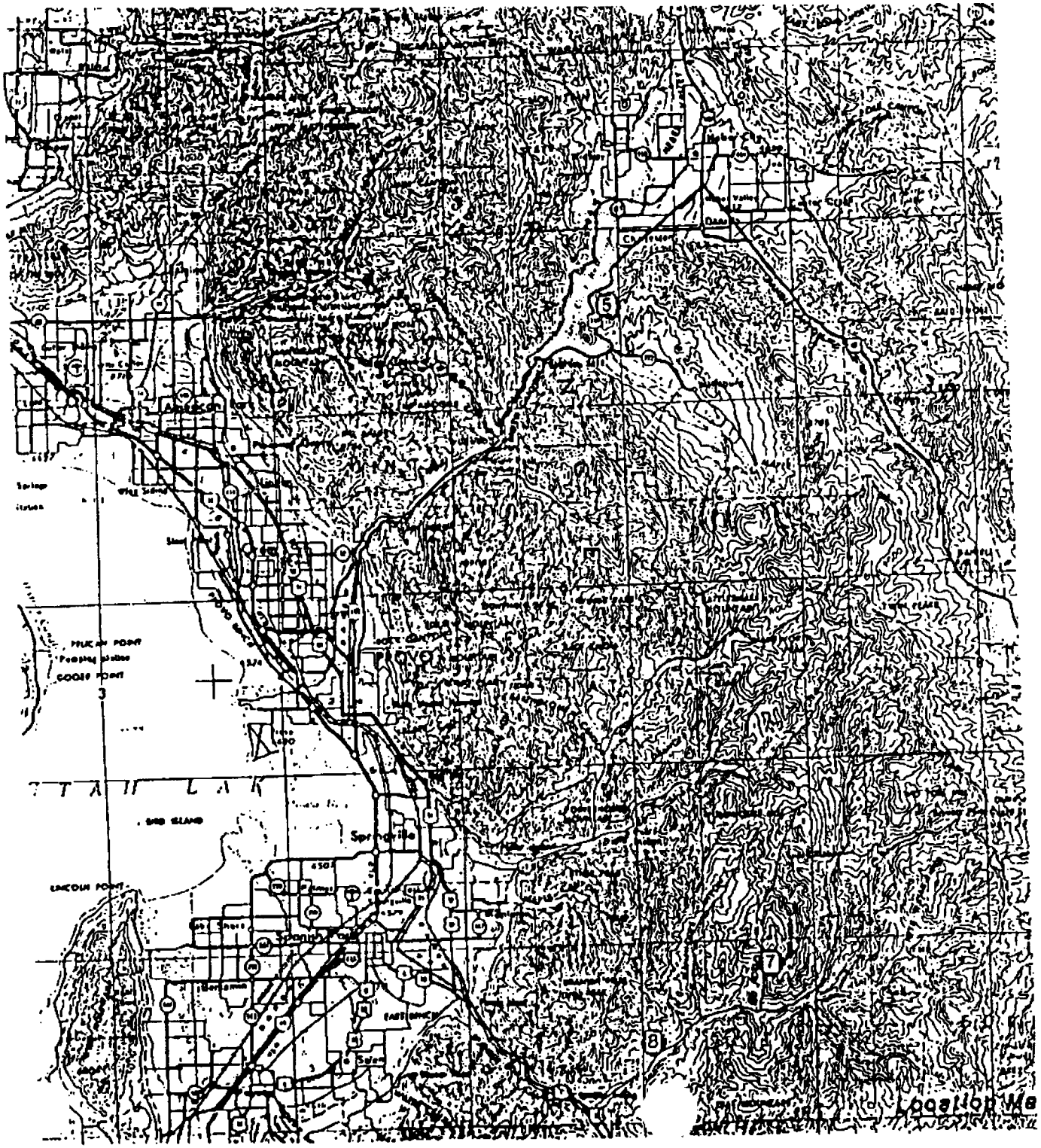
Coal Mine Hollow Properties - Currant Creek

	ORIGINAL COAL MINE PROPERTIES (640 Ac)			EXTRA PROPERTIES (572 AC)		
	Hunters	Hunter Days	Harvest	H	HD	H
1. Beaver			10			9
2. Moose	3	23	1	3	21	1
3. Elk	25	177	1	22	158	1
4. Deer	24	88	8	21	79	7
5. Sage grouse	0	0	0	0	0	0
6. Forest grouse	15	49	40	13	44	36

Vegetation	Acres	Vegetation	Acres
Sagebrush	250	Sagebrush	[illegible]
Quaking aspen	387	Quaking aspen	346
Riparian	3	Riparian	3
Total	640	Total	572

Factor for determination of extra properties wildlife values:

$$\frac{572}{640} = 0.89 \text{ or } 89\%$$


PROVO
Springville
Spanish Fork
LINCOLN POINT
COOLEY POINT
BIRD ISLAND
5
7
8

Central Utah Project Completion Program

Attachment C

October 2004

UTAH RECLAMATION
MITIGATION
AND CONSERVATION
COMMISSION

Attachment C

ATTACHMENT C

1988 AQUATIC MITIGATION PLAN FOR STRAWBERRY AQUEDUCT AND COLLECTION SYSTEM

AQUATIC MITIGATION PLAN FOR STRAWBERRY AQUEDUCT AND COLLECTION SYSTEM

Prepared by

Interagency Aquatic Biological Assessment Team

Represented by:

Utah Division of Wildlife Resources

U.S. Forest Service

U.S. Fish and Wildlife Service

U.S. Bureau of Reclamation

Central Utah Water Conservancy District

DECEMBER 1988

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AQUATIC MITIGATION PLAN FOR
STRAWBERRY AQUEDUCT AND COLLECTION SYSTEM

DECEMBER 1988

INTRODUCTION

This report is the Final Aquatic Mitigation Plan for the Strawberry Aqueduct and Collection System (Collection System) which has been prepared by the Interagency Aquatic Biological Assessment Team (Team). Sufficient work and additional analyses has been completed by the Team since 1984 to warrant updating and revising the Aquatic Mitigation Plan for the Collection System. This plan should be implemented by the Bureau of Reclamation (Bureau) to the extent required to fully compensate for aquatic impacts of the Collection System.

As stated in previous reports, the goal of the Streamflow Agreement of February 27, 1980 is to provide 44,400 acre feet of water for instream flow in order to preserve at least 50 percent of historic adult trout habitat in the four major streams (Strawberry River, Currant Creek, West Fork Duchesne River, and Rock Creek). All signators to the agreement recognized as a basic precept that providing a minimum volume of good quality water is the most important factor in retaining fish habitat. Adequate instream flows are required if trout losses in the affected streams are to be mitigated. Analyses in this report are based on the assumption that 44,400 acre feet of water will be available for fishery releases. This Aquatic Mitigation Plan addresses mitigation that is needed to offset the remaining 50 percent loss of adult trout habitat. If 44,400 acre feet of water are not available, additional mitigation measures will be identified and incorporated into the Aquatic Mitigation Plan. In addition, if the 44,400 acre feet of water are not available many of the benefits identified in this plan may not occur, thereby requiring additional mitigation.

As with previous reports, the first priority of this plan is mitigation in-kind. That is, losses of stream fisheries habitat and stream fishing opportunities are to be offset by gains in the same habitat types and opportunities as near to the place of loss as possible.

It is the recommendation of the Team that the Bureau, the agency responsible for mitigation of losses caused by the Collection System, immediately implement this Aquatic Mitigation Plan. This includes seeking funds under Sections 5 and 8 of the Colorado River Storage Project Act and, as appropriate, preparing necessary plans and designs. The U.S. Fish and Wildlife Service (Service), U.S. Forest Service (Forest Service), and Utah Division of Wildlife Resources (Division) should support the Bureau in acquiring funds for the plan implementation. Because mitigation has not been concurrent with project construction, prompt funding with implementation as quickly as possible is essential.

It is the Team's understanding that the Bureau's present policy is that operation and maintenance costs associated with fish and wildlife mitigation items are not the Bureau's responsibility. The Service, Forest Service, and Division have stated they feel it is the Bureau's responsibility to provide some reasonable level of operation and maintenance for the life of the project. For example, if maintenance is not provided for instream habitat improvement structures, benefits are likely to diminish over time. The issue of operation and maintenance responsibilities needs immediate resolution at the administrative level.

BACKGROUND

The original project plan (1965 Definite Plan Report (DPR)) for the Bonneville Unit provided only 6,500 acre feet of water for fishery releases. With this plan, there would have been an estimated 73 percent reduction in habitat for adult trout in the affected streams and a corresponding loss of 120,800 angler days of stream fishing on Indian and non-Indian lands. An analysis of instream flow needs for the affected streams was conducted in 1979 by the Team. The

results of this analysis were presented in a report to the Governor of Utah on May 7, 1979. This report outlined nine options for providing varied levels of fishery habitat protection by release allocation. The option to provide 50 percent of adult trout habitat which required 44,400 acre feet of water for fishery releases was recommended. The Team has and will continue to monitor fish populations and analyze new data as it becomes available. Although the monitoring program is not part of the aquatic mitigation plan, it has and will continue to provide information on the status of fish populations in the four major streams affected by the Collection System.

The report to the Governor was instrumental in bringing about the Streamflow Agreement endorsed by the Governor and representatives of the Central Utah Water Conservancy District (District), the Forest Service, various State agencies and the Department of the Interior on February 27, 1980. The objective of the Streamflow Agreement is to retain 50 percent of the adult trout habitat in the reaches downstream from project dams and diversions in the four major trout streams affected by the Collection System. Full implementation (44,400 acre feet) of the Streamflow Agreement still results in 100 percent loss of habitat in South Fork of Rock Creek, Layout, Wolf, Hades, Water Hollow, and Twin Creeks below project features. This mitigation plan addresses all of the stream fishery losses associated with the project.

Information and procedures used in these analyses are based on the 1979 Governor's report on file in the Service's Salt Lake City office. For simplicity and continuity, analysis conducted for this report as well as mitigation credits will be expressed in terms of angler-day losses or gains.

Potential mitigation measures for the Collection System have been reduced to four categories: (1) purchase and/or exchanges of water to provide instream flows; (2) acquisition of angler access; (3) in-stream habitat improvement measures; and (4) replacement of a trout egg-taking station on the Strawberry River near Strawberry Reservoir. Both on-site and off-site mitigation has been recommended in this plan. On site mitigation would occur on Strawberry River, Currant Creek, West Fork of the Duchesne River, North Fork of the Duchesne River, Rock Creek, and the South Fork of Rock Creek.

While the acquisition of access will not mitigate losses of fish habitat, substantial mitigation in angler use would be realized. To assure that maximum benefits are provided to the public, habitat improvement measures are recommended only for stream reaches that have angler access. Items within each of the mitigation categories identified previously are discussed in detail in the following section. As appropriate, mitigation already accomplished is identified and credited.

IMPACT SUMMARY

Angler use losses attributed to the Collection System with 44,400 acre feet of fishery releases without additional mitigation measures are shown in Table 1. The projected loss on non-Indian lands would be 34,090 angler days annually. In addition, 37,200 angler days would be lost on Indian lands and will be mitigated separately. As stated previously, it is assumed that streamflows (44,400 acre feet) will be available to achieve the objectives of the Streamflow Agreement.

POTENTIAL MITIGATION MEASURES

ACQUISITION OF WATER

The Team recognizes that providing streamflow is the most important method to mitigate aquatic impacts associated with the Collection System. This mitigation procedure would entail providing streamflow in addition to the 44,400 acre feet of fishery water that would retain 50 percent of the adult trout habitat in the four major streams. The Team recommends that wherever feasible the Bureau acquire additional water for fishery streamflow.

TABLE 1
IMPACT OF THE STRAWBERRY AQUEDUCT AND COLLECTION SYSTEM UPON ANGLER USE (ANGLER DAYS/YEAR)

Stream Segment	Net Impact (angler days)
Strawberry River	
Soldier Creek Dam to Starvation Dam	-12,850
Downstream from Starvation Dam	+900
Currant Creek	-4,400
West Fork Duchesne River	-1,500
Rock Creek	
Upper Stillwater Reservoir to Lower Stillwater Reservoir	-15,900
Downstream from Lower Stillwater Reservoir	-37,200[a]
South Fork Rock Creek	-600
Hades Creek	-200
Wolf Creek	-800
Water Hollow Creek	-300
North Fork Duchesne River	-60
Duchesne River	+1,620

TOTAL INDIAN LAND	-37,200
TOTAL NON-INDIAN LAND	-34,090
GRAND TOTAL	-71,290

a/ Impacts located on Indian lands.

Strawberry Exchange

The Strawberry Exchange Plan was initially described in a report prepared by Geer (1978). Essentially, this mitigation measure would restore natural streamflows in the Upper Strawberry River (16.3 miles) and a total of 9.8 miles in Bjorkman Hollow, Hobble Creek and Willow Creek. The Strawberry Exchange Plan would also provide trout spawning habitat to compensate for the loss of spawning habitat in those streams that will be inundated by the enlargement of Strawberry Reservoir. The Team considers the Strawberry Exchange to be the highest priority mitigation measure. The benefits that would occur with implementation of this mitigation measure are shown in Table 2.

Seven alternative measures for providing water to accomplish the Strawberry Exchange have been identified, and a biological evaluation of each was made by the Team and a report was submitted to the Service. The Service obtained concurrence from the Forest Service and Division prior to submitting the report to the Bureau on July 31, 1984. The Team's report is included in Appendix A. Subsequently, the Bureau evaluated the alternatives in terms of water availability and cost and also identified several other alternatives. Although the Bureau has studied the alternatives for several years, the alternative that will be used to implement the Strawberry Exchange has not been selected. Presently, as indicated in the Bureau's Plan of Study dated October, 1987, the Daniels Creek Alternative has been selected as the alternative that will receive concentrated study. The Bureau needs to expeditiously acquire the water required to implement the Strawberry Exchange.

Water Purchase

This mitigation alternative involves the purchase of water to provide streamflow in addition to the flow that would be provided by the 44,400 acre feet of fishery water provided by the Instream Flow Agreement. The Team realizes that, other than project water, little water is available for purchase in the vicinity of project diversions. The Team recommends that the Bureau evaluate the purchase of project water and/or any other source of water that may be available for Collection System aquatic mitigation. Until the amount

TABLE 2
BENEFITS IN ANGLER USE OF MITIGATION MEASURES
RECOMMENDED FOR THE STRAWBERRY AQUEDUCT AND COLLECTION SYSTEM

Mitigation Procedures	Stream Miles	Benefits (angler days/year)	Mitigation Achieved (angler days/year)
Acquisition of Water			
Strawberry Exchange	26.1	10,000[a]	-
Purchase of Water	-[b]	-[c]	-
Sixth Water Creek	7.5	3,422	-
Subtotal	33.6	13,422	-
Angler Access			
Currant Creek (upstream from Highway 40)	10.9	2,740	1,310
Strawberry River (Camelot Resort property)	8.0	2,400	510
Strawberry River (Soldier Creek Dam to Camelot)	11.2	3,360	-
Strawberry River (Private property downstream from Starvation Dam)	2.0	600	-
West Fork Duchesne River	9.3	2,325	-
Duchesne River	7.0	1,750	
Rock Creek	2.2	550	550
Subtotal	50.6	13,725	2,370
Egg Taking Station		1,800	1,800
Fish Habitat Improvement			
Strawberry River (Public land downstream from Starvation Dam)	6.2	3,028	-
Currant Creek	16.2	1,368	390
Rock Creek	10.0	914	183
West Fork Duchesne River (downstream from Vat Diversion)	11.3	845	75
Strawberry River (upstream from Strawberry Reservoir)	18.1	304	104
Strawberry River (downstream from Soldier Creek Dam)	6.0	507	-
Provo River (Jordanelle Dam to Deer Creek Reservoir)	9.3	4,543	-
Sixth Water Creek	7.5	242	-

TABLE 2 (Continued)
BENEFITS IN ANGLER USE OF MITIGATION MEASURES
RECOMMENDED FOR THE STRAWBERRY AQUEDUCT AND COLLECTION SYSTEM

Mitigation Procedures	Stream Miles		Benefits (angler days/year)		Mitigation Achieved (angler days/year)
Upper Diamond Fork	6.6		265		-
North Fork Duchesne River (downstream from Hades Creek)	6.0		398		199
North Fork Duchesne River (upstream from Hades Creek)	5.0		332		-
West Fork Duchesne River (upstream from Vats Diversion)	10.0		748		-
South Fork of Rock Creek (upstream from diversion)	3.0		224		-
Diamond Fork (upstream from Springville Crossing)	4.0		160		-
Subtotal		119.2	13,878		951
GRAND TOTAL				42,825	5,121

a/ 9,225 to 10,225 angler days. Exact benefits will depend on alternative selected.

b/ Unknown until source of water is identified.

c/ Precise determination cannot be made but 480 to 660 angler-day benefits would be expected for each 1,000 acre-feet of water purchased.

and location of water available to supplement streamflow is known, a precise assessment of benefits cannot be made. However, based on the information provided in the 1979 Governor's Report, expected benefits would range from 480 to 660 angler days annually for each 1,000 acre feet of supplemental streamflow provided.

Sixth Water Exchange

The Sixth Water Exchange would provide 49 cubic feet per second (cfs) during the summer and 32 cfs of flow during the winter in Sixth Water Creek downstream from the existing Strawberry Tunnel. Upon completion of the new Syar Tunnel and subsequent delivery of project water from Strawberry Reservoir to the Wasatch Front, minimum flow in Sixth Water Creek is expected to be 5 cfs. The exchange would provide the recommended 49 and 32 cfs stream flow from Syar Tunnel to the existing Strawberry Tunnel and into Sixth Water Creek. It is understood by the Team that the bypass valve between the two tunnels that would enable the exchange to take place has been incorporated into construction design specifications. Operation and maintenance costs are currently being evaluated. It has been assumed that this 7.5-mile reach of Sixth Water Creek would be managed for wild cutthroat trout. Based on the evaluation conducted in 1987, the recommended stream flow would mitigate 3,422 angler days annually.

ACQUISITION OF ANGLER ACCESS

No provisions for angler access are included in the Streamflow Agreement. However, it is recognized that angler access must be available before angler-day benefits defined for various mitigation alternatives can be realized. Wherever possible, access should be acquired in fee title to assure public access and habitat preservation. However, where owners are not willing to sell, easements to provide long-term access should be obtained. Access to only one stream side would provide less benefits than if both sides were available. Where possible, access should extend a minimum of 30 feet from the mean highwater mark on both banks, or to canyon walls, whichever is less, and be provided from public roads, parkways, or other locations convenient to the streams. Entry to the corridor should be provided at approximately one-mile intervals. Appropriate parking will be needed at the entry points. As shown

on Table 2, seven stream reaches have been identified for the acquisition of angler access. Each of these are identified and discussed in more detail in the following sub-sections.

Currant Creek (10.9 miles)

Angler access has been obtained along both sides of a 2-mile reach and along one side of a 6.4-mile reach of Currant Creek. This access has been credited with providing 1,310 angler days. It would be desirable to obtain angler access to the opposite stream bank of the 6.4-mile reach and along both banks of the remaining 2.5-mile stream reach. This remaining angler access would provide an additional 1,430 angler-day benefits.

Strawberry River (Camelot Property) (8.0 miles)

The Bureau has obtained angler access to about 1.7 miles within this stream segment and this purchase has been credited with providing 540 angler-day benefits annually. Presently, The Nature Conservancy has purchased the remaining Camelot property which includes 6.3 miles of the Strawberry River. The Nature Conservancy purchased the property with the understanding that the Bureau would then purchase the property from them in 1989 for angler access required for Collection System aquatic mitigation. Angler access to this 6.3-mile reach of the Strawberry River is projected to provide 1,890 angler-day benefits.

Strawberry River (Camelot to Soldier Creek Dam) (11.2 miles)

The Strawberry River from Red Creek upstream to Soldier Creek Dam is considered to be one of the best quality fishing streams in the State of Utah. Therefore, the Team considers obtaining angler access from Camelot to Soldier Creek Dam a high priority mitigation item. Obtaining angler access for this reach of the river would result in a gain of 3,360 angler days.

Strawberry River (Downstream from Starvation Dam) (2.0 miles)

In the reach of the Strawberry River that extends downstream from Starvation Dam to the confluence with the Duchesne River, a total of 2 stream miles is located on private land. This reach of the Strawberry River provides valuable brown trout spawning habitat. Acquiring angler access for this stream reach would result in 600 angler-day benefits.

West Fork Duchesne River (9.3 miles)

This stream segment extends upstream from the confluence of the North Fork Duchesne River to the Vat Diversion. This stream segment is projected to have less angler usage, therefore, access acquisition here has a lower priority than the Strawberry River and Currant Creek. Obtaining angler access for this stream reach would result in 2,325 angler-day benefits.

Duchesne River (7.0 miles)

This stream reach extends downstream from the confluence of the West Fork and North Fork of the Duchesne River for 7 miles. Monitoring of the trout population in this reach of the Duchesne River indicates that a productive fish population exists. Angler access to this 7 mile reach of river would provide 1,750 angler-day benefits.

Rock Creek (2.2 miles)

This tract of land was purchased by the Bureau for mitigation of fish and wildlife losses and was a source of aggregate for the upper Stillwater Dam. This 2.2 mile stream reach provides 550 angler-days benefits annually. The Team recommended transfer of these lands to the U.S. Forest Service.

Summary

In the seven stream segments identified and discussed, the Team has recommended approximately 50 miles of acquisition for angler access. If

access is obtained for all reaches, this mitigation would provide 13,725 angler-day benefits annually.

FISH HABITAT IMPROVEMENT MEASURES

Fish habitat improvement measures include items which improve trout habitat. Potential measures include those that would stabilize banks and riparian zones, improve water quality in a stream, reduce velocity, decrease stream width, increase cover and improve pool-riffle ratios. Some habitat improvement measures can improve habitat by enhancing more than one of these factors. Specific habitat measures include bank stabilization and instream structures such as low head sills, boulder clusters, overhanging deflectors, and cabled tree revetments. In assigning benefits, it was assumed that stable stream banks and improvement features would be protected by appropriate land management. In addition, the assignment of mitigation credits assumed that the benefits would occur throughout the life of the project. However, for instream structures to provide benefits for the life of the project (50+ years) adequate protection and maintenance of structures must be provided. If protection and maintenance are not provided, the benefits would be substantially less.

Aquatic mitigation required for the Collection System is 26.6 acres of adult trout habitat which equates to 34,090 angler days. The assumption that one angler day equals 34 ft^2 of adult trout habitat is the same as used in the 1979 Governor's Report. As stated in the aquatic mitigation plans developed in 1983 and 1984, no more than 9,790 angler days should be mitigated by instream structures. Therefore, a total of 7.64 acres (331,000 ft^2) of adult trout habitat can be mitigated by the habitat improvement portion of the plan. In determining mitigation credits for instream structures the following assumptions were made:

1. Small Streams were less than 20 feet wide at low flow, medium streams were 20 to 40 feet wide at low flow and large streams were more than 40 wide at low flow.

2. The amount of adult trout habitat provided by a boulder would be equal to the length and width (square) of the boulder. In addition, the size of boulders used would increase with larger streams.
   - Small streams - boulders average 2 ft by 2 ft, or 4 ft^2
   - Medium streams - boulders average 3.5 ft by 3.5 ft, or 12.25 ft^2
   - Large streams - boulders average 5 ft by 5 ft, or 25 ft^2

3. The amount of adult trout habitat provided by overhanging deflectors would increase with larger streams as follows:
   - Small streams - linear feet times 1.5 feet
   - Moderate streams - linear feet times 2.5 feet
   - Large streams - linear feet times 4.0 feet

4. The amount of adult trout habitat provided by rock sills, log sills, check dams, rock deflectors, log drop structures, and V-berms would increase with larger streams as follows:
   - Small streams - 0.5 width (or linear feet) times 2 feet
   - Moderate streams - 0.5 width (or linear feet) times 5 feet
   - Large streams - 0.5 width (or linear feet) times 8 feet

5. The amount of adult trout habitat provided by cabled trees would increase with larger streams as follows:
   - Small streams - linear feet times 2 feet
   - Moderate streams - linear feet times 3 feet
   - Large streams - linear feet times 8 feet

Mitigation credits for instream structures were assigned to 14 stream segments on the basis of the above assumptions. In addition to the mitigation benefits, stream segments to receive instream structures were prioritized by the Team. These are listed in priority order in Table 3. This table also provides information on the availability of development plans, angler access, and other controlling factors. Stream segments without development plans should have such plans developed in a timely manner. Public access should be acquired for a stream segment before habitat improvement structures are constructed.

PRIORITY, MITIGATION CREDIT, AND DEVELOPMENT FOR STREAM REACHES IDENTIFIED FOR INSTREAM STRUCTURES AS PART OF STRAWBERRY AQUEDUCT AND COLLECTION SYSTEM AQUATIC MITIGATION

Stream Reach	Priority	Size[a]	Stream Length (miles)	Mitigation Credit[b] (angler days)	Development Constraints
Strawberry River (downstream from Starvation Dam)	1	L	6.2	3,028	Private landowners and resolution of flooding issue.
Currant Creek (Currant Creek Dam to highway)	2	M	16.2	1,368	Private landowners
Rock Creek (Upper Stillwater Dam to Indian Reservation)	3	L	10.0	914	None
West Fork Duchesne River (Vat Diversion to confluence)	4	M	11.3	845	Private landowners
Strawberry River (upstream from Strawberry Reservoir)	5	S	18.1	304	Transfer of Strawberry Valley Project lands to Forest Service, grazing restrictions, and implementation of Strawberry Exchange.
Strawberry River (downstream from Soldier Creek Dam to Red Creek)	6	M	6.0	507	Private landowners, purchase of Camelot property, and preparation of development plan
Provo River (Jordanelle Dam to Deer Creek Reservoir)	7	L	9.3	4,543	Construction of Jordanelle Dam, private landowners, and preparation of development plan
Sixth Water Creek	8	M	7.5	242	Completion of the Syar Tunnel, provisions for operation and maintenance costs and assurance of recommended flow would be needed
Diamond Fork (Three Forks to Springville Crossing)	9	S	6.6	264	None

TABLE 3 (Continued)
PRIORITY, MITIGATION CREDIT, AND DEVELOPMENT FOR STREAM REACHES IDENTIFIED
FOR INSTREAM STRUCTURES AS PART OF STRAWBERRY AQUEDUCT AND COLLECTION SYSTEM AQUATIC MITIGATION

Stream Reach	Priority	Size[a]	Stream Length (miles)	Mitigation Credit[b] (angler days)	Development Constraints
North Fork Duchesne River (downstream from Hades Creek)	10	M	6.0	398	Private landowner
North Fork Duchesne River (Hades Creek to West Fork)	11	M	5.0	332	Preparation of development plan
West Fork Duchesne River (upstream from Vat Diversion)	12	M	10.0	748	Preparation of development plan
South Fork Rock Creek (upstream from Doc's Diversion)	13	S	3.0	224	Preparation of development plan
Diamond Fork (upstream from Springville Crossing)	14	S	4.0	160	Preparation of development plan
			119.2	8,017	

a/ S = Small stream (< 20 feet
M = Medium stream (20 to 40 feet)
L = Large Stream (> 40 feet)

b/ 34 square feet of adult trout habitat equals one angler day.

Habitat improvements in these stream segments could mitigate the loss of 13,878 angler days. Of this total, habitat improvements that have already been constructed in these stream reaches provide 951 angler-day benefits. However the Team realized that with the many constraints of habitat improvement, it would not be possible on all 119 stream miles. Additional stream segments have been identified as candidates for habitat improvements. As stated in the Aquatic Mitigation Plans developed in 1983 and 1984, the Team believes that no more than 9,790 angler-days should be mitigated by instream structures. The Team views instream structures as the lowest priority method to mitigate aquatic impacts associated with the Collection System.

Strawberry River Downstream from Starvation Dam (6.2 miles)

The principle factor limiting the fishery is eroding stream banks which lowers the water quality, silts spawning gravel, and reduces stream cover. This stream reach contains both public and private lands. Additional public access must be obtained before the entire reach can be developed and maximum benefits realized. A plan for instream structures for this stream reach was developed by Trout Habitat Specialists (1987a). Concern has been expressed that several of the recommended structures have the potential to reduce channel capacity. Following evaluation by the District and Bureau, it was determined that all rock sills would be constructed at stream bed elevation to avoid reducing channel capacity. If the plan recommended by Trout Habitat Specialists is implemented, a total of 3,028 angler days per year would be mitigated.

Currant Creek (16.2 miles)

Presently, angler access has been obtained along both sides of a 2-mile reach and along one side of a 6.4-mile reach of Currant Creek. Public access must be obtained for the remaining 2.5-mile reach before the entire habitat improvement recommendation can be implemented. Measures recommended for this stream include bank stabilization and instream structures. Development plans for subreaches of this stream reach were prepared by Trout Habitat Specialists (1987b) and Orsborne et al. (1985). These two plans cover the entire 16.2 mile

reach of the stream upstream from Highway 40 to the dam. With total implementation of both plans, 1,368 angler days per year would be realized. A habitat improvement pilot study has been completed on Currant Creek and has been credited with providing 390 angler-day benefits.

Rock Creek (10.0 miles)

This stream reach, located on the Ashley National Forest, extends from Upper Stillwater Dam downstream to the Uintah and Ouray Indian Reservation boundary. Restriction of the stream channel to accommodate reduced flows, improvement of cover for trout, and reduction of the amount of eroding banks are the major needs of this stream reach. A plan for this stream reach was developed by Trout Habitat Specialists (1987c). Implementation of this plan would mitigate 914 angler days per year. The habitat improvement pilot study that has been completed on Rock Creek will provide 183 angler-day benefits annually.

West Fork Duchesne River (Downstream from Vat Diversion) (11.3 miles)

This reach extends upstream from the confluence of the North Fork Duchesne River to the Vat Diversion. Much of the reach is located on private land and before starting habitat improvement work angler access must be obtained. Bank stabilization and instream structures to improve pool-riffle ratios and confine the channel are the habitat improvements recommended by the Team for this stream reach. A plan for improving trout habitat in this stream reach was prepared by Trout Habitat Specialists (1987d). Implementation of this plan would mitigate 845 angler days annually. The habitat improvement pilot study completed on this stream reach has been credited with providing 75 angler-day benefits annually.

Strawberry River Upstream from Strawberry Reservoir (18.1 miles)

This stream reach extends upstream from Strawberry Reservoir 18.1 miles to the headwaters of the Strawberry River. Presently much of the area is located on Strawberry Valley Project lands and the riparian areas have been overgrazed. Methods to control grazing (fencing and/or adjusted grazing program) are needed

before instream structures would provide fishery benefits. Efforts to transfer these lands to the Uinta National Forest are in progress; however, this will require Congressional action. A plan for improving trout habitat in this stream segment was prepared by Trout Habitat Specialists (1987e). With full implementation of this plan, a total of 304 angler days would be mitigated. A portion of this stream segment is located on the Uinta National Forest and a habitat improvement pilot study has been completed within this area. This pilot study provides 104 angler-day benefits annually.

Strawberry River Downstream from Soldier Creek Dam (6.0 miles)

This stream reach includes 2.0 miles of the Strawberry River from Soldier Creek Dam downstream to Willow Creek and 4.0 miles of the Strawberry River within the Camelot property. The Nature Conservancy has purchased the Camelot Property which provides angler access necessary for the placement of fish habitat structures.

A development plan for instream structures has not been prepared for this stream reach, and such a plan would be needed. Without a specific plan for this stream reach, the Team assumed that benefits of habitat improvement would be similar to Currant Creek. Based on this relationship, the Team determined that the implementation of a habitat improvement plan for this stream reach could mitigate 507 angler days annually.

Provo River from Jordanelle Dam to Deer Creek Reservoir (9.3 miles)

With the completion of Jordanelle Dam, flows in this reach of the Provo River will be altered. Angler access to this 9.3 mile reach is part of the aquatic mitigation required for the Jordanelle Dam. Trout habitat improvements would provide excellent benefits if angler access is obtained.

Presently no plan has been developed for habitat improvement structures in this segment and a plan would need to be prepared. The Team assumed that habitat improvements would provide benefits similar to the Strawberry River downstream from Starvation Dam. Based on this relationship, the Team determined that

habitat improvement structures in this reach of the Provo River could mitigate 4,543 angler days per year. Jordanelle Dam must be completed before improvements are implemented.

Sixth Water Creek (7.5 miles)

Sixth Water Creek is a tributary of Diamond Fork and will have its flow stabilized by the diversion of water for the Diamond Fork Power Project. Providing additional water to this stream has also been identified as a mitigation item. Mitigation benefits discussed in this section are predicated on the condition that the recommended summer (49 cfs) and winter (32 cfs) flows would be available. Bank stabilization and instream structures are habitat improvement measures recommended for this stream. This stream is located on the Uinta National Forest; therefore, public access is not an issue. Detailed plans for this stream segment were prepared by Trout Habitat Specialists (1987f). With recommended flows, implementation of the improvement plan would mitigate 242 angler days annually.

Diamond Fork - Three Forks to Springville Crossing (6.6 miles)

Although this reach of the Diamond Fork above the Three Forks confluence will not be impacted by the Bonneville Unit of the Central Utah Project, it does provide an opportunity for aquatic mitigation in the vicinity of the Collection System. This 6.6 mile stream reach was examined by Trout Habitat Specialists (1987g) and instream structures were recommended. Placement of the recommended structures would mitigate 264 angler days annually.

North Fork Duchesne River-Hades Creek to West Fork Confluence (6.0 miles)

This stream reach extends from Hades Creek downstream to the confluence of the West Fork. Most of this segment is on the Ashley National Forest with a limited amount on private land. A plan for improving trout habitat in this stream reach was prepared by Trout Habitat Specialists (1987h). If the proposed habitat improvement for this stream reach is completed, a total of 398 angler days would be mitigated annually. A total of 199 angler-day benefits

have been achieved by the habitat improvement pilot study that was completed on this stream segment.

North Fork Duchesne River - Upstream from Hades Creek (5.0 miles)

This reach of the North Fork of the Duchesne River extends 5 miles upstream from Hades Creek and is located entirely on the Ashley National Forest. Eroding banks and lack of trout cover have been identified as major factors that limit trout productivity. Improvement of habitat in this reach has not been evaluated and a development plan would need to be prepared. The Team assumed that habitat improvements would provide benefits similar to the North Fork downstream from Hades Creek. Based on this relationship, it was determined that habitat improvements in this reach of the North Fork could mitigate 332 angler days annually.

West Fork Duchesne River - Upstream from Vat Diversion (10.0 miles)

This reach of the West Fork extends upstream from Vat Diversion for 10 miles and is located on the Uinta National Forest. This stream reach has not been evaluated with regard to habitat improvement needs or benefits that could be expected. Specific plans for this stream reach will need to be developed. The Team assumed that habitat improvements would provide benefits similar to those expected in the West Fork downstream from the diversion. Based on this relationship, it was determined that habitat improvements in this stream reach would mitigate about 748 angler days annually.

South Fork Rock Creek-Upstream from Doc's Diversion (3.0 miles)

This reach of the South Fork of Rock Creek extends upstream from the Doc's Diversion for 3 miles. The stream is located entirely on the Ashley National Forest. Trout habitat benefits expected with habitat improvements have not been evaluated. Specific plans for this stream reach will need to be developed. It is expected that benefits would be similar to benefits estimated for the West Fork Duchesne River. Based on this comparison, it was determined

that about 224 angler days annually could be mitigated by constructing habitat improvement structures in this stream reach.

Diamond Fork - Upstream from Springville Crossing (4.0 miles)

This stream reach is located on the Uinta National Forest and would provide an opportunity for aquatic mitigation on public land in the vicinity of the Collection System. Plans for habitat improvement structures in this stream reach will need to be developed. It was assumed that benefits would be similar to those estimated for the upper Diamond Fork. Based on this comparison, it was determined that habitat improvement in this reach of the Diamond Fork would mitigate a total of 160 angler days per year.

Other Candidate Stream Segments

Other candidate stream segments for habitat improvements have be identified. If adequate mitigation benefits for habitat improvements are not provided by the 14 identified stream segments, the aquatic mitigation plan will be modified to include other stream segments.

Tributary streams to Strawberry Reservoir upstream from Soldier Creek Dam are leading candidate stream segments. A total of 69 miles of tributary streams have been identified and it is extremely important that habitat improvements on these streams be completed no later than Fiscal Year 1992. Implementation by this date is required to obtain maximum long-term benefits from the fish eradication and restocking program for the Strawberry Reservoir. Other funding programs may be forthcoming that would allow habitat improvements on these stream segments to be completed within the desired time period. Because of these potential funding programs, habitat improvements on these stream segments were not included in this aquatic mitigation plan. If these funds do not become available, the addition of the Strawberry tributaries into the aquatic mitigation plan will be reevaluated.

EGG-TAKING STATION

For over 40 years, the Division has operated a trout egg-taking station on the Strawberry River immediately upstream of Strawberry Reservoir. The enlargement of Strawberry Reservoir would result in the loss of this egg-taking station through reservoir inundation. In recent years, the Division has collected between 1.2 and 1.8 million trout eggs annually at the station. Most of the trout reared from these eggs are stocked in Utah lakes. In addition, a small percentage of the reared trout are stocked in streams located in the vicinity of the Collection System.

The exact number of stream angler days that are satisfied by the stocking of trout from the egg-taking station is difficult to determine because of a number of factors that affect the level of overall success. Some of these factors include: stocking rates, survival rate of stocked fish, percent of fish harvested and the number of fish caught per angler day. An extended discussion was held with the Division regarding these factors. The following assumptions were agreed upon to evaluate benefits of the new egg-taking station: (1) the ability to produce eggs will be increased by 500,000; (2) four percent of the fish produced will be stocked in project area streams; (3) seventy-five percent of the fish will survive to catchable size (3 per pound); (4) the harvest rate will be about 30 percent; and (5) the catch rate will be approximately 2.5 fish/angler day. Based on these assumptions, benefits of 1,800 angler days may be credited to mitigation as a result of the new facility.

IMPLEMENTATION PLAN

Because aquatic mitigation for the Collection System has not been concurrent with construction, an aggressive aquatic mitigation program should be undertaken by the Bureau. This program should be continued until all 34,090 angler days are mitigated. More emphasis should be placed on the acquisition of streamflow, especially the Strawberry Exchange and the acquisition of angler access. Mitigation associated with the acquisition of water, acquisition of angler access, and instream habitat structures should be implemented concurrently. The Team has prepared an implementation schedule that would

result in aquatic mitigation for the Collection System being provided in an orderly manner and completed by 1997. The type and amount of mitigation required each year is shown below. This schedule should be closely followed to assure the timely and orderly completion of required mitigation. The Service will prepare an annual assessment of the mitigation accomplishments.

Fiscal Year - 1988

Acquisition of Water

- Supplemental Analysis for Strawberry Exchange Plan
- Analysis of Sixth Water Exchange

Acquisition of Angler Access

- None

Fish Habitat Improvement

- Rock Creek (2.0 miles)
- North Fork Duchesne River downstream from Hades Creek to West Fork confluence (3.0 miles)
- West Fork Duchesne River downstream from Vat Diversion (1.0 mile)

Fiscal Year - 1989

Acquisition of Water

- Finalize Strawberry Exchange Plan
- Evaluate and Finalize Sixth Water Exchange

Angler Access

- Strawberry River on Camelot Property (6.5 miles)
- Strawberry River downstream from Starvation Dam (2.0 miles)

- Currant Creek - both sides (2.5 miles)
- Currant Creek - one side (6.4 miles)

Fish Habitat Improvement

- Currant Creek (4.4 miles)
- Rock Creek (4.0 miles)
- Diamond Fork-Three Forks to Springville Crossing (2.5 miles)
- Design work on Provo River downstream from Jordanelle Dam (10.0 miles), Strawberry River downstream from Soldier Creek Dam (6.0 miles), and North Fork Duchesne River upstream from Hades Creek (5.0 miles)

Fiscal Year - 1990

Acquisition of Water

- Implement Strawberry Exchange Plan

Angler Access

- Strawberry River from Soldier Creek Dam to Camelot property (11.2 miles)
- West Fork Duchesne River downstream from Vat Diversion (9.3 miles)
- Duchesne River downstream from confluence of North and West Fork (7.0 miles)

Fish Habitat Improvement

- Strawberry River downstream from Starvation Dam (2.1 miles)
- Currant Creek (7.8 miles)
- Rock Creek (2.0 miles)
- Diamond Fork upstream from Three Forks (2.5 miles)
- North Fork Duchesne River upstream from Hades Creek (1.7 miles)

- Design work on South Fork Rock Creek (5.0 miles), Diamond Fork upstream from Springville Crossing (4.0 miles), and West Fork Duchesne River upstream from Vat Diversion (10.0 miles)

Fiscal Year - 1991

Acquisition of Water

- Complete the Implementation of the Strawberry Exchange Plan

Angler Access

- None

Fish Habitat Improvement

- Diamond Fork upstream from Three Forks (1.6 miles)
- Strawberry River downstream from Soldier Creek Dam (6.0 miles)
- Diamond Fork upstream from Springville Crossing (1.0 mile)
- West Fork Duchesne River upstream from Vat Diversion (10.0 miles)
- North Fork Duchesne River upstream from Hades Creek (1.7 miles)
- Strawberry River downstream from Starvation Dam (2.1 miles)

Fiscal Year - 1992

Acquisition of Water

- None

Angler Access

- None

Fish Habitat Improvement

- South Fork Rock Creek (1.5 miles)

- Diamond Fork upstream from Springville Crossing (3.0 miles)
- Provo River downstream from Jordanelle Dam (10.0 miles)
- North Fork Duchesne River upstream from Hades Creek (1.6 miles)
- Strawberry River downstream from Starvation Dam (2.0)

Fiscal Year - 1993

Acquisition of Water

- None

Angler Access

- None

Fish Habitat Improvement

- Strawberry River upstream from Strawberry Reservoir (16.1 miles)
- South Fork Rock Creek (1.5 miles)

Fiscal Year - 1994

Acquisition of Water

- None

Angler Access

- None

Fish Habitat Improvement

- West Fork Duchesne River downstream from Vat Diversion (4.8 miles)
- Strawberry River upstream from Strawberry Reservoir (1.8 miles)

Fiscal Year - 1995

Acquisition of Water

- None

Angler Access

- None

Fish Habitat Improvement

- West Fork Duchesne River downstream from Vat Diversion (4.5 miles)

Fiscal Year - 1996

Acquisition of Water

- Implement Sixth Water Exchange

Angler Access

- None

Fish Habitat Improvement

- Sixth Water Creek (7.5 miles)
- Design work on Diamond Fork Creek downstream from Monks Hollow Dam (8.0 miles)

Fiscal Year - 1997

Acquisition of Water

- None

Angler Access

- None

Fish Habitat Improvement

- Diamond Fork Creek downstream from Monks Hollow Dam (8.0 miles)

The Team realizes that numerous factors may affect the precise schedule and the mitigation that can be implemented by the Bureau. If factors cause the schedule to change, the Bureau should provide additional effort in subsequent years to assure that the identified schedule is maintained.

Overall mitigation for angler access and fish habitat improvements should not exceed 13,725 and 9,790 angler days, respectively. With the high priority the Team places on streamflow, at least 10,000 angler days of mitigation should be provided by acquisition of water. However, if additional water can be acquired that would provide mitigation benefits in excess of 10,000 angler days, these benefits would be recognized by the Team and appropriate adjustments would be made to fish habitat improvement mitigation needs.

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_____, 1987c. Trout habitat improvement plan for Rock Creek in the Ashley National Forest, Duchesne County, Utah. Design Package Report Number 3 prepared for the USDA Forest Service, Uinta National Forest, Provo, Utah. 56 pp.

_____, 1987d. Trout habitat improvement plan for West Fork of Duchesne River in Wasatch County, Utah. Design Package Report Number 4 prepared for the USDA Forest Service, Uinta National Forest, Provo, Utah. 63 pp.

_____, 1987e. Trout habitat improvement plan for the Strawberry River above Strawberry Reservoir, Utah. Design Package Report Number 2 prepared for the USDA Forest Service, Uinta National Forest, Provo, Utah. 55 pp.

_____, 1987f. Trout habitat improvement plan for Sixth Water Creek in the Uinta National Forest, Utah. Design Package Report Number 8 prepared for the USDA Forest Service, Uinta National Forest, Provo, Utah. 51 pp.

_____, 1987g. Trout habitat improvement plan for the Upper Diamond Fork in the Uinta National Forest, Utah. Design Package Report Number 7 prepared for the USDA Forest Service, Uinta National Forest, Provo, Utah. 50 pp.

_____, 1987h. Trout habitat improvement plan for North Fork of Duchesne River, Ashley National Forest, Utah. Design Package Report Number 5 prepared for the USDA Forest Service, Uinta National Forest, Provo, Utah. 44 pp.

APPENDIX A

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
1311 FEDERAL BUILDING
125 SOUTH STATE STREET
SALT LAKE CITY, UTAH 84138-1197

(ES) July 31, 1984

MEMORANDUM

TO: Projects Manager, Utah Projects Office
Bureau of Reclamation
Provo, Utah

FROM: Acting Field Supervisor
Ecological Services
Salt Lake City, Utah

SUBJECT: Evaluation of Stream Fisheries in Relation to Alternatives for Accomplishing the Strawberry Exchange Plan

Attached is a copy of the subject report and letters of comments from Regional Forester J.S. Tixier, U.S. Forest Services, dated July 5, 1984; and Acting Director William H. Geer, Utah Division of Wildlife Resources, dated July 5, 1984. This evaluation was prepared by the Interagency Aquatic Biological Assessment Team. Your staff requested this evaluation for use in a report that you are preparing that will address the engineering, economic, and social impacts of alternatives.

The Forest Service and Division of Wildlife Resources question the preference arrangement that the Team assigned to different alternatives, but concur in the fisheries evaluations. The Fish and Wildlife Service concurs in the report evaluations as well as the priority assignments to alternatives.

The Strawberry Exchange is one of our highest priority measures for the mitigation of fishery losses attributed to the Strawberry Aquaduct and Collection System, and the identification of a preferred alternative and action for its implementation warrant vigorous pursuit. I feel that the subject report should be useful as a planning aid for determining which alternatives

LColborn:vc

useful as a detailed consideration. We wish to continue to work closely with you and the other involved agencies in regard to this mitigation item.

3 Enclosures

cc: Regional Director, Upper Colo Regional Office, USBR, Salt Lake City, Utah
Director, UDWR, Salt Lake City, UT
Regional Forester, Intermountain Region, USFS, Ogden, UT
Forest Supervisor, Uinta National Forest, USFS, Provo, UT
CUP Liasion Officer, USFS, Provo, UT
RO (HR), Denver, CO
FWS/ES, Washington, D.C.

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
1311 FEDERAL BUILDING
125 SOUTH STATE STREET
SALT LAKE CITY, UTAH 84138-1197

(ES) July 17, 1984

MEMORANDUM

TO: Assistant Field Supervisor
Ecological Services, FWS
Salt Lake City, Utah

FROM: Interagency Aquatic Biological Assessment Team Leader

SUBJECT: Evaluation of Stream Fisheries in Relation to Alternatives for Accomplishing the Strawberry Exchange Plan

In response to a request from the Utah Projects Office, Bureau of Reclamation, Provo, Utah, the Team has evaluated the stream fishery aspects of seven alternatives to accomplish the subject mitigation feature. Biologists who particiated in the evaluation include: Robert Black and James Romero of the Bureau of Reclamation; Alvin Mills and Robert Hurley of the Forest Service; Maureen Wilson of the Utah Division of Wildlife Resources; Quentin Bliss, consultant for the Central Utah Water Conservancy District; and Leon Colborn of the Fish and Wildlife Service.

The analysis utilized a fish habitat model developed by Binns and Eiserman (1979)1/ and creel data provided by the Utah Division of Wildlife Resources. The following assumptions were made: (1) fish will enter the creel after age 1; (2) the harvest rate will be 30 percent annually; (3) the combined harvest and natural mortality rate will be 60 percent annually; and (4) fish that are 4 years old and older will not contribute significantly to the creel. Following is a description of the seven evaluated alternatives addressed in their biologically preferred order. A summary of the benefits and negative impacts associated with the alternatives is shown in Table 1.

1/Binns, N.A., and F.M. Eiserman. 1979. Quantification of fluvial trout habitat in Wyoming. Trans. Am. Fish. Soc. 108:215-228.

TABLE I - Summary of Strawberry Exchange Alternatives

ALTERNATIVES	IMPACTS				
	Beneficial		Adverse		Net
(In Priority Order)	Angler Days	Other	Angler Days	Other	Angler Days
1. Water rights purchase (3,370 acre-feet)	10,225	Water to streamflow agreement	-1,000 (Daniels Creek)	Reduced irrigation - 1,000 acres	9,225
2. Purchase land with water rights (approx. 1,000 acres - 2,370 acre-feet)	10,225	Water to streamflow agreement; Potential wildlife enhancement	-1,000 (Daniels Creek)	Reduced irrigation; Reduced tax base	9,225
3. Jordanelle Reservoir (Pump 3,370 acre-feet)	10,225	Irrigation water on demand. Water to Streamflow Agreement	-1,000 (Daniels Creek)	Construction impacts (pipeline and canal) on vegetation/wildlife	9,225
4. Strawberry Reservoir (Pump 3,370 acre-feet)	10,225	Irrigation water on demand		Construction impacts (pipeline) on vegetation/wildlife; Erosion in upper Daniels Creek	10,225
5. Bjorkman Hollow Dam *	10,225	None	-28 (Bjorkman Hollow)	Construction impacts (pipeline and dam) on vegetation/wildlife	10,197
6. Mill 9 Flat Dam (Strawberry River) *	10,225	None	-370 (Strawberry River and Mill 9 Creek)	Construction impacts (pipeline and dam) on vegetation/wildlife; Blockage of spawning run; Inundation of spawning habitat	9,855
7. Broken Dam (Mill B Creek) *	10,225	None	-25 (Mill B Creek)	Construction impacts (pipeline and dam) on vegetation/wildlife; Blockage of spawning run; Inundation of spawning habitat; Water rights issue	10,200

* Reservoir system fixed to provide a minimum of 3,370 acre-feet

1. Acquire the rights to 3,370 acre-feet of water presently diverted from the upper Strawberry River and delivered to Heber Valley via the Strawberry River and Hobble Creek ditches to Daniels Creek Drainage. This would restore historic streamflows and trout habitat in 20.6 miles of the upper Strawberry River, 4.5 miles of Willow Creek, 4.8 miles of Bjorkman Hollow Creek and 2.6 miles of Hobble Creek. Strawberry River Ditch and Hobble Creek diversions into Daniels Creek would be terminated with a subsequent loss of 1,000 angler days. Flows in Daniels Creek would no longer be supplemented and fishing would be limited to a 9.5 mile segment and primarily dependent upon stocking. Annual net benefits of this alternative are 9,225 angler days and 3,370 acre-feet of water that would help meet obligations of the Streamflow Agreement. The reduction of irrigation water in the Heber Valley would be a negative impact to irrigation.

2. Acquire approximately 1,000 acres of irrigated lands in Heber Valley to obtain 3,370 acre-feet of associated water rights. This would have the same effect on streamflows and result in the same fisheries benefits and water for meeting terms of the Streamflow Agreement as Alternative 1. With this alternative, the acquired land, as well as other lands that are in a wildlife mitigation banking status, could be managed for wildlife habitat to help mitigate losses that may be attributed to various other Bureau of Reclamation projects. These lands would not be acquired with any of the other six alternatives. The reduction of irrigation water in the Heber Valley would be a negative impact to agriculture.

3. Negotiate an exchange of water from Jordanelle Reservoir to replace the 3,370 acre-feet of water annually diverted into Daniels Creek for the irrigation of land in Heber Valley. In order to secure the needed water from Jordanelle Reservoir, a 5.6 mile long canal from Jordanelle Reservoir to Heber Valley, a 5.7 mile long 24-inch pipeline in Heber Valley and a pumping facility would be required.

   This alternative would have the same effect on streamflows and result in the same fisheries benefits and water for meeting terms of the Streamflow Agreement as alternatives 1 and 2. There would be adverse impacts to vegetation and wildlife along canal and pipeline corridors. Additional flexibility to use irrigation water when needed and enhanced efficiency from an improved delivery system would be provided.

4. Replace the 3,370 acre-feet of water that is annually diverted from the upper Strawberry River system by pumping from the enlarged Strawberry Reservoir to the Daniels Creek system. This alternative would require construction of a buried pipeline extending from Strawberry Reservoir to the Daniels Creek system.

This would have a similar effect on streamflows as alternatives 1, 2 and 3; however, flows in Daniels Creek would not be changed and angler day losses in that stream would not occur. Annual net angler day benefits realized with this alternative are 10,225. There would be no additional water added to the Strawberry Reservoir Basin that could contribute toward meeting obligations of the Streamflow Agreement which would make this alternative less desirable than alternatives 1, 2 and 3. In addition, temporary vegetation and wildlife habitat losses would occur along the pipeline corridor. Additional flexibility to use irrigation water when needed and enhanced efficiency from an improved delivery system would be provided.

5. Construction of a reservoir in the Bjorkman Hollow narrows to impound water from Currant, Bjorkman Hollow and Willow creeks; and constructing a buried pipline from Currant Creek to the Willow Creek Ditch. This alternative would result in net benefits of 10,197 angler days annually. Although the angler day benefits would be greater with this alternative than with alternatives 1, 2 or 3, it is less desirable because of dam construction, reservoir inundation and pipeline construction impacts on wildlife habitats.

6. Construction of a dam on the Strawberry River at Mill B Flat. Although this alternative would result in a net increase of 9,856 angler days annually, it is unacceptable because of detrimental impacts associated with inundation of prime spawning habitat and blockage of spawning runs in the upper Strawberry River and Mill B Creek. It is also undesirable because of dam construction and reservoir inundation impacts on wildlife habitats.

7. Construction of a dam in Mill B Canyon at the Broken Dam Reservoir site and construction of a buried pipeline from Currant Creek to the Mill B Canyon Dam site. This alternative would result in net benefits of 10,200 angler days annually. Although the angler day benefits would be greater with this alternative than with alternatives 1, 2 or 3, it is less desirable because it would block spawning migrations, inundate spawning habitat, and have greater adverse wildlife impacts associated with the construction of the dam and reservoir inundation. This may be an unacceptable alternative because of unresolved water rights issues.

Leon J. Lobson

APPENDIX B

United States Department of Agriculture
Forest Service
Intermountain Region
324 25th Street
Ogden, UT 84401

Reply to: 2510

Date: JUL 5 1984

U S FISH AND WILDLIFE
RECEIVED
JUL 09 1984
SALT LAKE CITY
AREA OFFICE

Mr. Clark D. Johnson
Assistant Field Supervisor
Fish and Wildlife Service
1311 Federal Building
125 South State Street
Salt Lake City, UT 84138

Dear Clark:

We have reviewed the draft report on alternatives for accomplishing the Strawberry Exchange Plan, as you requested.

The restoration of normal flow to the Upper Strawberry River and its tributaries would be a significant contribution toward mitigating losses of aquatic habitat due to the Central Utah Project.

It would appear that all seven alternatives have merit. The first four alternatives have specific beneficial advantages over the last three. However, there is not sufficient information provided to determine whether the listed priority ranking is the most feasible selection. We suggest that a preliminary cost analysis be made to determine if significant cost differences exist among the alternatives and what the tradeoffs would be including socioeconomic impacts. The beneficial and adverse impacts displayed do not provide sufficient information for us to make that determination. We believe such an analysis would easily eliminate some alternatives and aid in selection of a preferred alternative.

Thank you for the opportunity to review and comment on the draft report.

Sincerely,

for J. S. TIXIER
Regional Forester

STATE OF UTAH
NATURAL RESOURCES & ENERGY
Wildlife Resources

Scott M. Matheson, Governor
Temple A. Reynolds, Executive Director
Douglas F. Day, Division Director

1596 West North Temple - Salt Lake City, UT 84116 - 801-533-9333

RECEIVED
JUL 06 1984
SALT LAKE CITY
AREA OFFICE

July 5, 1984

Mr. Clark Johnson, Asst. Field Supervisor
Ecological Services
U.S. Fish and Wildlife Service
125 South State Street, Room 1311
Salt Lake City, UT 84138-1197

Subject: Alternatives for accomplishing the Strawberry Exchange Plan (dated May 3, 1984); Strawberry Aqueduct and Collection System; Bonneville Unit, Central Utah Project.

Dear Clark:

We have reviewed the subject report on the Strawberry Exchange Plan alternatives drafted by the Interagency Aquatic Biological Team, and agree with the report's analysis. The Strawberry exchange plan is one of our highest mitigation priorities.

We do, however, have one comment on Alternative 2. Water rights may not be available for purchase without associated lands with already over 9,500 acres in the collection system "mitigation bank". The acquistion of additional land could not be justified, making Alternative 2 less preferable.

Thank you for the opportunity for input.

Sincerely,

William H. Geer, Acting Director
DIVISION OF WILDLIFE RESOURCES

Board/Warren T. Harward, Chairman • L. S. Skaggs • Lewis C. Smith • Jack T. World • Roy L. Young

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Department of Agriculture
Service
National Forest
Provo, UT 84603

Reply to: 2510

Date: JUL 2 7 1988

U S FISH & WILDLIFE
SLC UTAH

Robert Reusink
State Supervisor
Fish and Wildlife Service
1745 West 1700 South
Salt Lake City, UT 84104

Dear Robert:

We have reviewed the Draft Aquatic Mitigation Plan for Strawberry Aqueduct and Collection System. A copy of the report is enclosed with our proposed changes written in the margins.

We appreciate the opportunity to review the plan.

Sincerely,

Walter E. Hanks

WALTER E. HANKS
CUP Liaison Officer

Enclosure

Caring for the Land and Serving People

STATE OF UTAH
NATURAL RESOURCES
Wildlife Resources

Norman H. Bangerter, Governor
Dee C. Hansen, Executive Director
William H. Geer, Division Director

96 West North Temple · Salt Lake City, UT 84116-3154 · 801-533-9333

U S FISH & WILDLIFE
SLC UTAH

August 4, 1988

Mr. Robert Ruesink
State Supervisor
U.S. Fish and Wildlife Service
2078 Administration Building
1745 West 1700 South
Salt Lake City, Utah 84104

Subject: Review of draft Aquatic Mitigation Plan for Strawberry Aqueduct and Collection System.

Dear Bob:

Thank you for the opportunity to review and comment on the draft Aquatic Mitigation Plan (Plan). We consider the efforts of the Interagency Aquatic Biological Assessment Team (Team) vital to the mitigation process, and generally support their recommendations.

Enclosed is a "marked-up" copy of the draft Plan, which suggests a number of minor editorial changes. We hope these comments are useful to the Team. Please forward the copy to Leon Colborn for consideration.

We do have a substantial suggested change to the draft Plan. We strongly encourage the Team to reinstate the rehabilitation of approximately 69 miles of Strawberry Reservoir tributary streams into the Fish Habitat Improvement Measures section of the Plan. The 69 miles of tributaries collectively represent the majority of potential spawning streams for salmonid fishes in Strawberry Reservoir. As you are aware, chemical rehabilitation of Strawberry Reservoir is planned for 1989. Recovery of degraded tributaries to prime spawning habitat is instrumental to the long-term success of the renovation. Earlier commitments from the Team, as well as the resource agencies, supported the need to rehabilitate the tributary streams, and the appropriateness of mitigation credit for this purpose. The Team's support and involvement in developing the necessary plans is desirable, and can only be assured by including rehabilitation of the tributaries in the Plan.

Thank you for the opportunity to provide these comments.

Sincerely,

William H. Geer
Director

Enclosure

UNIT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
FISH AND WILDLIFE ENHANCEMENT
UTAH-COLORADO FIELD OFFICE
2060 ADMINISTRATION BUILDING
1745 WEST 1700 SOUTH
SALT LAKE CITY, UTAH 84104-5110

TAKE PRIDE IN AMERICA

IN REPLY REFER TO

(FWE)

December 13, 1988

McCue 12/13/88
12/13/88
12/13/88

MEMORANDUM

TO: Regional Director, Upper Colorado Region, Bureau of Reclamation, Salt Lake City, Utah

FROM: Field Supervisor, Fish and Wildlife Enhancement, Fish and Wildlife Service Salt Lake City, Utah

SUBJECT: Aquatic Mitigation Plan for the Strawberry Aqueduct, Bonneville Unit, Central Utah Project

Enclosed is a copy of the subject report, which was prepared jointly by biologists of the Utah Division of Wildlife Resources (Division), U.S. Forest Service (Forest), Central Utah Water Conservancy District (District), the Bureau of Reclamation (Bureau), and this office, the U.S. Fish and Wildlife Service (Service). The report fulfills a requirement of the September 25, 1981 "Memorandum of Agreement between the Fish and Wildlife Service and Bureau of Reclamation Relative to the Agreement on Minimum Streamflows Affected by the Strawberry Aqueduct and Collection System, Bonneville Unit, Central Utah Project" that requires the preparation of a total aquatic mitigation plan on the project in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

Letters of comments on a draft of the report were received from all of the involved agencies except the District. Some of the responses included edited copies of the report. Copies of the letters are included in Appendix B of the report, but we did not include the edited copies of the draft report that accompanied them. Most of the suggestions called for changes in the schematics. These changes were made and we feel that it improved the quality of the final product.

The subject plan included measures that would totally mitigate aquatic impacts attributable to the Strawberry Aqueduct and Collection System; however, some of the recommended mitigation items are located within areas of influence of the Municipal and Industrial System or Diamond Fork Power System rather than the subject project area. This caused some confusion. Changes were made in the final report to indicate which of the features are outside of the Strawberry Aqueduct and Collection System project area. The report refers to these as "off-site" mitigation components.

The Division has requested that fisheries habitat improvements on 69 miles of tributary streams to Strawberry Reservoir be included as a segment of the subject aquatic mitigation plan. It is extremely important that both the trawberry Exchange (a component of the mitigation plan) and habitat mprovement work on the tributary streams be completed no later than Fiscal Year (FY) 1992. The scheduled date for completion of the Strawberry Exchange in the mitigation plan is FY 1991. The early completion of stream habitat improvements and the Strawberry Exchange is necessary for maximizing long-term benefits from the fish eradication and restocking program for the Strawberry Reservoir that is scheduled for the Fall of 1989.

Prerequisites for the installation of fish habitat improvements on the Strawberry Reservoir tributaries will be: (1) livestock grazing on streams that are to be improved must be controlled; and (2) detailed plans for the structures need to be developed. On the basis of experience gained from the Pilot Project Program and evaluations used in the subject plan evaluations, it is expected that the improvement of 69 miles of these tributary streams would provide additional benefits of 1,150 angler-days annually. The initial cost for these improvements would be about $1,722,500.

Neither the subject mitigation plan nor the agreement that was executed between involved agencies, "Interagency Acquisition for Design and Implementation of Fish Habitat Improvement Plan for Aquatic Mitigation -- Strawberry Aqueduct and Collection System -- Bonneville Unit -- Central Utah Project", provides for fish habitat improvements on the Strawberry Reservoir tributaries. However, the agreement is flexible enough so that modifications could be made at a later date to accomplish needed stream improvements if the Interagency Coordinating Committee finds that such changes are advisable.

he Service recognizes the importance of improving habitat on the tributary streams at an early date; however, we are hopeful that funds to accomplish this, under other programs, will be forthcoming. We believe that the Interagency Coordinating Committee will have a better understanding of funding that may be available from other programs after January 1, 1989. The Service would be agreeable to modifying the mitigation plan and the Interagency Acquisition agreement, if necessary, to accomodate the needed improvements provided that no more than 9,790 angler-days of mitigation are credited as accomplished by habitat improvements. That means that if habitat improvements are to be installed on the Strawberry Reservoir tributaries, some of the habitat improvements that are planned elsewhere would be forgone.

We appreciate the assistance that your staff provided in the development of this aquatic mitigation plan.

Robert L. McCue

Enclosure

cc: Projects Manager/BR

UDWR/SLC

Regional Forester/Intermountain Region

Forest Supervisor, Ashley National Forest/Vernal, Utah

Forest Supervisor, Uinta National Forest/Provo, Utah

CUP Liaison Officer, Uinta National Forest/Provo, Utah

General Manager, Central Utah Water Conservancy District/Orem, Utah

Jim Henriksen, National Ecology Center, FWS, 2627 Redwing Road, Creek Side One, Fort Collins, Colo. 80526-2899

Dr. Timothy Modde, Assistant Unit Leader, Utah Cooperative Fish and Wildlife Reasearch Unit, Utah State University 84322-5210

bcc: AWE/Mail Stop 60120
Project file
Reading file

LGC/jm: 12-6-88
STREPORT.WP2

Central Utah Project Completion Program

Attachment D

October 2004

UTAH RECLAMATION
MITIGATION
AND CONSERVATION
COMMISSION

Attachment D

ATTACHMENT D

1990 AMENDMENT TO STREAM FLOW AGREEMENT

AMENDMENT TO AGREEMENT

THIS AMENDMENT TO AGREEMENT is made and entered into in Salt Lake City, Utah, this 13th day of September, 1990, by and among the UNITED STATES OF AMERICA, acting through the Secretary of Interior, and pursuant to Federal Reclamation laws, and the Fish and Wildlife Coordination Act, hereinafter called "United States"; STATE OF UTAH, by and through its Governor, hereinafter called "Utah"; and CENTRAL UTAH WATER CONSERVANCY DISTRICT, a water conservancy district organized and existing pursuant to the laws of the State of Utah, hereinafter called "District",

RECITALS:

The parties to this Amendment to Agreement heretofore entered into an Agreement dated February 27, 1980, providing for the Bonneville Unit of the Initial Phase of the Central Utah Project (hereinafter called "Project"), to provide up to 22,300 acre-feet of Project water for instream use, to assist in a cooperative effort to secure enough water for stream flow maintenance to retain 50% of the historic adult trout habitat in Strawberry River, Rock Creek, West Fork Duchesne River and Currant Creek, as shown in a report of May 1979 entitled "Summary of Analyses of Alternate Stream Flows", and as more particularly set forth in said 1980 Agreement.

Federal funding authorizations for the Colorado River Storage Project ("CRSP") and consequently the Bonneville Unit of the Central Utah Project, a subdivision of the CRSP, are anticipated to soon be exhausted, leaving the Project substantially short of completion. The District is presently petitioning

Congress for funding authorization which would permit completion of the Project.

It is anticipated that Congress will require as a condition to increasing the funding authorization for CRSP that the amount of Project water to be committed to stream flow maintenance will be increased from the present 22,300 acre-feet committed by the above noted 1980 Agreement to 44,400 acre-feet. The purpose of this Amendment is to subject any such additional Project water committed to stream flow maintenance to the terms and conditions of the 1980 Agreement and to provide for the downstream recapture of said water by the Project and to otherwise amend said 1980 Agreement in regard thereto, as herein provided.

NOW, THEREFORE, the parties hereto agree to the following terms and conditions:

1. It is mutually agreed that any additional Project water appropriated under state law hereafter committed by Congress to the maintenance of minimum stream flows for fish habitat protection in the Uinta Basin shall be subject to and shall be delivered and used in accordance with the terms and conditions of the said Agreement of February 27, 1980, as supplemented hereby.

2. The parties acknowledge that the 1980 Agreement committed the parties to endeavor to increase the water available for stream flow maintenance to 44,400 acre-feet by additional construction, appropriation, purchase or otherwise. Such an increase above the 22,300 acre-feet of Project water heretofore committed has not occurred. It is, however, acknowledged that the District and the United States have voluntarily undertaken to provide 44,400 acre-feet of water annually for stream flow

maintenance during the interval between the 1980 Agreement and the time when full Project demand will occur. The District is also willing to forego part of the planned transmountain diversion, so as to permit a total of 44,400 acre-feet of Project water, except during periods of drought, to be retained in the Uinta Basin for fish habitat protection, but only if Congress authorizes construction of the proposed irrigation and drainage system, as heretofore planned, and also authorizes the federal portion of a state and federal program for construction of the proposed irrigation and drainage system, as heretofore planned. However, this Amendment will not become effective and will be null and void unless and until legislation providing such congressional authorization has been enacted. All Project water committed by the Congress, or by the 1980 Agreement, as supplemented hereby, will be governed by the 1980 Agreement, as so supplemented, and these agreements shall be construed and administered under and in accordance with the laws of the State of Utah. In this regard the District asserts that it was agreed in the 1965 Repayment Contract, as supplemented, that the District would pay the reimbursable costs of the irrigation, municipal and industrial water to be developed by the Project, as said costs are allocated under Federal Reclamation law, and in return the United States agreed that the District would, in perpetuity, have the use of the Project water supply. Out of the 313,000 acre-feet of water which the Project initially proposed to develop, it was contemplated that 136,600 acre-feet would be available to be diverted by transmountain diversion from the Uinta Basin to the Bonneville Basin. The Project also was

intended to develop an additional 6,500 acre-feet (that is, additional to the 136,600) for maintenance of Uinta Basin stream flows. Part of the 136,600 acre-feet of water was intended to be used by exchange as needed to replace water in Utah Lake so that Provo River water can be withheld and stored in Jordanelle Reservoir, and that use may still be required. The plan proposed to take most of the remainder of said transmountain diversion water to the south to be used for irrigation purposes, but with the right to convert to municipal and industrial uses, all as is set forth in the Repayment Contract between the District and the United States.

3. This commitment of Project water in the amount of 44,400 acre-feet will supersede the provisions of the 1980 Agreement, which committed the parties to proceed jointly to develop or acquire additional water (above the 22,300 acre-feet of Project water committed thereby) for stream flow maintenance. In lieu of said commitment to proceed jointly to develop or acquire additional water, the District and the United States have hereby increased the commitment of Project water for stream flow maintenance from 22,300 acre-feet committed in the 1980 Agreement to 44,400 acre-feet agreed to herein. Therefore, said Agreement for joint development of water is superseded hereby.

4. The 44,400 acre-feet of Project water committed for fish habitat protection under the terms of this Amendment, include the 6,500 acre-feet committed by the District in the April 12, 1965 Agreement, and the 15,800 acre-feet committed by the 1980 Agreement (making the combined total of 22,300 acre-feet of water previously committed). The increase to 44,400 acre-feet of water

per year is thus the total of all Project water committed to stream flow maintenance. However, it is mutually acknowledged that the maintenance of minimum stream flows equal to 50% of the historic adult trout habitat on the four streams identified above would require approximately 54,900 acre-feet and that the difference will be made up by irrigation by-passes and spills to the stream (hereinafter "base flows").

5. It is anticipated that the long-time average annual Project yield of the Strawberry Aqueduct and Collection System, including carry-over storage in the Enlarged Strawberry Reservoir, will provide an average of 44,400 acre-feet for fish habitat protection and an average 100,000 acre-feet per year for transmountain diversion. It is acknowledged that the 44,400 acre-feet will be an annual operational commitment to stream flow maintenance. The 44,400 acre-feet may be used annually, except when sharing shortages, as provided for herein, or on a space available basis may be placed in carry-over storage for future stream flow maintenance. However, it is not contemplated that the use of Project water for transmountain diversion will necessarily be 100,000 acre-feet each and every year; rather, during wet cycles the existing local sources may supply much of the needed water and less Project water may be used during such wet years. In such years, when the water diverted from storage for transmountain diversion is less than 100,000 acre-feet, the excess water will be held in storage, but it will remain Project water. Then at other times more than 100,000 acre-feet may be used for transmountain diversion. There also will be set aside

10,500 acre-feet of storage space in Strawberry Reservoir for minimum stream flow maintenance and water allocated for minimum stream flow maintenance which is unused in any one year may be carried over in such space and will not be spilled when the reservoir fills. Said 10,500 acre-feet of storage space will be filled once with Project water and thereafter will have to be supplied from unused water under the annual allocation, which subject to shortages will be 44,400 acre-feet. All other unused minimum stream flow water which is carried over in storage for minimum stream flow maintenance will become Project water, if it is computed that the reservoir would fill. Water allocated annually for stream flow maintenance may also be carried over in storage on a space available basis from the current year for one more calendar year, but any of such carry-over water not used by December 31st of the said second year will become Project water after said date, or when the reservoir fills, whichever occurs first. In this regard it is recognized that there is no spillway on the Soldier Creek Dam, which creates the present Enlarged Strawberry Reservoir, and elevations of water in Strawberry Reservoir will be controlled by diversions to Strawberry Reservoir by the Strawberry Aqueduct and Collection System and by releases from the reservoir. Thus, when the diversion or releases of water to or from Strawberry Reservoir are stopped because the available storage space is filled, it will be considered, for the purposes of this paragraph, that the reservoir has in legal effect spilled, and any carry-over of minimum stream flow maintenance water, other than such water stored in the above

noted 10,500 acre-feet of reservoir space will become Project water.

6. All Project water released for stream flow maintenance purposes may be rediverted by the District for Project use. Unless the water is retained in the stream because of existing law, or by agreement, the rediversion for Project use may occur at any point below the confluence of the Strawberry River and the Duchesne River, and water up to, but not exceeding 12,000 acre-feet per year may be stored in Starvation Reservoir, so long as such storage does not cause the flows at any point between the Knight Diversion and the confluence of the Duchesne and Strawberry Rivers to drop below 15 c.f.s., nor cause the flows between the Starvation Dam and the confluence of the Strawberry River with the Duchesne River to be reduced to less than 15 c.f.s. In this regard it is acknowledged that the by-pass valve and pipeline have a capacity of 15 c.f.s. when the reservoir is low and a maximum capacity of 22 c.f.s. when the valve and by-pass line are operating under the pressure of a full reservoir. Thus, the flows between Starvation Dam and the confluence of the Strawberry River and the Duchesne River will necessarily fluctuate between a low of 15 c.f.s. and a high of 22 c.f.s. After the Section 7 consultations under the Endangered Species Act are completed, the parties will jointly explore retrofitting the outlet works using Section 8 funds to increase the capacity to by-pass said water. The Utah Division of Wildlife Resources and U. S. Fish & Wildlife Service will retain the option granted in the 1980 Agreement to vary the place of use, such as to decrease the amount in the stream below the Knight Diversion Dam and

increase the flows in the Strawberry River, or make other changes. Until it is resolved whether existing law will require that said entire 44,400 acre-feet of water remain in the Duchesne River until its confluence with the Green River, the District will not redivert above said confluence. In this regard it is mutually acknowledged that instream uses may not, under the present laws of the State of Utah, be considered to be beneficial uses and that water released for instream and/or fishery protection purposes, without any Project plan or intention to recapture the same, may be subject to diversion and use by others holding valid water rights. The right of the Project to recapture and reuse said water will both enhance the economic benefits of the Project and help assure that water released for stream flow maintenance and/or fishery purposes will not be diverted by others with water rights in the same source, but will remain Project water and shall be subject to rediversion and reuse by the Project. The District, after consultation with the U. S. Department of Interior will be responsible for establishing points of rediversion, as required by Utah law.

7. The parties hereto mutually acknowledge that there may be shortages. In the event of shortages, the shortages will be shared on a pro rata basis between the 44,400 acre-feet committed for stream flow maintenance and that portion of the 100,000 acre-feet initially committed for transmountain diversion for irrigation use. As noted above, part of the transmountain diversion water may be needed for exchange purposes in Utah Lake, so that Provo River water may be utilized by the Project for municipal and industrial use. The Deer Creek-Strawberry Exchange Agreement, dated May 16, 1986, among the U. S. Department of the

Interior, through its Bureau of Reclamation, Provo River Water Users' Association, Central Utah Water Conservancy District and Metropolitan Water District of Salt Lake City (which agreement will terminate when Jordanelle Reservoir becomes operational) presently utilizes water from the Strawberry Collection System for municipal use by virtue of that Exchange Agreement. It is agreed that municipal and industrial uses (from the transmountain diversion water) shall be administered as though they had a higher priority than either irrigation or stream flow maintenance water. This will not apply to any water hereafter converted from irrigation to municipal or industrial use.

8. It is contemplated by the parties hereto that in addition to the commitment of 44,400 acre-feet of water to stream flow maintenance that in order to maintain the desired 50% of historic adult trout habitat, that a base flow in each of the four streams noted above is needed to obtain the said 50% level. The base flows available during the irrigation season are there because existing water rights of downstream users entitle them to receive said water. Any upstream change in point of diversion, or place of use, or other use of said water which would adversely affect minimum stream flows will be subject to the requirement that a change application be filed and approved in accordance with state law. Any proposal to divert such water for power generation purposes would also be subject to the requirement that an application to appropriate water for that purpose be filed in accordance with Utah law. The approval process under Sec. 73-3-8 Utah Code Anno. 1953, as amended, involves consideration of the public interest, protection of the natural stream environment and

protection of prior rights, and the United States and the District will join in resisting any such new hydro-power application, including any federal license or permit, which would adversely affect the intent of the parties to provide for stream flow maintenance.

9. The 1980 Agreement in paragraph 3(a) provides that the District will insert in all long-term contracts for the sale and delivery of Bonneville Unit water specific provisions which will enable it, notwithstanding said sales contracts, to assure that it can supply 15,800 acre-feet of water for maintenance of minimum stream flows and fisheries. It also provides that this 15,800 acre-feet, when added to the commitment of 6,500 acre-feet, will assure 22,300 acre-feet of water for such purposes, etc. The District and the United States hereby agree that they will reference that 1980 Agreement and this Amendment in all such future long-term contracts, but will not seek to re-write existing contracts.

10. Any provision of the 1980 Agreement which is inconsistent herewith is superseded and replaced by this Amendment to Agreement. In all other respects the Agreement of the parties entered into on the 27th day of February, 1980 shall remain in full force and effect and unchanged, and all of the provisions thereof will apply to the 44,400 acre-feet, rather than to the 22,300 acre-feet specified in the said 1980 Agreement.

IN WITNESS WHEREOF, the parties hereto have executed this Amendment to Agreement the day and year first above written.

UNITED STATES OF AMERICA

By _____

Its

STATE OF UTAH

By _____
Governor

CENTRAL UTAH WATER CONSERVANCY DISTRICT

By _____
Its President

Attest:

_____
Secretary

The following concur in and agree to the foregoing.

U. S. FISH & WILDLIFE SERVICE
(formerly U. S. Fish & Wildlife Resources)

By _____

U. S. FOREST SERVICE

By _____

UTAH DEPARTMENT OF NATURAL RESOURCES

By _____

UTAH DIVISION OF WATER RESOURCES

By _____

UTAH DIVISION OF WILDLIFE RESOURCES

By _____

Central Utah Project Completion Program

Attachment E

October 2004

UTAH RECLAMATION
MITIGATION
AND CONSERVATION
COMMISSION

Attachment E

PLANNING AID MEMORANDUM

To: Agencies Involved in Reviewing the Status of Environmental Commitments Included in the 1988 Definite Plan Report (See Attached Distribution List)

From: Utah Field Supervisor, Ecological Services, U.S. Fish and Wildlife Service, Salt Lake City, Utah

Date: April 9, 1997

Subject: Results of Consultation Concerning the Status of Certain Environmental Commitments Included in the 1988 Definite Plan Report for the Bonneville Unit, Central Utah Project

This memorandum supersedes our February 21, 1997 memorandum, which transmitted information on the subject commitments and called a February 26, 1997 interagency meeting to discuss these matters.

The purpose of this memorandum is to identify 1988 Definite Plan Report (DPR) commitments that have not been completed and to determine if the commitments are still warranted. The attached list of commitments, based primarily on an analysis by the Department of the Interior's (DOI's) CUP Completion Act Office, was used as an outline in defining actions that require concurrence of this office.

Sec. 301(f)(2) of the Central Utah Project Completion Act pertains to the reallocation of section 8 funds, and states:

> *Reallocation of Section 8 Funds. - Notwithstanding any provision of this Act which provides that a specified amount of section 8 funds available under this Act shall be available only for a certain purpose, if the Commission determines, after public involvement and agency consultation as provided in subsection (g)(3), that the benefits to fish and wildlife, or recreation will be better served by allocating such funds in a different manner, then the Commission may reallocate any amount so specified to achieve such benefits: Provided, however, That the Commission shall obtain the prior approval of the United States Fish and Wildlife Service for any reallocation from fish and wildlife purposes to recreation purposes of any of the funds authorized in the schedule in section 315.*

Under the Fish and Wildlife Coordination Act, the Fish and Wildlife Service (FWS) works closely with the Utah Division of Wildlife Resources (UDWR) and other involved resource management agencies and cooperating agencies, as may be appropriate, in the development of fish and wildlife resource mitigation plans for water development projects. In addition to the February 26, 1997 interagency meeting, we have conducted further review of the items that are shaded on the attached list.

It is our understanding that the Utah Reclamation Mitigation and Conservation Commission (URMCC) intends to issue a draft of their Five Year Plan for review and comments shortly. It is hoped that this memorandum will aid agencies in understanding the FWS's position on components of the subject document. Our comments on these specific items are as follows:

STRAWBERRY AQUEDUCT AND COLLECTION SYSTEM (SACS)

1. Fish screen on intake to Currant Creek Pipeline from its Currant Creek Reservoir outlet to exclude fish.

The purpose of the screen was to keep fish from being lost from Currant Creek Reservoir. Original plans for the outlet were modified by lowering the elevation of the outlet pipeline to a depth where fish escapement from Currant Creek Reservoir would be insignificant.

Recommendation 8 of the 1965 Fish and Wildlife Coordination Act Report, entitled, "Fish and Wildlife Resources in Relation to the Bonneville Unit, Central Utah Project, Initial Phase Utah" was, "that the Currant Creek Reservoir intake to the Strawberry Aqueduct be designed to exclude fish." A Substantiating Report attached to the Fish and Wildlife Coordination report explained the rationale for the recommendation and that plans for the project had been modified to eliminate the need for this screen. The substantiating report states (Page 49), "The intake to the Strawberry Aqueduct in Currant Creek Reservoir will be designed to exclude fish by lowering the intake works to sufficient depth to minimize escapement of fish. Considerable loss of fish into the tunnel section and siphons beyond Currant Creek would likely occur without this modification." In discussing mitigation measures, the August 2, 1973 Final Environmental Statement Authorized Bonneville Unit, Central Utah Project" (INT 73-42), states, "(7) The Currant Creek Reservoir intake to the Strawberry Aqueduct has been designed to exclude fish."

Designs contained in the FEIS eliminated the FWS's concerns. Although it appears that some fish do exit Currant Creek Reservoir via the pipeline, we do not believe it feasible to effectively screen the 10.25 foot diameter, 3,860 foot-long Currant Creek Pipeline with a 620 cfs capacity to exclude fish entry to the enlarged Strawberry Reservoir.

Problems associated with introducing undesirable fish in Strawberry Reservoir were not addressed in the 1965 Fish and Wildlife Coordination Act report or the 1973 EIS. A need to rehabilitate Strawberry Reservoir may develop in future years. Rehabilitation efforts may be undertaken during dry cycles that can be expected at intervals of perhaps 25 years. As with the 1990 rehabilitation effort, any future restoration efforts would not be the responsibility of the Bureau of Reclamation (Reclamation) or the URMCC. This would be a responsibility of the UDWR, although other State and Federal agencies could participate.

2. Angler access to mitigate 12,700 angler-days.

The list indicates that acquisition is an ongoing activity. The URMCC plans a public scoping meeting on this matter in the near future to discuss progress in meeting this commitment. FWS reserves the right to comment further after information from the meeting becomes available, but is satisfied with thci progress that has been made to date.

3. Develop 140 acres of riparian and wetland habitats at Starvation Reservoir.

A 1982 Fish and Wildlife Coordination Act report on the Duchesne River Area Canal Rehabilitation Project contained the following recommendations:

(1) Provisions for development of approximately 145 acres of riparian marsh and riparian/shrub tree complexes at Rabbit Gulch and Salveratus Wash along Starvation Reservoir.

(2) Provisions for improvement of approximately 60 acres of riparian marsh in the Bridgeland East area along the Duchesne River. Improvements should consist of

development of new potholes, enlargement of existing potholes, and a system of connecting canals between the potholes.

(3) Provisions for mule deer protection along the Lower Taylor (Pleasant Valley) and Duchesne Feeder Canals, to include fencing, protected crossing structures, and/or deer escape ramps.

(4) Reclamation of borrow areas to pre-project conditions.

(5) Provisions for development, operation and maintenance funds to be provided by the Bureau to assure the above mitigation recommendations for the life of the project.

(The information provided below was gleaned from a draft Fish and Wildlife Coordination Act Report that was not finalized because of uncertainty when the FWS determined it was not able to commit to managing the Myton mitigation property. The information in the following paragraph was informally coordinated with involved agencies during preparation of the draft report; however, the FWS does not have formal letters to document the dispensation of Recommendations 3 and 4 that appear in the following paragraph. We specifically request comments and/or concurrence in this paragraph from the Central Utah Water Conservancy District (CUWCD), Reclamation, and UDWR.)

Reclamation, the UDWR, and the FWS determined that Recommendation 3 should be deleted because the Lower Taylor and Duchesne Feeder canals are earth lined and not deemed a threat to big game animals. In accordance with Recommendation 4, the CUWCD revegetated all borrow areas used for the project, which complied with that recommendation.

During 1984 through 1987 a pilot project was conducted in regards to development of 145 acres of riparian habitat at Starvation Reservoir in accordance with Recommendation 1. The conclusion drawn from that study was that the pilot effort had been unsuccessful and an alternative mitigation plan should be developed. Also, plans for several of the canal rehabilitation proposals (Tabby and Murray White canals) were modified, resulting in additional losses of 6.11 acres of riparian shrub/tree habitat. By memorandum dated August 16, 1988, Reclamation requested the assistance of FWS in developing a revised mitigation plan.

The revised mitigation plan was initiated, but not finalized. The mitigation plan would have eliminated the need for recommendations 1, 2, and 5 of the 1982 Fish and Wildlife Coordination Act report. The revised plan included acquisition of the 890 acre R.W. Young property with water rights and the 70 acre Ford Finance Corporation property east of Myton, Utah and developing these Myton properties for management to mitigate losses attributed to the project. Reclamation and FWS agreed that losses for the Duchesne River Area Canal Project could be achieved by this action, and Reclamation purchased the land and attached water rights in fee title. It was anticipated the FWS would manage the property; however, the FWS was unable to assume this responsibility. Title to the lands and water rights are presently held by Reclamation.

As is indicated in notes of the list under review, long-term management plans for the area need resolution. Several important matters that must be resolved are the identification of a management entity and means for delivery of water to the lands. A comprehensive study for the management of riparian wetlands along the Duchesne River is in progress including planning for the Wissiups management area and other waterfowl developments along the river.

Both the Ute Indian Tribe and UDWR have great interest in management of wetland and waterfowl resources along the Duchesne River, and both have expressed interest in management of the property.. The UDWR owns and operates the Mallard Springs Wildlife Management Area which is upstream from the property; and the Tribe owns other lands in vicinity of the property, including lands that are traversed by the canal that conveys water to the property.

The FWS intends to confirm with the URMCC that plans for development of the Myton properties mitigate for losses attributable to the Duchesne River Area Canal Rehabilitation Project and work cooperatively towards resolution of management options and development of an approved management plan.

STARVATION COLLECTION SYSTEM

4. Water provided by Taylor Drains to be made available for wildlife use by the Bureau of Land Management (BLM).

Provisions for providing water to the BLM wildlife management area were included in plans for providing supplemental irrigation water in the Pleasant Valley area. These irrigation plans were subsequently abandoned; consequently conveyance facilities for delivery of water to the management area are no longer being planned.

During the February 26, 1997 interagency discussion of this matter, it was agreed that this proposal is no longer feasible.

(The FWS does not have documentation from Reclamation that the Taylor Drains Project has been abandoned. We specifically request that Reclamation and other involved parties that may construct the required conveyance facilities provide comments and/or concurrence in the above statements on this matter.)

MUNICIPAL AND INDUSTRIAL SYSTEM

5. 2-year study of Utah Lake dike modification for channel catfish spawning habitat.

Recommendation 20 of the 1965 Fish and Wildlife Coordination Act report was, "That spawning areas for channel catfish be built in Utah Lake provided that future studies indicate their feasibility." The sustaining report atached to the Fish and Wildlife Coordination Act report gave rationale for the recommendation, which reads as follows:

> "Utah Lake's outstanding fishery for channel catfish is maintained entirely by natural reproduction. Successful spawning of channel catfish depends upon the seclusion afforded by overhead cover. The entire northern half of Utah Lake, with the exception of a few isolated spots, contains little of the necessary kind of cover. The Provo Bay area has many dead trees, which provide numerous spawning sites, but most channel catfish spawning areas are found in and near Goshen Bay. These areas are characterized by rock outcrops and ledges providing numerous crevices in which channel catfish spawn. With the diking of Provo and Goshen Bays, numerous spawning areas will be eliminated.
>
> It is possible that the Goshen and Provo Bay Dikes could be modified to provide sufficient spawning sites to enable the channel catfish population of the lake to continue to maintain itself by natural reproduction after the diking off of Goshen and Provo Bays. However, other measures may be required as well. For this reason the project plan includes a 2-year study to be conducted by the Utah State Department of Fish and Game to provide recommendations or whatever specific developments are needed to mitigate the spawning area losses that will occur."

This matter was discussed during the February 26, 1997 interagency meeting, and there was unanimous agreement that the recommendation was made when diking was part of project plans. Diking is no longer a part of the plans, and there is no longer a need for funding the study.

6. Negotiate for a minimum pool in Utah Lake.

Recommendation 21 of the 1965 Fish and Wildlife Coordination Act report was, "That favorable consideration be given to the request of the Utah State Department of Fish and Game to maintain Utah Lake at a minimum pool elevation of 4,480 feet, representing a maximum drawdown of about 9.3 feet below compromise level, and to negotiate with present Utah Lake users and explore other means to prevent the lake from being drawn down below -9.3 feet as has historically occurred." The sustaining report attached to the Fish and Wildlife Coordination Act report gave rationale for the recommendation, which related to the warmwater sport fishery rather than the June sucker. The June sucker was federally listed as endangered with critical habitat, effective March 31, 1986 (51 FR 10857).

The Utah State Engineer's Water Distribution Plan for the Utah Lake Drainage Basin stated criteria to be used in distributing water from Utah Lake. This document was transmitted to the Utah Lake Water Users by the State Engineer's memorandum of October 22, 1992. The distribution plan states (page 7, paragraph 3.2.2, "The water users of Utah Lake are responsible to maintain the pumps and channels in Utah Lake to allow water to be withdrawn from the lake down to 8.70 feet below compromise elevation." The State Engineer's letter that transmitted the document mentioned that the inactive storage level set for Utah Lake was originally proposed at 9.2 feet below compromise, and stated his opinion that the inactive storage level should be raised to 8.7 feet below compromise.

The 8.7 foot below compromise elevation would satisfy the recommendation presented in the 1965 Fish and Wildlife Coordination Act report. The State Engineer's plan has not yet been finalized. This plan is an interim plan that is still subject to revision.

Section 209 of the Central Utah Project Completion Act (CUPCA) of October 30, 1992 states, "The District in consultation with the Commission and the Utah Division of Water Rights shall apply its best efforts to achieve operating agreements for the Jordanelle Reservoir, Deer Creek Reservoir, Utah Lake and Strawberry Reservoir within two years of the date of enactment of this Act." Informal discussions of the matter between the FWS and Central Utah Water Conservancy District (CUWCD) indicate that the CUWCD believes the State Engineer's Water Distribution Plan satisfies the requirements of Section 209 of CUPCA.

It should be noted that the State Engineer's plan is an interim plan that is subject to revision, and that this interim plan was developed and published prior to the enactment of CUPCA and the URMCC was not yet established and could not have participated in consultations. While both the CUWCD and URMCC could accept the State's distribution plan, we do not believe that this would relieve the CUWCD from its responsibilities to consult with the FWS in accordance with Section 7 of the Endangered Species Act (ESA). Under Section 205(b) of the CUPCA, the CUWCD is considered a Federal agency for compliance with Federal environmental laws, including the ESA and other acts. The operation plan required by Section 209 requires consultation with the URMCC and also consultation pursuant to Section 7 of the ESA. We believe these requirements need to be met if the State Engineer's plan is to be adopted as fulfillment of Section 209.

In summary, we believe that the recommendation set forth in the 1965 Fish and Wildlife Coordination Act report and required by the 1988 Definite Plan Report will be satisfied if the inactive storage level is established at 8.7 feet below compromise as per the State Engineer's distribution plan. The State Engineer's plan however has not yet been finalized. The FWS will review the water level needs for the endangered June sucker during consultations for the Spanish Fork Nephi (SFN) System and new operating agreements for the M&1 and Diamond Fork Systems. The FWS will also review the matter when an operating plan has been developed in accordance with Section 209 of the CUPCA.

7. Build and repair 42-inch high fence on all highways and manage lands.

The DPR stated that this commitment had been incorporated into the plan and that an agreement was in place with the Utah Department of Transportation (UDOT) for its accomplishment.

The recommendation for 42-inch high fences appeared in a September 1985 report by the Interagency Biological Assessment Team, which was subsequently issued by the FWS under authority of the Fish and Wildlife Coordination Act. This document stated, "Approximately two miles of new fence would be required and five miles of existing fence would need repairing. In order to allow for the safe passage of mule deer, fences should be four-strand barb wire with a maximum height of 42 inches... This recommendation was made before the highways had been constructed and actual losses were known..

The original recommendation for 42-inch high fencing is inappropriate because of the large number of big-game animal mortalities that are actually experienced on the highways. The Jordanelle Reservoir lands are now completely fenced and the recommendation for 42-inch high fence needs no further consideration. A 7 foot-high type G highway fence is needed to provide a highway barrier to big-game animals. This type of fence is made of wire mesh and provides an effective barrier to both deer and elk.

Although the 7-foot high fence is not a 1988 DPR item, the loss of big-game animals actually experienced is significant and warrants further mitigation. The recommendation for 7-foot high big-game proof fence was made during the research that is addressed under item 8 below.

8. Include warning reflectors to reduce big-game mortality.

By memorandum of October 25, 1985, the FWS transmitted under authority of the Fish and Wildlife Coordination Act an evaluation report prepared by the Interagency Wildlife Mitigation Team, composed of biologists from Reclamation, FWS, and UDWR . The Team's report was entitled, "Terrestrial Wildlife Impact Analysis and Mitigation Recommendations for Alternative Relocation Routes of U.S. Highway 189 at Jordanelle Reservoir Municipal and Industrial System Bonneville UnitCentral Utah Project." This pre-project report identified the loss of 12 deer per year and estimated an annual loss of 24 deer and 3 elk as a result of the new highways. The report also recommended measures to mitigate these project losses, including the warning reflectors.

The UDWR and FWS determined that the proposed Swareflex reflectors were ineffective in reducing deer highway mortalities in Utah, and the FWS advised Reclamation of this determination by memorandum of September 15, 1989. The proposed reflectors were deleted from plans.

By memorandum of February 19, 1991, the FWS transmitted a subsequent report by the Team, which documented actual observed losses of 174 deer during the first year the highways were in operation. This report was entitled, "Big Game Vehicle Mortality Along Highway Relocations Adjacent to Jordanelle Dam and Reservoir - Bonneville Unit - Central Utah Project." The report suggested an experimental design for big-game proof fences combined with crosswalk structures to facilitate safer passage for big game, and recommended two phases of research to evaluate the efficacy of these structures. The report further recommended that conventional underpasses or overpasses be installed if the experimental crossings were found to be insufficient.

Several research studies by graduate students of the Utah Cooperative Fish and Wildlife Research Unit (UCFWRU), Utah State University, Logan, Utah have been conducted. Agencies that cooperated in this research included Reclamation, UDOT, UCFWRU, UDWR, and the FWS.

Phase I of the research was a two-year study to quantify the big-game animal mortality on 9.1 miles of U.S. Highway 40, 9.6 miles of State Route 32, and 10.2 miles on State Route 248 at Jordanelle

Reservoir. One-hundred and seventy-four deer mortalities were recorded during the first year the highways were in operation (December 1989-December 1990). Three-hundred and ninety-seven big-game animal mortalities were recorded from October 15, 1991 to October 14, 1993.

Phase II of the research evaluated the efficacy of experimental crosswalks with deer proof fencing and one-way gates that were installed during September 1994. This was also a two-year study (began October 15, 1993 and terminated November 30, 1995). Based on expected kill levels the research concluded that the mitigation measures likely reduced the incidence of deer-vehicle collisions by 54 occurrences (a 40 percent reduction) during the 15 month Phase II monitoring period. To further reduce losses, the research recommended an additional 30 miles of big-game proof fencing at a cost $612,990, additional structures or other measures at a cost of $293,509 and research to evaluate the success (another two-year study) at $45,080.

The research that has been accomplished provides an excellent data base that we believe must be maintained until evaluations demonstrate that the losses have been properly mitigated. Losses are heavy, and the potential for property damages and even the loss of human life must be recognized.

The FWS finds that fencing of the highway in combination with additional crosswalks to facilitate safer big-game animal highway crossings, escape ramps, and vegetative modifications along some portions of the highway are needed. We believe however, that imminent urbanization, particularly housing developments, could reduce the winter range carrying capacity and diminish justification for the expenditure of $951,579, as per the plans recommended by the Phase II research. UDOT has committed to fund the two year research that was recommended in the Phase II research provided that other agencies commit funding for the costs for the structural and vegetative modification measures.

We support phased implementation of measures recommended in the Phase II research as determined appropriate following annual evaluation of the pace of urbanization and impact on the affected deer herd and review of deer mortality monitoring results. We also support continued review of the benefits being achieved from implementation of installed measures. We recommend that the Phase I implementation elements shown in the following table be installed on the existing mitigation area (i.e., the area where crossing facilities have already been installed) during year 1 of funding by the URMCC at a cost of approximately *$75,709:*

PHASE I IMPLEMENTATION

Feature	Cost	Total
16 escape ramps approximately midway between crosswalks	$1,800 each	$28,800
Big-game proof fence -- 300 feet either side of 9 crosswalks (10.800 feet or 2.1 miles)	$20,433/mile	$40,909
Vegetation control and reseeding (4 acres)	$1,500/acre	$6,000
		$75,709

Following installation of the Phase I implementation plans the FWS recommends that research results be reviewed and a determination made at that time whether to proceed into Phase II of implementation at a cost of $828,790, which will include elements itemized in the Phase II Implementation table below. Also, before proceeding with the Phase II Implementation work, commitments need to be secured for further research that would evaluate and document results of this work.

PHASE II IMPLEMENTATION

Feature	Cost	Total
6 escape ramps approximately midway between crosswalks	$ 1,800 each	$28,800
30 miles of big-game oo ence	$20,433/mile	$612,990
4 crosswalks (US 40)	$28,000 each	$112,000
5 crosswalks (SR 32)	$15,000 each	$75,000
Total		$828,790

9. Compensate for loss of 562 (630) acres of riparian habitat including wetlands.

The 1987 Wildlife Mitigation Plan for the Strawberry Collection System, Municipal and Industrial System and Diamond Fork Power System, Bonneville Unit, Central Utah Project identified a total of 630 acres of riparian habitat to compensate for anticipated losses, including 165 acres of Moon property (Currant Creek), 237 acres of Camelot property (Strawberry River), and 228 acres of riparian development. The Moon and Camelot properties have been acquired. The 228 acres of riparian development has not yet occurred.

With respect to unfulfilled mitigation, FWS believes the Provo River Restoration Project (PRRP) Preferred Alternative, the recently acquired Hayes property on Strawberry River, or the Witherspoon properties on the West Fork Duchesne River could be used as mitigation for the 228 acres of riparian development that are needed. We feel certain that the deficit could be totally offset if plans for the PRRP Preferred Alternative are implemented.

10. Relocation of Highway 189 with the southern route preferred.

A September 2, 1986 Fish and Wildlife Coordination Act report entitled, "Fish and Wildlife evaluations and Recommendations in relation to Modified Plans for the Municipal and Industrial (M&I) System, Bonneville Unit, Central Utah Project, identified losses of 195 mule deer, 3 elk, and 109 sage grouse as a result of construction of both the Nor'them and Southern highway routes. These same losses were considered in the January 1987 Wildlife Mitigation Plan for Strawberry Collection System, Municipal and Industrial System, Bonneville Unit, Central Utah Project. This document stated, "The plan would include 9,461 acres of Smith banking land with some water developments to partially compensate for indirect losses of deer, elk, and sage grouse and provide replacement for direct habitat losses from inundation. Acquisition of an additional 720 acres at Jordanelle would be needed to safeguard a golden eagle nesting territory and a sage grouse breeding area. Habitat improvement on about 970 acres of the Deer Creek lands would also be needed to provide full compensation on an acre-for-acre basis for riparian acquisitions..." (Mitigation for the riparian resources was discussed under 9. above. The water development on Emory Smith is addressed in item 11 below).

By memorandum of November 25, 1996, FWS advised Reclamation that the 720 acre West Hills Wildlife Management area situated between the two arms of Jordanelle Reservoir had been inspected by personnel of Reclamation, UDWR, URMCC, and FWS on November 1, 1996. It was FWS's opinion that goals of the operating agreement between Reclamation and UDWR for management of the lands had been met and that transfer of title to these lands to UDWR could be effected at their convenience.

11. Manage and develop water sources on 9,461 acres of Emory Smith mitigation lands.

By letter dated February 24, 1997 from Acting Director, John Kimball, UDWR to Regional Director, Charles Calhoun, Upper Colorado Regional Office, Reclamation, the UDWR agreed that the water development features installed by Reclamation satisfied this mitigation responsibility. The FWS is in agreement with the UDWR's concurrence that this mitigation measure has been satisfied.

12. Transfer to the UDWR and provide funds to improve 970 acres of Deer Creek lands as mitigation for deer and elk.

The 1987 Mitigation Plan included a total of 2,000 acres Deer Creek lands for mitigation; 970 was for M&I System, 1,030 was for the Diamond Fork System.

The transfer of 970 acres plus the additional acres comprising the Deer Creek lands to UDWR for management to mitigate losses were components of the 1987 mitigation plan; however, legal counsel for the Provo River Water Users Association (Association) advised Reclamation that under terms of the June 27, 1936, "Contract Between the United States and Provo River Water Users' Association Providing for the Construction of the Deer Creek Division of the Provo River Project, Utah", the Association has certain rights to the land that precluded their transfer for mitigation purposes without compensation to the Association.

The Regional Solicitor's Office, DOI, has confirmed that although there is the option to use the Deer Creek lands as a National Wildlife Refuge, credits for mitigation to offset losses caused be the Bonneville Unit cannot be assigned to this action. The lands cannot be used for mitigation; therefore, the URMCC cannot fund development or operation of the area for that purpose. The $200,000 earmarked for improvement of these lands could be used for other DPR mitigation efforts.

Article 34 of the June 27, 1936 contract with the Association permits use of the lands for "bird reserves or wildlife refuges upon the land acquired for the Deer Creek Dam or reservoir", should the "Biological Survey of the Department of Agriculture" so desire. Over the years, the name of the Biological Survey was changed to the Fish and Wildlife Service.

By Memorandum of October 11, 1989, the FWS advised Reclamation that FWS wished to explore the option of establishing a refuge on the lands. Reclamation included the option of managing the lands for wildlife in a June 1995 Draft Environmental Assessment for their Resource Management Plan for Deer Creek Reservoir. That document has not been finalized. Reclamation expects to circulate another draft during the early summer of 1997.

The FWS wishes to pursue plans for establishing a National Wildlife Refuge on the property, and enter a cooperative agreement with the UDWR wherein that agency would be responsible for operation and ma!'. gement of the area.

During the February 26, 1997 interagency meeting, the UDWR requested an opportunity for further coordination within their agency on the matter of assuming management responsibilities for the property. Since the meeting, the UDWR has confnued that they are interested in managing a large part of the lands, and are in the process of identifying the specific area.

At about the same time the use of Deer Creek lands for Bonneville Unit mitigation was under dispute, the Diamond Fork System was being reformulated. As a result of the reformulation, there were fewer project impacts and consequently a reduced need for mitigation. The 1990 FS FEIS for the Diamond Fork System describes the project reformulation and the resulting reduced need for mitigation of 1,962 acres from 6.000 to 4.038 acres. The reduction was only slightly less than the 2,000 acres of mitigation that would

have been credited for management and protection of the Deer Creek lands. Consequently, it appears possible to meet the mitigation responsibilities of the Bonneville Unit without regard to the Deer Creek lands by adjusting mitigation credits on other mitigation properties already acquired for the Diamond Fork System and M&I systems and acquiring an additional 161 acres of other yet unidentified property. Tentative adjustments are shown in the Attached Appendix A.

DIAMOND FORK SYSTEM

13. Installation of fish screen to inlet of Syar Tunnel. (See discussion below)

14. Study Fish movement through Syar Tunnel

The FWS has reviewed the requirements for installation of a fish screen at the inlet of Syar Tunnel and study of fish movement from Strawberry Reservoir into Syar Tunnel originally specified in the 1988 DPR Supplement and subsequently modified in the 1991 Fish and Wildlife Coordination Act Report for the Diamond Fork System. The FWS has consulted with Reclamation and UDWR about project features and operation in relation to fish passage into the Syar Tunnel inlet and movement through Syar Tunnel to Sixth Water Creek. The agencies have concluded that fish passage into the inlet is unlikely but could occur occasionally under circumstances described below. Fish that do enter Syar Tunnel are not expected to survive the trip to the tunnel outlet due to the pressures in the system. Finally, should Bonneville cutthroat trout survive the journey, they would not compromise objectives of the Sixth Water fisheries management strategy. Accordingly, the FWS finds that:

1. The inlet to Syar Tunnel is already adequately screened to prevent fish loss under most circumstances. Therefore, this mitigation requirement has been met.

2. At this time, there is no evidence supporting the need for a fish movement study. This item should be deleted as a mitigation requirement.

The FWS has been informed that if/when Strawberry Reservoir is lowered below 35 feet above the outlet and kokanee smolts are located in the reservoir water column at a similar level, it is possible that the smolts will enter the outlet and leave the reservoir. They are not expected to survive the journey through the tunnel. Under these circumstances, the reservoir will lose a year class of kokanee. Should these conditions (reservoir drawdown) persist over several years, more than one year class could be lost. These circumstances would also have occurred had the reservoir not been enlarged and Syar Tunnel not constructed, therefore this impact is not considered a unique result of Bonneville Unit construction or operation.

Drawdown of the reservoir to a level putting kokanee smolts at risk is not expected to occur soon as the reservoir is now nearly full, and may not occur for decades depending upon long term weather patterns. Should predictions of reservoir operation indicate that a problem could exist, an interagency team should convene to discuss methods for determining if kokanee smolts are being lost and plan for remediation should losses be verified.

15. Monitor water temperatures throughout the system.

The FWS has reviewed the requirements for water quality and temperature monitoring in Diamond Fork Creek originally specified in the 1988 DPR Supplement and subsequently modified in the 1991 Fish and Wildlife Coordination Act Report for the Diamond Fork System. These water quality monitoring requirements resulted from concern about the effects of Monks Hollow Dam and Reservoir on downstream aquatic resources. The temperature monitoring requirements resulted from concerns about

importation of colder water from Strawberry Reservoir through Syar Tunnel to Sixth Water and Diamond Fork creeks.

The pipeline and road rehabilitation portion of the Diamond Fork System are currently under construction. However, Monks Hollow Dam, or alternative means of regulating water delivered through Syar Tunnel, is being planned as a part of the SFN System, and operation of Monks Hollow Reservoir or alternative structures will be determined by the SFN System. The SFN System proposed action is still being refined, with a Draft Environmental Impact Statement and Definite Plan Report Supplement describing project features and operation expected in late spring, 1997. It is possible that there will be some modifications in what is now identified as the proposed action.

Discussions with UDWR fisheries biologists confirm the FWS's continuing concern about Monks Hollow Dam and Reservoir impacts on downstream aquatic resources. Additionally, it is our opinion that solely monitoring impacts following project construction and implementation may limit options for avoiding, minimizing, or mitigating them. We therefore recommend that the water quality and temperature requirement be modified as follows:

1. Water quality parameters should be modeled and/or currently available data reanalyzed based on proposed project features and operation. If results of modeling and reanalysis indicate potential problems, project features and operation should be examined for opportunities to avoid or minimize problems and project plans should be revised accordingly, as determined feasible. This analysis should be incorporated into the SFN DEIS due for completion later this year. The URMCC and the CUWCD have already initiated monitoring of selected water quality parameters. The Utah Department of Environmental Quality will also be involved in water quality monitoring. The URMCC will coordinate data collection and monitoring to ensure that all appropriate parameters are measured and avoid duplication of effort. Results will be shared with interested agencies.

2. Monitoring should continue after project implementation to verify predictions and determine if water quality and temperature are acceptable. Results of monitoring should be made available to interested agencies including the FWS, UDWR, the Forest Service, CUWCD, and URMCC. CUWCD and URMCC should take whatever actions are feasible and appropriate, to be determined in consultation with the above-named agencies, to rectify water quality and temperature problems that occur as a result of the project.

16. Cooperate with other agencies on fisheries problems in Sixth Water Creek.

An interagency effort to plan and implement fisheries and riparian habitat restoration on Sixth Water Creek has been underway since 1994. URMCC has contracted with the Forest Service to develop a restoration plan. URMCC, UDWR, and FWS participated with the Forest Service in preparing the scope of work and evaluating proposals for development of the restoration plan. These agencies plus others including CUWCD and Trout Unlimited have been involved in reviewing drafts of the plan and making recommendations. It is expected that these interagency cooperative efforts will continue as they are considered a staff responsibility of URMCC. Therefore, this mitigation requirement is being met.

Attachments

Attachment F

Central Utah Project Completion Program

Attachment F

October 2004

UTAH RECLAMATION
MITIGATION
AND CONSERVATION
COMMISSION

ATTACHMENT F

Utah Lake System Environmental Impact Statement Biological Assessment

Attachment F

Utah Lake System
Environmental Impact Statement
Biological Assessment

F.1 Introduction

This document is the Biological Assessment on the Spanish Fork Canyon – Provo Reservoir Canal (Proposed Action) for the Utah Lake System (ULS) Environmental Impact Statement (EIS). The ULS EIS is being prepared to address potential effects of constructing and operating the Proposed Action and other ULS alternatives. The ULS is the last of the six original systems of the Bonneville Unit of the Central Utah Project (CUP) that would develop central Utah's water resources for municipal and industrial (M&I) supply, irrigation, fish and wildlife, and recreation. The ULS evolved from and will replace the Irrigation and Drainage System, which was first identified in the Bonneville Unit Final Environmental Impact Statement in 1973 (Reclamation 1973). The other five Bonneville Unit systems are complete and operating, or under construction. The ULS is now proposed to deliver the remaining uncommitted Bonneville Unit water in Strawberry Reservoir as an M&I water supply to Wasatch Front communities. The Central Utah Water Conservancy District (District), U.S. Department of the Interior (DOI) and Utah Reclamation Mitigation and Conservation Commission (Mitigation Commission) are joint-lead agencies (JLA) preparing the EIS.

Section 7(C) of the Endangered Species Act (ESA) requires a federal agency to prepare a Biological Assessment to disclose effects of a Proposed Action on threatened or endangered species listed by the U.S. Fish and Wildlife Service (FWS). Threatened or endangered status is assigned to individual species by the FWS. The Biological Assessment is used by the FWS to determine if there is an effect on a species and to document that the action does not contribute toward the loss of viability of a listed species, contribute to a trend toward a need for federal listing, or jeopardize or adversely modify critical habitat of federally listed species.

In compliance with the ESA, the FWS provided the District with a list of threatened or endangered species known or suspected to occur in the EIS project area (letter dated December 11, 2003 – Attachment 1). Table F-1 presents the threatened or endangered species presented in the FWS list sent to the District and provides a brief discussion of the potential for species occurrence.

Some of the species listed in Table F-1 would not be affected under the Proposed Action because they do not occur in habitat or geographic areas that could be affected by project activities. Previous consultations on species listed in Table F-1 that do not occur in habitat or geographic areas potentially affected by the ULS are addressed in this document.

The species with potential to be affected by project activities are addressed in more detail in this Biological Assessment. These species are: June sucker (*Chasmistes liorus*), Bonytail *(Gila elegans)*, Colorado Pikeminnow *(Ptychocheilus lucius)*, Humpback Chub *(Gila cypha)*, Razorback Sucker *(Xyrauchen texanus)*, Bald eagle (*Haliaeetus leucocephalus*), Canada lynx (*Lynx canadensis*), Ute ladies'-tresses (*Spiranthes diluvialis*), and Western Yellow-billed Cuckoo *(Coccyzus americanus occidentalis)*.

Table F-1
Threatened and Endangered Species Identified During Fish and Wildlife Service Consultation that may Occur in the EIS Study Area

Species	Potential for Occurrence
ENDANGERED SPECIES	
June sucker (*Chasmistes liorus*)	Inhabits Utah Lake. Spawning populations occur in the lower Provo River; the final June Sucker Recovery Plan has designated other tributaries to Utah Lake as potential locations to develop spawning populations.
Bonytail *(Gila elegans)*	Does not occur in the ULS construction and operation effect area of influence; potential effects of depletions from the Colorado River basin occur under the Bonneville Unit of the CUP
Colorado pikeminnow *(Ptychocheilus lucius)*	Does not occur in the ULS construction and operation effect area of influence; potential effects of depletions from the Colorado River basin occur under the Bonneville Unit of the CUP
Humpback chub *(Gila cypha)*	Does not occur in the ULS construction and operation effect area of influence; potential effects of depletions from the Colorado River basin occur under the Bonneville Unit of the CUP
Razorback sucker *(Xyrauchen texanus)*	Does not occur in the ULS construction and operation effect area of influence; potential effects of depletions from the Colorado River basin occur under the Bonneville Unit of the CUP
Utah valvata *(Valvata utahensis)*	Utah Valvata is presumed extirpated from the range that would be affected by Proposed Action.
Clay phacelia *(Phacelia argillacea)*	Does not occur in the effect area of influence; known occurrences are limited to two sites, one at the Tucker rest area along SR-6 in Spanish Fork Canyon and five miles west-northwest of the Tucker population.
THREATENED SPECIES	
Bald eagle (*Haliaeetus leucocephalus*)	Commonly observed from August through March around Utah Lake, lower Diamond Fork Creek, and scattered wetlands.
Canada lynx *(Lynx canadensis)*	Potential habitat occurs in the effect area of influence; Canada lynx hair was found in the Manti-La Sal National Forest south of the affected project area during 2002
Ute ladies'-tresses (*Spiranthes diluvialis*)	Species present within the effect area of influence along the Spanish Fork River.
Deseret milkvetch *(Astragalus desereticus)*	Does not occur in the effect area of influence; deseret milkvetch is endemic to central Utah and known from only one occurrence in the Thistle Creek Valley near the town of Birdseye in Utah County.
CANDIDATE SPECIES	
Western Yellow-billed cuckoo *(Coccyzus americanus occidentalis)*	Records in the affected project area are clustered near Deer Creek Reservoir along the Provo River and Provo City, with other observations at the Brigham Young University Agricultural Station north of Salem City and in Santaquin City

F.2 Proposed Action Features

Table F-2 presents the Proposed Action features, which would deliver 30,000 acre-feet of Bonneville Unit ULS M&I secondary water to southern Utah County and 30,000 acre-feet of M&I water to Salt Lake County. It would involve construction of five new pipelines: 1) from the mouth of Diamond Fork Canyon to the mouth of Spanish Fork Canyon; 2) from the Spanish Fork Canyon Pipeline to Santaquin in southern Utah County; 3) from Santaquin to Mona Reservoir; 4) from the Spanish Fork Canyon Pipeline to Hobble Creek along the Mapleton-Springville Lateral canal alignment; and 5) from the Spanish Fork Canyon Pipeline to the Provo Reservoir Canal.

Table F-2
Features of Utah Lake Drainage Basin Water Delivery System
Spanish Fork Canyon – Provo Reservoir Canal Alternative (Proposed Action)

Feature	Description
Water Supply and Delivery	• 30,000 acre-feet of Bonneville Unit ULS water to southern Utah County starting in 2016 for secondary M&I use • 30,000 acre-feet of Bonneville Unit ULS water to Salt Lake County starting in 2016 for M&I use • 1,590 acre-feet of Bonneville Unit CUP M&I water previously contracted to cities in southern Utah County • DOI acquisition of about 57,000 acre-feet of District secondary water rights in Utah Lake • 10,200 acre-feet conveyance of SVP water to southern Utah County through ULS pipelines • 12,037 acre-feet to promote June sucker spawning and rearing lower Hobble Creek • 16,000 acre-feet for in-stream flows in lower Provo River • 12,165 acre-feet to enhance June sucker spawning and rearing in lower Provo River
Spanish Fork Canyon Pipeline	7.0-mile steel pipeline 84-inches diameter
Sixth Water Power Facility and Transmission Line	45-MW generator with upgrade of 15.5 miles of existing overhead transmission lines
Upper Diamond Fork Power Facility	5-MW generator with existing underground cable through Tanner Ridge Tunnel to Sixth Water Transmission Line
Spanish Fork – Santaquin Pipeline	17.5-mile steel pipeline ranging from 60- to 36-inches diameter
Santaquin – Mona Reservoir	7.7-mile steel pipeline 24-inches diameter (pipeline would be

Pipeline	constructed; separate NEPA compliance would be required on operation and water supply for potential future conservation pool in Mona Reservoir for June sucker refugia)
Mapleton – Springville Lateral Pipeline	5.7-mile pipeline ranging from 48- to 30-inches diameter from terminus of Spanish Fork Canyon Pipeline to Hobble Creek
Spanish Fork – Provo Reservoir Canal Pipeline	19.7-mile steel pipeline ranging from 60- to 48-inches diameter

The following summarizes the Proposed Action operation.

- 30,000 acre-feet of ULS M&I water would be conveyed to Salt Lake County through a combination of existing facilities (Jordan Aqueduct and Provo Reservoir Canal conveyance facilities) to water treatment plants for treatment and culinary supply. This water would be delivered through the Spanish Fork – Provo Reservoir Canal Pipeline to the enclosed Provo Reservoir Canal during the summer months and conveyed to Salt Lake County. During the winter months, the ULS M&I water would be delivered through the Spanish Fork – Provo Reservoir Canal Pipeline to the Jordan Aqueduct and conveyed to Salt Lake County.

- An annual average of 16,273 acre-feet of Bonneville Unit water from Strawberry Reservoir would be released for in-stream flows in Sixth Water Creek and Diamond Fork Creek and flow down the Spanish Fork River to Utah Lake mainly during the winter months. This water would be subsequently exchanged from Utah Lake to Jordanelle Reservoir. The release of this water would meet the 60-cfs winter and 80-cfs summer minimum flows required in Diamond Fork Creek at Monks Hollow.

- As the ULS facilities are completed, but not later than 2030, 30,000 acre-feet of ULS M&I water would be delivered through new pipelines in southern Utah County under a contract with South Utah Valley Municipal Water Association (SUVMWA).

- Up to 10,200 acre-feet of Strawberry Valley Project (SVP) water owned by the cities comprising SUVMWA would be conveyed to cities in southern Utah County.

- Of the 1,590 acre-feet already contracted to SUVMWA, 590 acre-feet of Bonneville Unit would continue to be used by SUVMWA member cities as secondary M&I water.

- Hydroelectric power would be generated from the M&I water conveyance and contracted to the Western Area Power Administration.

- An annual average of 16,000 acre-feet of water would be delivered to the lower Provo River to assist meeting the in-stream flows towards meeting the 75-cfs target flow and subsequent exchange from Utah Lake to Jordanelle Reservoir. This water would be conveyed through the Spanish Fork – Provo Reservoir Canal Pipeline and discharged to the Provo River at the pipeline crossing. A minimum 75-cfs flow normally occurs in the river between the Olmsted and Murdock diversions during the summer months when releases are made from Deer Creek Reservoir.

- Under the Deer Creek Reservoir–Jordanelle Reservoir operating agreement, an annual 12,165 acre-feet of water would be provided as flows for June sucker spawning and rearing in the lower Provo River to meet JSRIP goals annually.

- Approximately 3,300 acre-feet of lower Provo River water rights already purchased by the Mitigation Commission would flow undiverted to Utah Lake, thereby increasing the summertime flow in the lower Provo River.

- Discharge from the Mapleton-Springville Lateral pipeline into Hobble Creek would consist of 4,000 acre-feet annually to promote June sucker spawning and rearing in lower Hobble Creek, and an annual average of 8,037 acre-feet available throughout the year to provide in-stream maintenance flows. The annual average of 8,037 acre-feet would range from 0 to 32,136 acre-feet depending on the hydrologic year. This water would be part of the exchange from Utah Lake to Jordanelle Reservoir.

F.3 General Procedures

F.3.1 Analysis Methods

The determination of effects of the Proposed Action on threatened and endangered species involved defining the affected environment, evaluating the potential for occurrence, analyzing the effects of the Proposed Action on listed species, identifying cumulative effects and recommending conservation measures to avoid or minimize potential effects. Specific analysis methods, evaluation criteria and survey methods are described in the following subsections.

F.3.2 Assumptions

Several assumptions were made as part of the effects analysis. One assumption was that taking (as defined by the ESA) of individuals of a threatened or endangered species or alteration of their population, distribution, behavior, or habitat as a result of the action, inclusive of construction, operation and maintenance, would be considered an effect. Effects can be beneficial or adverse. For example, creation or enhancement of habitat would be considered a beneficial effect of the action. Loss of threatened or endangered species habitat would be considered an adverse effect of the action.

Another assumption was that lack of documented sightings of a particular species would not necessarily indicate that a species is absent from the study area. Even under optimal field survey conditions, a species may be missed, especially if identification is reliant upon certain characteristics, such as flowering parts on a plant that does not reproduce every year.

F.3.3 Baseline Conditions

Baseline conditions include: 1) past and present impacts of all Federal, state and private actions and other human activities in the effect area of influence; 2) the anticipated effects of all proposed Federal projects in the effect area of influence that have already undergone formal or early Section 7 consultation; and 3) the impact of state or private actions contemporaneous with the consultation process.

Baseline conditions in the Provo River were assumed to be full operation of the M&I System. Baseline conditions in the Spanish Fork River were assumed to be the same as the Interim Operation of the Diamond Fork System Proposed Action, which released 86,100 acre-feet of water into the mouth of Diamond Fork Creek and conveyed to Utah Lake throughout the year.

F.3.4 Evaluation Criteria

If construction, operation and maintenance activities of the Proposed Action would result in the taking of a threatened or endangered species, loss or degradation of habitat, or increased disturbance levels that would cause displacement, increased stress, and/or reduced reproductive success, a "may affect" determination was made. If construction, operation and maintenance activities of the Proposed Action would result in beneficial effects on a threatened or endangered species, a "may affect" determination was made.

F.3.5 Effect Area of Influence

The effect area of influence for the effects analysis on threatened and endangered species is dependent on the species of concern. Map F-1 shows the overall effect area of influence associated with the features of the Spanish Fork Canyon – Provo Reservoir Canal Alternative (Proposed Action).

F.4 Colorado River Fishes

The FWS Biological Opinion for the Duchesne River Basin, Utah (FWS 1998) was that "historic project operations and the development and use of new project water contributes to the endangerment of listed fishes and is likely to jeopardize the continued existence of the Colorado squawfish [pikeminnow], razorback sucker, humpback chub, and bonytail and is also likely to adversely modify their critical habitats in the Duchesne, Green, and Colorado Rivers." "Historic projects" with Federal involvement or control prior to the Bonneville Unit of the CUP included the Strawberry Valley Project, the Provo River Project, the Moon Lake Project, the Midview Exchange, and the Ute Indian Irrigation Project. The Bonneville Unit of the CUP, with a total depletion of 143,200 acre-feet, was included as a historic project with a total of 101,900 acre-feet identified for transbasin diversion to the Bonneville Basin. Future projects identified in the Biological Opinion included the Uintah Unit and the Upalco Unit of the Uintah Basin Replacement Project.

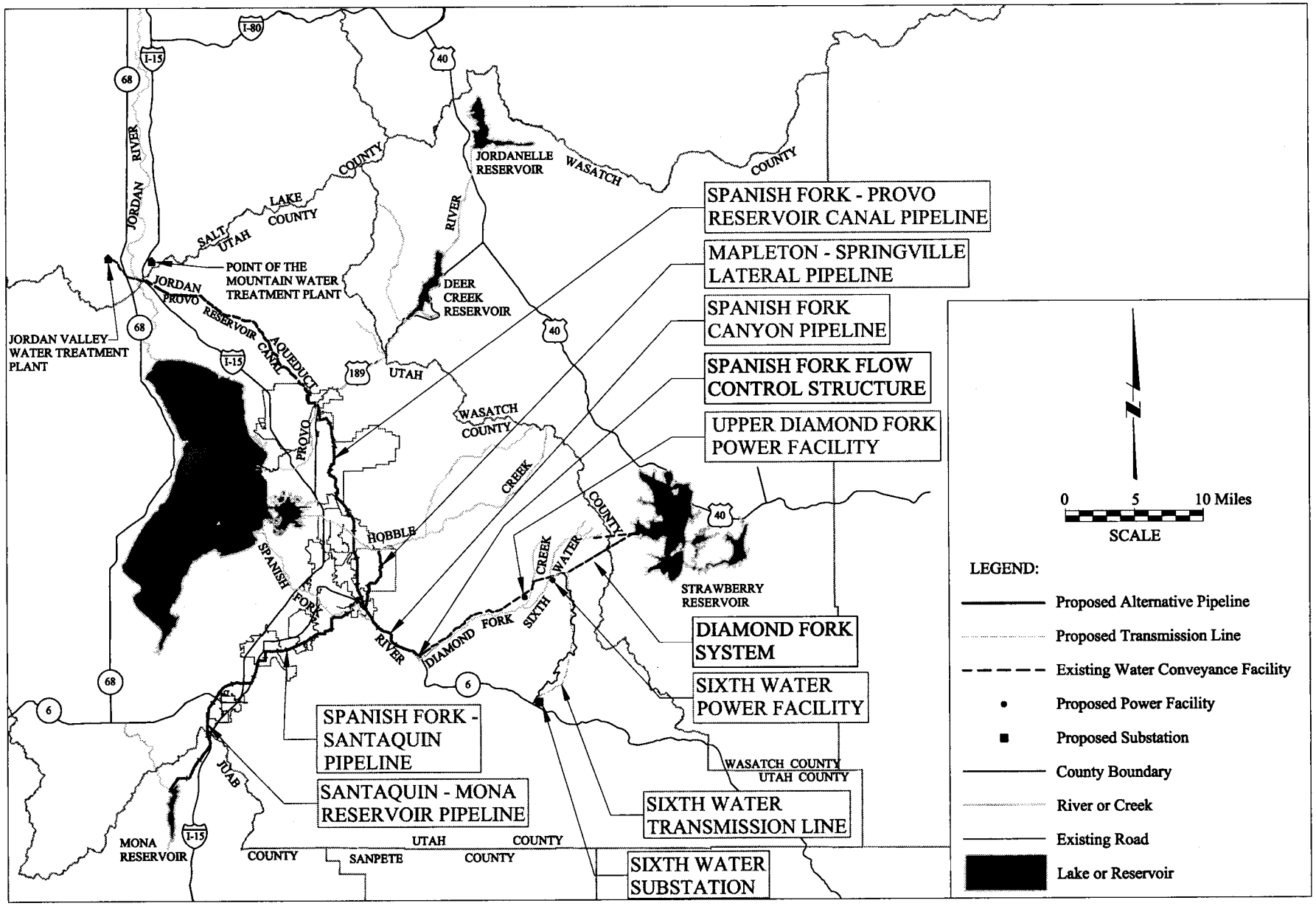
The preferred alternative for ULS includes the depletion from the Colorado River basin of the 101,900 acre-feet transbasin diversion for the Bonneville Unit. Therefore, a review of the status of the Section 7 Consultation for the Duchesne River Basin is warranted in this Biological Assessment.

The 1998 Duchesne River Biological Opinion, issued to DOI, Mitigation Commission, Reclamation, U.S. Bureau of Indian Affairs, and the District, was based on the best scientific and commercial data available at the time including: 1) the level of knowledge of the Duchesne River, 2) the status of the Colorado squawfish [pikeminnow], humpback chub, bonytail, and razorback sucker, 3) the environmental baseline for the Duchesne River basin area, 4) the cumulative effects of non-Federal projects in the Duchesne River basin and 5) the effects of the proposed action (historic project operations and the development and use of new project water). As stated in the Biological Opinion, the FWS determined that completion and /or implementation of all elements of the reasonable and prudent alternative (RPA) would offset impacts of historic and future projects and would avoid the likelihood of jeopardy and the destruction or adverse modification of critical habitats. In addition, successful implementation of all elements of the RPA would allow the Recovery Implementation Program (RIP) for Endangered Fish Species in the Upper Colorado River Basin to serve as the RPA for Federal actions which result in depletion impacts to the Duchesne River. Further, the biological opinion states that the "Service believes that the integrated operation of new and existing facilities, constrained by annual hydrologic conditions and available water storage, can be coordinated to meet the needs of the listed fishes in most years."

RPAs identified in the Biological Opinion consisted of items from the RIP's Recovery Action Plan (RAP). The following identifies the RPAs applicable to the Bonneville Unit of the CUP and the status of action to meet the RPAs.

I.A.1 Conduct hydrology/water availability study. This item has been completed. CH2M Hill (1997) conducted a study with the main purpose of determining the effect of existing projects (both existing and future operation) on Duchesne River flows and to identify possible water sources that could be used to augment river flows to meet preliminary flow recommendations that were identified in the 1998 Biological Opinion. The study pointed to several potential water sources including; Bonneville Unit Fishery Flows, Daniels Creek Diversions, Land Purchase and Fallow, Conservation Projects-Delivery Systems, On-Farm Conservation Projects and Purchase of Existing Water in Storage.

I.D.1. Determine feasibility and benefits of coordinated reservoir operation. Reclamation initiated a coordinated reservoir operations study that was scheduled for completion in June 2003. This study should be brought to completion as soon as practical to provide information necessary to effectively coordinate implementation and protection of in-stream flows. This activity would be completed under the amended Duchesne Biological Opinion.



Map F-1

Features of the Spanish Fork Canyon - Provo Reservoir Canal Alternative (Proposed Action)

I.D.2. Develop agreements, if feasible, to coordinate reservoir operation and protect flows to the Green River. Revised flow recommendations for the Duchesne River required in the RPA to the 1998 Biological Opinion were developed by the RIP and finalized in 2003 (Modde and Keleher 2003). An informal Duchesne River Working Group (DRWG) that includes representatives from the FWS, The State of Utah, Department of Natural Resources (Divisions of Water Rights, Water Resources and Wildlife Resources), the District, the DOI, and the Mitigation Commission, was formed in 2003 to address issues involved with implementation of the flow recommendations, including water availability, water management, and protection of in-stream flows provided for endangered fishes. It is anticipated that this working group will be formalized in the amended Biological Opinion for the Duchesne River. The FWS is in the process of amending the Biological Opinion for the Duchesne River based on the recent flow recommendations and it is anticipated that implementation of flow recommendations will be coordinated through the DRWG. Preliminary investigations into potential water sources for meeting flow recommendations have been promising. Potential water sources are being investigated along with opportunities to modify existing diversion structures (to measure flows and allow fish passage) and develop agreements to provide legal assurances that water identified for endangered fish flows is not diverted for other purposes and can be protected under the State of Utah Water Rights Law to the confluence with the Green River.

I.A.2 Conduct follow-up studies to evaluate and refine flow recommendations. This action has been completed. Studies to develop flow recommendations were funded through the RIP and initiated in 1997. A final report entitled Flow Recommendations for the Duchesne River with a Synopsis of Information Regarding Endangered Fishes (Modde and Keleher 2003) was approved by the RIP in 2003. The year-round flow recommendations were designed to provide for the physical processes needed to maintain channel complexity and substrate quality (high flow needs) and maintain adequate flows for endangered fish access and aquatic productivity needed to sustain the prey base for Colorado pikeminnow (base flow needs). Flow recommendations account for various types of hydrologic conditions by allowing for high peak flows in wet years (>4,000 cfs) while requiring no peak flows in dry years. Base flows were similarly scaled, targeting a minimum of 50 cfs in dry years and up to 115 cfs in wet years.

The FWS has prepared a preliminary draft of an amendment to incorporate new information into the Final Biological Opinion, July 1998 for the Duchesne River Basin and to provide a revised RPA and a re-initiation notice. The RPA for the jeopardy finding in the 1998 Biological Opinion required follow-up studies to evaluate and refine flow recommendations for the Duchesne River. The amendment provides supplemental information on the biology and habitat requirements of the Colorado pikeminnow, razorback sucker, and the flows required to support these species in the Duchesne River. It provides a new RPA that replaces the original RPA developed for the 1998 Biological Opinion. All other sections of the 1998 Biological Opinion remain in effect, including the project description, estimates of depletions, status of the species, conclusions and the incidental take statement.

The RIP for endangered fish species in the Upper Colorado River Basin (FWS, April 4, 2003) outlines procedures for consultation pursuant to Section 7 of the ESA on water projects in the Upper Colorado River Basin. The Section 7 Agreement (including Section 7 Consultation, Sufficient Progress and Historic Project Agreement) was developed to clarify how Section 7 consultations will be conducted on water depletion impacts related to new projects and impacts associated with historic projects in the Upper Colorado River Basin. The RIPRAP was developed in support of the Section 7 Agreement using the best, most current information available and the recovery goals for the four endangered Colorado River fish species.

The District and DOI, although not signatories, participate in the Colorado Fishes RIP. The Mitigation Commission does not or has not participated in the RIP, does not fund the RIP or participate on any committees, and up until 2003, had never been contacted with respect to the RIP. The Mitigation Commission is involved through the working group formed to investigate potential ways to meet in-stream flow targets. The District provides funding and technical resources to ensure success of the RIP in both recovery of the Colorado River fishes and in meeting human water needs. The District will continue to be committed to RIP efforts.

The following sections summarize listing information, life history, species status and state the conclusions of effects from the ULS project on the four endangered Colorado River fish species.

F.4.1 Bonytail (Endangered)

There are no documented collections of bonytail (*Gila elegens*) from the effect area of influence. The bonytail is listed as "endangered" under the federal ESA and by the State of Utah. Bonytail was listed under the federal ESA in 1980 (45 FR 27710), with a final determination of critical habitat on March 21, 1994 (59 FR 13374). A small number of wild adults exist in Lake Mohave on the mainstem Colorado River of the Lower Colorado River Basin (i.e., downstream of Glen Canyon Dam, Arizona) and there are small numbers of wild individuals in the Green River and upper Colorado River sub-basins of the Upper Colorado River Basin (FWS 2002a). Its National Heritage Status in Utah is S1, critically imperiled.

Currently no self-sustaining populations of bonytail exist in the wild, and very few individuals have been caught throughout its range (FWS 2002a). The bonytail is considered adapted to mainstem rivers where it has been observed in pools and eddies (FWS 2002a). Similar to other closely related *Gila* spp., bonytail in rivers probably spawn in spring over rocky substrates; spawning in reservoirs has been observed over rocky shoals and shorelines (FWS 2002a).

There would be no effects on bonytail from construction of any of the ULS features because there has been no occurrence of this species found within the effect area of influence. Depletion effects are addressed through the amended Duchesne River Biological Opinion and RIP, and therefore are not considered part of this biological assessment. Construction, operation and maintenance of the ULS of the Bonneville Unit of the CUP will have no affect on bonytail because of the ongoing actions and District participation in the RIP.

F.4.2 Colorado Pikeminnow (Endangered)

There are no documented collections of Colorado pikeminnow (*Ptychocheilus lucius*) from the effect area of influence. The Colorado pikeminnow is listed as "endangered" under the federal ESA and by the State of Utah. This species was first included in the List of Endangered Species issued by the Office of Endangered Species on March 11, 1967 (32 FR 4001) and was considered endangered under provisions of the Endangered Species Conservation Act of 1969 (16 U.S.C. 668aa). The Colorado squawfish (pikeminnow) was included in the United States List of Endangered Native Fish and Wildlife issued on June 4, 1973 (38 FR No. 106), and it received protection as endangered under Section 4(c)(3) of the original ESA of 1973. The final rule for determination of critical habitat was published on March 21, 1994 (59 FR 13374). Wild, reproducing populations occur in the Green River and upper Colorado River sub-basins of the Upper Colorado River Basin (i.e., upstream of Glen Canyon Dam, Arizona), and there are small numbers of wild individuals (with limited reproduction) in the San Juan River sub-basin (FWS 2002b). The species was extirpated from the Lower Colorado River Basin in the 1970s but has been reintroduced into the Gila River sub-basin, where it exists in small numbers in the Verde River (FWS 2002b). Its National Heritage Status in Utah is S1, critically imperiled.

Currently, three wild populations of Colorado pikeminnow are found in about 2,821 miles of riverine habitat in the Green River, upper Colorado River, and San Juan River sub-basins (FWS 2002b). The Colorado pikeminnow is a long-distance migratory fish, moving hundreds of miles to and from spawning areas. Adults require pools, deep runs, and eddy habitats maintained by high spring flows (FWS 2002b). After hatching and emerging from spawning substrate, larvae drift downstream to nursery backwaters that are restructured by high spring flows and maintained by relatively stable base flows (FWS 2002b).

There would be no effects on Colorado pikeminnow from construction of any ULS features because there has been no occurrence of this species found within the effect area of influence. Depletion effects are addressed

through the amended Duchesne River Biological Opinion and RIP, and are not considered part of this biological assessment. Construction, operation and maintenance of the ULS of the Bonneville Unit of the CUP will have no affect on Colorado pikeminnow because of the ongoing actions and District participation in the RIP.

F.4.3 Humpback Chub (Endangered)

There are no documented collections of humpback chub (*Gila cypha*) from the effect area of influence. The humpback chub is listed as "endangered" under the federal ESA and by the State of Utah. This species was first included in the List of Endangered Species issued by the Office of Endangered Species on March 11, 1967 (32 FR 4001) and was considered endangered under provisions of the Endangered Species Conservation Act of 1969 (16 U.S.C. 668aa). The Humpback chub was included in the United States List of Endangered Native Fish and Wildlife issued on June 4, 1973 (38 FR No. 106), and it received protection as endangered under Section 4(c)(3) of the original ESA of 1973. The final rule for determination of critical habitat was published on March 21, 1994 (59 FR 13374). Six extant populations are known: the first five populations are in the Upper Colorado River Basin (i.e., upstream of Glen Canyon Dam, Arizona), and the sixth population is in the Lower Colorado River Basin (FWS 2002c). Its National Heritage Status in Utah is S1, critically imperiled.

Populations of humpback chub are restricted to deep, swift, canyon-bound regions of the mainstem and large tributaries of the Colorado River Basin (FWS 2002c). Adults require eddies and sheltered shoreline habitats maintained by high spring flows (FWS 2002c). Young fish require low-velocity shoreline habitats, including eddies and backwaters, that are more prevalent under base-flow conditions (FWS 2002c).

There would be no effects on humpback chub from construction of any of the ULS features because there has been no occurrence of this species found within the effect area of influence. Depletion effects are addressed through the amended Duchesne River Biological Opinion and RIP, and are not considered part of this biological assessment. Construction, operation and maintenance of the ULS of the Bonneville Unit of the CUP will have no affect on Humpback chub because of the ongoing actions and District participation in the RIP.

F.4.4 Razorback Sucker (Endangered)

There are no documented collections of razorback sucker (*Xyrauchen texanus*) from the effect area of influence. The razorback sucker is listed as "endangered" under the federal ESA and in the State of Utah. The species was listed under the federal ESA in 1991 (56 FR 54957) with critical habitat designated on March 21, 1994 (59 FR 13374). The species is endemic to the Colorado River Basin of the southwestern United States (FWS 2002d). Razorback sucker are currently found in small numbers in the Green River, upper Colorado River, and San Juan River sub-basins; lower Colorado River between Lake Havasu and Davis Dam; reservoirs of Lakes Mead and Mohave; in small tributaries of the Gila River sub-basin (Verde River, Salt River, and Fossil Creek); and in local areas under intensive management such as Cibola High Levee Pond, Achii Hanyo Native Fish Facility, and Parker Strip (FWS 2002d). Its National Heritage Status in Utah is S1, critically imperiled.

Historically, razorback sucker were widely distributed in warm-water reaches of larger rivers of the Colorado River Basin from Mexico to Wyoming (FWS 2002d). Habitats required by adults in rivers include deep runs, eddies, backwaters, and flooded off-channel environments in spring; runs and pools often in shallow water associated with submerged sandbars in summer; and low-velocity runs, pools, and eddies in winter (FWS 2002d). Spring migrations of adult razorback sucker were associated with spawning in historic accounts, and a variety of local and long-distance movements and habitat-use patterns have been documented (FWS 2002d). Young require nursery environments with quiet, warm, shallow water such as tributary mouths, backwaters or inundated floodplain habitats in rivers, and coves or shorelines in reservoirs (FWS 2002d).

There would be no effects on razorback sucker from construction of any of the ULS features because there has been no occurrence of this species found within the effect area of influence. Depletion effects are addressed through the amended Duchesne River Biological Opinion and RIP, and are not considered part of this biological assessment. Construction, operation and maintenance of the ULS of the Bonneville Unit of the CUP will have no affect on Razorback sucker because of the ongoing actions and District participation in the RIP.

F.5 June Sucker (Endangered)

F.5.1 Background

This section provides a history of consultation and summarizes the conclusions of previous consultation on June sucker.

Reclamation was informed by the Utah Division of Wildlife Resources in mid-February 1979 of the tentative taxonomic verification of the "June" sucker, a small population of an endemic fish unique to Utah Lake. The taxonomy of the fish was still uncertain and Utah Division of Wildlife Resources was requested to develop a proposal for further work. The evaluation of specific project impacts on reproductive success of this species in the Provo River and development of a mitigation plan was deferred until completion of the study. Unknowns relative to spawning habits and other requirements for this species precluded making conclusions concerning project impacts.

In 1982, the FWS published a notice in the Federal Register that it would review the status of the June sucker and requested information related to the species.

Reclamation coordinated with the FWS, the Utah Division of Wildlife Resources, and the District in 1983. In addition to three inter-agency meetings, several technical meetings were held with agency specialists. As a result of this coordination, Reclamation contracted with the Utah Division of Wildlife Resources to study the in-stream flow needs of the June sucker as a basis for determining project impacts and mitigation. The study was completed in 1986 (Radant et al 1987).

Reclamation re-opened Section 7 consultation with the FWS in 1985 because of proposed modifications to the M&I System and the proposed listing of the June sucker as an endangered species. Reclamation completed an environmental assessment of the impact of the M&I System on the proposed endangered June sucker. The assessment concluded there were no adverse impacts, was sent to the FWS as part of the official request for endangered species consultation.

On April 30, 1986, June sucker was officially listed as endangered. The FWS informed Reclamation that it would withhold its determination on the effects of the M&I System on that species pending further analysis of data gathered by Reclamation and Utah Division of Wildlife Resources.

On October 8, 1986, Reclamation submitted a supplement to the biological assessment, which again concluded no effect on the June sucker.

On December 11, 1986, the FWS concurred with Reclamation, issuing its own determination of no effect, but requesting that enhancement opportunities be considered. As quoted from the memorandum to Reclamation's Regional Director from the FWS Endangered Species Office Field Supervisor: "*The rather significant reduction in spring discharges could have negative impacts on the June sucker which are not apparent with our current level of knowledge. Therefore, it is important that the alterations associated with the project be monitored to*

assure that our current conclusions are in fact correct and borne out through observation before and with the project in place."

Late in 1986, the Utah Division of Wildlife Resources completed a study started in 1983 on in-stream flow needs of the June sucker (Radant et al 1987).

From the 1990 Diamond Fork Final Supplement to the 1984 Final EIS, the following excerpt is quoted: "*with the recommended plan and alternative A there would be fewer impacts to terrestrial and aquatic resources than those described in the Final EIS. Therefore, there would be no adverse impacts on ... June sucker... On January 21, 1987, the Service concurred in the "no effect" determination for alternative A"* (this was the Proposed Action).

From the 1993 Final Environmental Assessment for the Olmsted Diversion and Intake Structure Replacement Project, Bonneville Unit, Central Utah Project, the following is quoted: *"there are no special concern, threatened, or endangered fish species present in the project influence area. Migration blockage on the lower Provo River, and no change in river flows would result in no effect to the June sucker, which inhabits Utah lake or the lower Provo River. The federally-listed endangered June sucker, which occurs in Utah Lake, migrates into the Provo River to spawn in June, followed by several months of juvenile rearing. The diversion and falls at the Columbia Lane Bridge (located approximately 10.7 miles downstream of the diversion dam construction area) restrict this species' distribution in the Provo River to reaches well downstream of the project area (UDOT and FHWA, 1988; American Fisheries Society, 1989). Use of best management practices would minimize siltation and turbidity. Construction activities would occur during noncritical months for the June sucker. At the June 15, 1993, meeting with the FWS, they agreed that the Proposed Project would have no affect on June sucker."*

In a letter dated December 10, 1993, the FWS concurred in the assessment conclusion that there would be no effect on listed species.

The 1994 Biological Opinion for the Provo River Project stated that *"it is the Service's biological opinion that the Project, as operated, is likely to jeopardize the continued existence of the June sucker . . . and is likely to destroy or adversely modify designated critical habitat."* The Biological Opinion also stated that "*while additional, non-Federal water development in the Provo River basin will probably not occur, several State, local, and private activities are likely to occur in the future. The most obvious is the ongoing urbanization of areas historically utilized for agriculture. The conversion of farmlands to residential areas allows for encroachment of residential areas adjacent to critical habitat areas (thereby reducing future June sucker recovery options)... and will necessitate transferring of water rights to new urban interests... Urbanization and water conversions will, therefore, increase the likelihood of jeopardy to the June sucker and adverse modification of critical habitat."*

The RPA for June sucker was "*primarily based upon the establishment and protection of flows in the Provo River to ensure annual river flushing, support adult spawning activities, and maintain high quality egg and larval habitat conditions."* The RPA called for a range of research flows and associated studies over a three year period (1995-97) and "*at the end of the 3-year study, when data are available to determine June sucker flow needs, Reclamation will reinitiate consultation for the Project . . . This new consultation, using the study results, will define the size of the permanent block of water to be acquired and delivered by Reclamation for June sucker needs."*

The Central Utah Project Completion Act (CUPCA) was passed in 1992 as part of Public Law 102-575. The CUPCA legislation transferred responsibilities for the Bonneville Unit of the CUP from Reclamation to the District, however, Reclamation still has a responsibility for providing water for the June sucker under the 1994 Biological Opinion on the Provo River Project.

The following summarizes the RPAs identified in the FWS Biological Opinion on the Effects of Operation of the Provo River Project:

1. Reclamation will identify, acquire, and permanently store a block of water to augment Provo River flows during June sucker spawning and rearing activities, the volume of which will be determined from 1995-1997 studies as identified in the Biological Opinion.

2. Reclamation will ensure that Provo River Water Users Association's operation of Deer Creek Reservoir, especially during periods of importation of Weber and Duchesne River water to Utah Lake, are provided as necessary to ensure activities leading up to or during importation do not adversely alter the timing, magnitude, and/or duration of June sucker research flows.

3. Establish a permanent water quality monitoring station within critical habitat. This station would be monitored by Reclamation personnel immediately prior to and during June sucker occupation of the Provo River to determine if suitable water quality exists for adult and larval June sucker riverine needs. As necessary to protect June sucker, adjustments in flow releases would subsequently be accomplished by Reclamation to enhance water quality and quantity conditions.

4. Reclamation will actively cooperate with the FWS and other members of the Provo River Resource Team, or a subteam thereof, to successfully implement the above activities. The Team would meet at least twice a year to specifically discuss June sucker needs, water year scenarios, options to assist recovery efforts, and activities to implement this RPA. Reclamation and the FWS would share co-lead for ensuring timely Team meetings, discussions, and actions.

Conservation measures for June sucker in the FWS Biological Opinion on the Effects of Operation of the Provo River Project included the following:

1. Reclamation should provide technical support and participation in the Utah Lake Fish Management Team (Team). This Team is currently reviewing native/nonnative fish interaction habitat alteration issues in Utah Lake and its tributary inflow areas and will be developing management recommendations that will have impact on future fish management, Utah Lake levels, and Provo River flow decisions.

2. Reclamation should work to minimize Utah Lake water level fluctuations that occur partially as a result of Reclamation's historic projects. Water surface elevation stabilization to historic conditions would enhance vegetation colonization, thereby creating critical in-lake nursery rearing habitat for young June sucker.

3. Review, with Utah Division of Wildlife Resources, fish management in Reclamation's Provo River drainage facilities to ensure introduced species compatibility with native fish populations. Reclamation also should investigate fish entrainment occurrence at Deer Creek and Jordanelle Reservoirs and develop plans to reduce incidental movement of nonnative species, both forage and sportfish species, into occupied endangered species habitat.

After reviewing the 1996 Biological Assessment for the Wasatch County Water Efficiency Project and Daniels Replacement Project, the FWS concurred with the finding of a "no effect" on June sucker in a letter dated July 11, 1996 and stated that a biological opinion would not be required for the project.

From the 1999 Diamond Fork System Final Supplement to 1990 Final Supplement to the 1984 Final EIS for the Bonneville Unit of the CUP (CUWCD 1999a), the Biological Opinion on June sucker states that "*after reviewing*

the current status of June sucker, the environmental baseline for the action area, the effects of the Bonneville Unit, and the cumulative effects, it is the Service's biological opinion that the Bonneville Unit, as proposed, is not likely to jeopardize the continued existence of the June sucker, and is not likely to destroy or adversely modify designated critical habitat. The finding of "not likely to jeopardize" is based on the commitment of the joint-lead agencies to implement the conservation recommendations which have been included as part of the proposed action." The following conservation actions were identified:

1. The JLA, in cooperation with the FWS and the June Sucker Flows Workgroup, should model reservoir operations and Provo River flows (using new approach of operational scenarios that mimic dry, moderate and wet years) over the period of record to determine how this approach meets the needs of water users and reservoir operation as well as meet flow requirements for June sucker.

2. The JLA, in cooperation with the FWS and the June Sucker Technical Workgroup, should determine the feasibility of restoring the lower Provo River to obtain past habitat characteristics and complexity. The lower Provo River historically had a complex delta system, which provided braided, slow, meandering channels. This delta system provided low velocity habitat as a refuge and rearing habitat for larval and juvenile June sucker. Re-establishment of the delta system may provide habitat needed by larval and juvenile June sucker to obtain sized needed to reduce predation by nonnative fishes.

3. The JLA, in cooperation with the FWS and the June Sucker Technical Workgroup, should determine the feasibility of the Spanish Fork River as an additional self-sustaining June sucker spawning run in Utah Lake. The June Sucker Recovery Plan identifies the need for a second spawning run for delisting of the species. Completion of the Diamond Fork System allows the opportunity of the JLA to determine habitat needs and availability and flow requirements to establish a second river for a June sucker spawning run.

The 1999 Diamond Fork System Final Supplement to the 1990 Final Supplement to the 1984 Final EIS for the Bonneville Unit of the CUP (CUWCD 1999a) included the following environmental commitments based on the FWS *Draft* Biological Opinion:

1. The JLA will identify, acquire, and permanently provide a block of water for flows in the lower Provo River through critical habitat, in perpetuity, for June sucker.

2. The District, in cooperation with the other Provo River water users, the FWS, and other members of the Provo River Flows Workgroup, will agree on operational scenarios that mimic dry, moderate and wet years. The District, with the support of the JLA and Provo River water users, will apply operational scenarios to the annual Provo River operation to benefit June sucker.

3. The JLA, in cooperation with the State of Utah and the FWS, will work toward establishment of a refugium in Red Butte Reservoir for June sucker.

4. The JLA will participate in the development of a RIP for June sucker.

5. Any future development of the Bonneville Unit of CUP will be contingent on the RIP making sufficient progress towards recovery of June sucker.

From the Final Environmental Assessment for the Olmsted Flowline Rehabilitation and Replacement Project dated June 2001, *"the Proposed Action would have a may effect, not likely to adversely affect on June sucker in*

the lower Provo River or Utah Lake. This impact would not be significant because Provo River flows would remain unchanged from baseline conditions from April through October, which includes the late May through early July spawning and incubation period for June sucker."

In a letter dated March 9, 2001, from the FWS to Reclamation regarding the draft environmental assessment, the FWS stated they *"were unable to concur with your "no effect" determination for threatened and endangered species for the June sucker (Chasmistes liorus). Because flows will be altered during and following the Flowline Rehabilitation Project, we find a "may affect, not likely to adversely affect" determination to be warranted. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered."*

In April 2002, after several years of interim activity, the June Sucker RIP (JSRIP) was formally adopted by the following partners: FWS, DOI, Reclamation, District, Mitigation Commission, Utah Department of Natural Resources, Provo River Water Users Association, Provo Reservoir Water Users Company, and Outdoor and Environmental Interests (CUWCD 2002).

The JSRIP has the following two goals:

Goal 1. To recover June sucker so that it no longer requires protections under the ESA

Goal 2. To allow continued operation of existing water facilities and future development of water resources for human use

For the purpose of the JSRIP, the recovery actions identified in the June Sucker Recovery Plan (FWS 1999) were grouped into six general categories referred to as recovery elements. Recovery elements were established to organize recovery actions by the threats they are intended to address in an effort to ensure a diversified and balanced approach to the implementation of recovery actions whereby funding and effort can be applied at the appropriate level for each recovery element. The recovery elements include: (1) Nonnative and Sportfish Management, (2) Habitat Development and Maintenance, (3) Water Management and Protection to Benefit June Sucker, (4) Genetic Integrity and Augmentation, (5) Research, Monitoring and Data Management, and (6) Information and Education.

A final environmental assessment and FONSI on the JSRIP were prepared by the FWS and issued in April 2002 (FWS 2002e). The final EA analyzed the environmental consequences of federal agency participation in development and implementation of the JSRIP and determined that the recovery actions would not have a significant impact on resources of the human environment. These federal agencies include FWS, DOI, Mitigation Commission, and Reclamation. The District and Utah Division of Wildlife Resources serve as cooperating agencies. Future NEPA compliance may be necessary to cover potentially significant actions that could result from implementing the JSRIP.

In the 2003 Final Environmental Assessment for the Provo Reservoir Canal Enclosure Project (Reclamation was the Lead Agency) it is stated *"the Proposed Action will not have a negative impact on flows in the Provo River in regards to the June sucker. As a result, the Proposed Action will not violate any conditions of the 1994 Biological Opinion on the Provo River Project and will not hinder the success of the JSRIP."* It states that *"one of the threats to the June sucker identified in the FWS 1994 Biological Opinion was the change in flows in the Provo River. The FWS indicated that Reclamation will identify, acquire and permanently store a block of water for June sucker purposes. Although an amount of water was not specified in the Biological Opinion, the saved water (under Section 207 of CUPCA) from the Proposed Action would provide a significant portion, if not all, of the water needed to satisfy this block of water. The PRWUA would make the saved water available to the District who in turn would make the water available to DOI. The principle purpose for this saved water would be to satisfy the*

block of water needed for June sucker recovery. Reclamation has determined, in consultation with the FWS, that the Proposed Action may affect, but is not likely to adversely affect, the June sucker."

In a letter from the FWS dated April 23, 2003, the FWS concurred with "not likely to adversely affect" determination for June sucker and further stated that their concurrence was based on their *"understanding that the project will contribute saved water of sufficient quantity to help fulfill flow need for June sucker in the Provo River.*

In addition to the above-stated commitment for water, Reclamation is a signatory of and participant in the JSRIP (Program). In this role, Reclamation provides funding and technical resources to ensure Program success in both the recovery of the June sucker and in meeting human water needs. The FWS anticipates that Reclamation will continue to be a committed and effective partner in Program efforts to acquire and protect sufficient flows for the recovery of the June sucker. Acquisition and protection of flows offset impacts of ongoing and future water projects such that they do not adversely impact the June sucker. This concludes the basis for our concurrence. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered."

F.5.2 Status of Environmental Commitments, Conservation Actions, and Reasonable and Prudent Alternatives (RPAs) Resulting from ESA Consultation for June Sucker

F.5.2.1 1994 Biological Opinion for the Provo River Project

The District took action to address the following RPAs since operation of the Provo River Project affects the delivery of Bonneville Unit water, although Reclamation continues to have responsibility for the RPAs. The following identifies the RPAs resulting from the 1994 Biological Opinion and the status of actions to meet the RPAs.

1. Reclamation will identify, acquire, and permanently store a block of water to augment Provo River flows during June sucker spawning and rearing activities, the volume of which will be determined from 1995-1997 studies as identified in the Biological Opinion.

   Status: Flows provided during the 1995-1997 study period provided some insights into flow needs for June sucker (Keleher et al 1998), however, these studies fell short of clearly identifying the flow requirements for June sucker.

2. Reclamation will ensure that Provo River Water Users Association's operation of Deer Creek Reservoir, especially during periods of importation of Weber and Duchesne River water to Utah Lake, are provided as necessary to ensure activities leading up to or during importation do not adversely alter the timing, magnitude, and/or duration of June sucker research flows.

   Status: The RPA was issued to Reclamation as the federal agency responsible for the Provo River Project which is independent of ULS and the Bonneville Unit of the CUP.

3. Establish a permanent water quality monitoring station within critical habitat. This station would be monitored by Reclamation personnel immediately prior to and during June sucker occupation of the Provo River to determine if suitable water quality exists for adult and larval June sucker riverine needs. As necessary to protect June sucker, adjustments in flow releases would subsequently be accomplished by Reclamation to enhance water quality and quantity conditions.

Status: A permanent water quality monitoring station has been established within critical habitat. The station was first installed in the lower river below the fish weir in 1995. The station was later moved upstream to the current location near Harbor Drive because Utah Lake elevation was influencing the stage of the river at the lower site thereby making recorded flow measurements inaccurate.

The water quality station was installed and has been operated and maintained by the District. Water quality data for this site can be accessed on the District web page.

4. Reclamation will actively cooperate with the FWS and other members of the Provo River Resource Team, or a subteam thereof, to successfully implement the above activities. The Team would meet at least twice a year to specifically discuss June sucker needs, water year scenarios, options to assist recovery efforts, and activities to implement this RPA. Reclamation and the FWS would share co-lead for ensuring timely Team meetings, discussions, and actions.

   Status: The Provo River Flow Workgroup (Provo River Resource Team) has been functioning to coordinate flows each year since 1995. Workgroup members typically meet weekly leading up to and during the runoff period. The workgroup includes a diverse group of agency representatives, county and city representatives, and the river commissioner. Each year factors such as forecasted runoff and reservoir elevations are considered in determining the flow scenario. Since 1999 efforts have been made to implement a flow scenario that was developed by the District which mimics historic natural flow patterns depending on annual hydrologic conditions while providing target flow patterns and flexibility for reservoir managers.

F.5.2.2 1999 Biological Opinion for the Diamond Fork Final Supplement to 1990 Final Supplement to the 1984 Final EIS for the Bonneville Unit of the CUP

The following identifies the conservation actions from the 1999 Biological Opinion and the status of meeting the conservation actions.

1. The JLA, in cooperation with the FWS and the June Sucker Flows Workgroup (Workgroup), should model reservoir operations and Provo River flows (using new approach of operational scenarios that mimic dry, moderate and wet years) over the period of record to determine how this approach meets the needs of water users and reservoir operation as well as meet flow requirements for June sucker.

   Status: The flow approach developed by the District was incorporated into the modeling effort for the lower Provo River as part of the ULS planning effort. The results of the analysis incorporate water that would be supplied under the ULS and are included in the hydrology and impact analysis documented in the EIS.

   Because of their limited numbers and logistical constraints, it has been difficult to collect sufficient information on June sucker reproductive biology to determine precisely what flows are required to attract adults to the river and provide suitable conditions for spawning, incubation of eggs, and nursery of young-of-year. As a result of this lack of information, the District has proposed that the best way to ensure that adequate flows are provided is to mimic the conditions in which the species evolved, or what occurred naturally. This was attempted with previous flow recommendations that targeted providing a percentage of the flows occurring at the Hailstone gauge to the lower Provo River. Water management agencies had difficulties in providing flows in this manner (i.e., managing reservoir releases in winter to deliver a percentage of an unknown flow during the spring runoff and logistical difficulties associated

with large diurnal changes in flow), which has led to the development of the following approach. This approach has been used as the basis for flow deliveries that have been implemented since the 1999 runoff season.

For the period of record (1950-1995) the quantity of water imported from the Duchesne River and Weber River drainages was deducted from the water measured at the Hailstone gauge on the Provo River to determine historic "natural" runoff patterns. Runoff patterns (April though July) showed considerable variation from year to year for the period of record.

- Runoff volumes ranged from as low as 23,961 acre-feet in 1977 to a high of 199,345 acre-feet in 1986.
- The maximum peak magnitude, based on daily averages, ranged from 345 cfs in 1977 to 2,820 cfs in 1983.
- Minimum flows during the runoff ranged from as low as 1.4 cfs in 1990 to 219 cfs in 1986.
- The date of the runoff peak ranged from April 10 through June 15.

In spite of the variation in the natural runoff pattern, two trends were apparent: 1) the duration of the runoff was longer, and 2) the peak in the hydrograph was higher and tended to occur later in wetter years. Based on these trends, and in an attempt to mimic historic conditions, this approach was developed for providing target flows for the June sucker spawning and nursery period.

The date of the hydrograph peak occurrence was split into three equal categories: early, mid, and late runoff. The date of the median occurrence of each of these categories was used to determine peak dates for the proposed approach. The early peak was determined to be May 15, the mid-runoff peak was determined to be May 26 and the late peak was determined to be June 7.

Peak magnitudes were split into three equal categories: low, moderate, and high magnitudes. The median peak magnitudes were roughly 1,100 cfs for low, 1,500 cfs for moderate, and 2,100 cfs for high magnitudes. Because of existing demands on a limited water supply and channel capacity limitations as a result of floodplain encroachment, one half of the median values were used as targets for the proposed approach. Hence, the target low magnitude peak is 550cfs, the target moderate magnitude peak is 750 cfs, and the target high magnitude peak is 1,050 cfs.

To determine a target for the duration of the runoff, the number of days that flows at the Hailstone gauge exceeded 219 cfs (the maximum minimum flow for a year in the period of record) was tallied for each year. The period of record was split into three equal groups: low duration, moderate duration and high duration runoff years. The average number of days that flows exceeded 219 cfs for each of these groups was used to target runoff duration. The low duration runoff averaged 46 days, the moderate duration runoff averaged 72 days, and the high duration runoff averaged 97 days.

Based on the trends in the historic data and using the analyses mentioned above, three hydrograph scenarios were produced using a 3-parameter Lorentzian Model (based on a 75 cfs base flow, peak date, magnitude, and runoff duration. For a dry (low flow) year, flows to the lower Provo River should peak around May 15 at 550 cfs with a runoff duration of 46 days (approximately April 23 to June 7) (see Figure F-1). For a moderate year, flows should peak around May 26 at 750 cfs with a runoff duration of 72 days (April 21 to July 1) (see Figure F-2). For a wet (high flow) year, flows should peak on June 7 at 1,050 cfs with a runoff duration of 97 days (April 20 to July 25) (see Figure F-3). The quantity of water required to provide the three scenarios (including a minimum 75 cfs base flow from April 1 to July 31) is 34,610 acre-feet for a dry year, 51,457 acre-feet for a moderate year, and 75,819 acre-feet for a wet year.

Implementing this approach is coordinated through the Provo River Flows Workgroup (Workgroup). Determinations of which hydrograph scenario to follow are based on available June sucker water supply, reservoir status, forecasted runoff, anticipated demands to the system and biological considerations for the given year. As weather conditions and demands to the system change, reservoir releases are adjusted to compensate for those changes.

Daily flow values in this approach represent targets for water managers. Actual flows in the lower Provo River may vary from target flows because it is difficult to maintain precise flows at such distances below control structures, and because of unforeseen changes within the system (i.e., sudden weather changes). Under this approach, beginning April 20-23 flow releases increase from base flow in the lower Provo River and reach approximately 550 cfs on May 15 (the peak date for the dry year scenario). By May 15, a decision is made based on forecast information and available reservoir space. If it appears that a dry year scenario is in store, and reservoirs can capture the remaining runoff, flows would recede in the lower Provo River targeting the return to base flow conditions around June 7. Flows would drop from the peak to base flow conditions sooner than June 7 if required to meet system demands. Base flow conditions should be such that water quality standards are maintained while not disturbing spawning areas or developing larval fish. These flows should provide researchers the opportunity to monitor the spawning

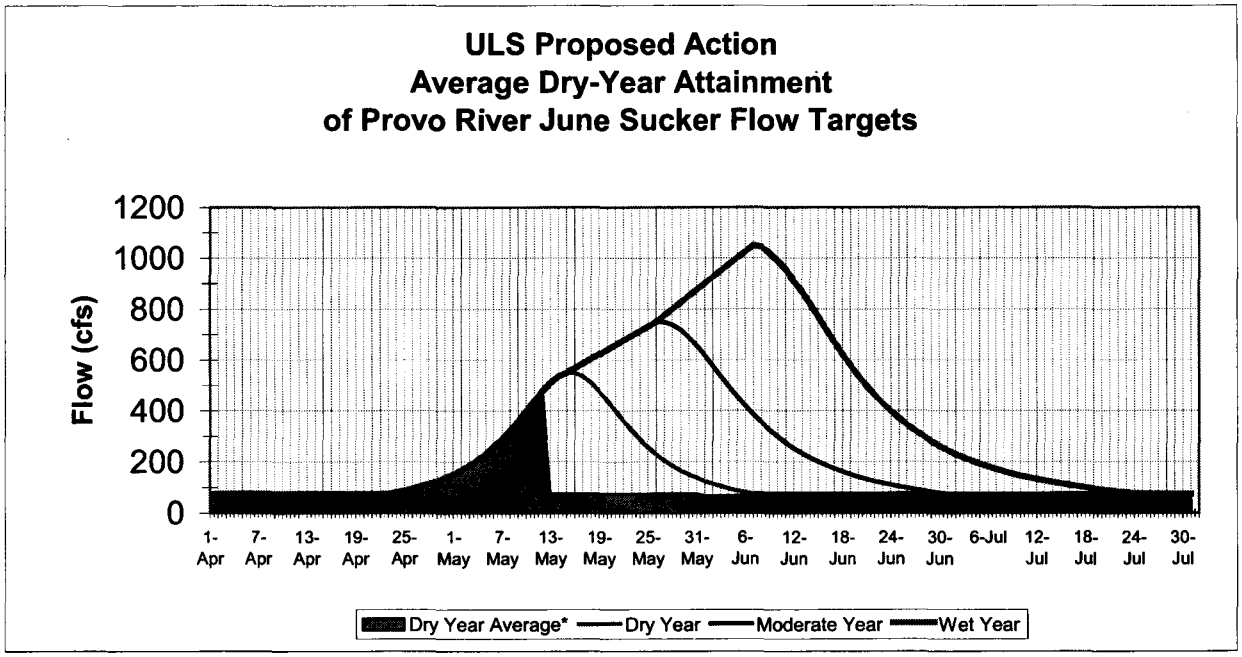


Figure F-1
ULS Proposed Action Average Dry-Year Attainment of Provo River June Sucker Flow Targets

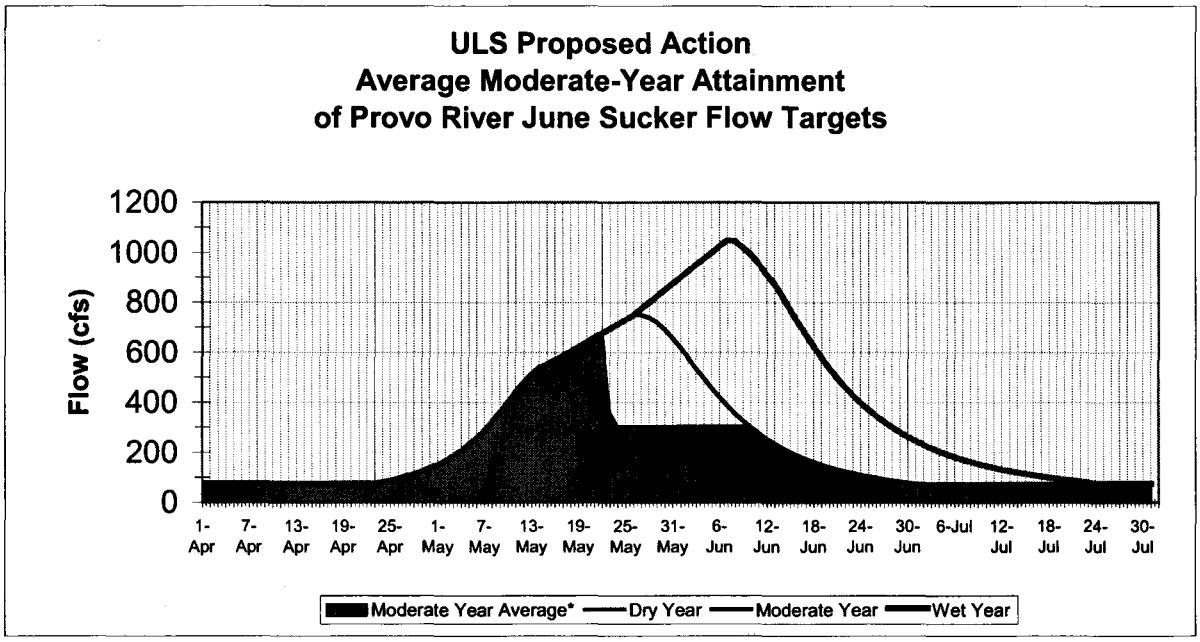


Figure F-2
ULS Proposed Action Average Moderate-Year Attainment of Provo River June Sucker Flow Targets

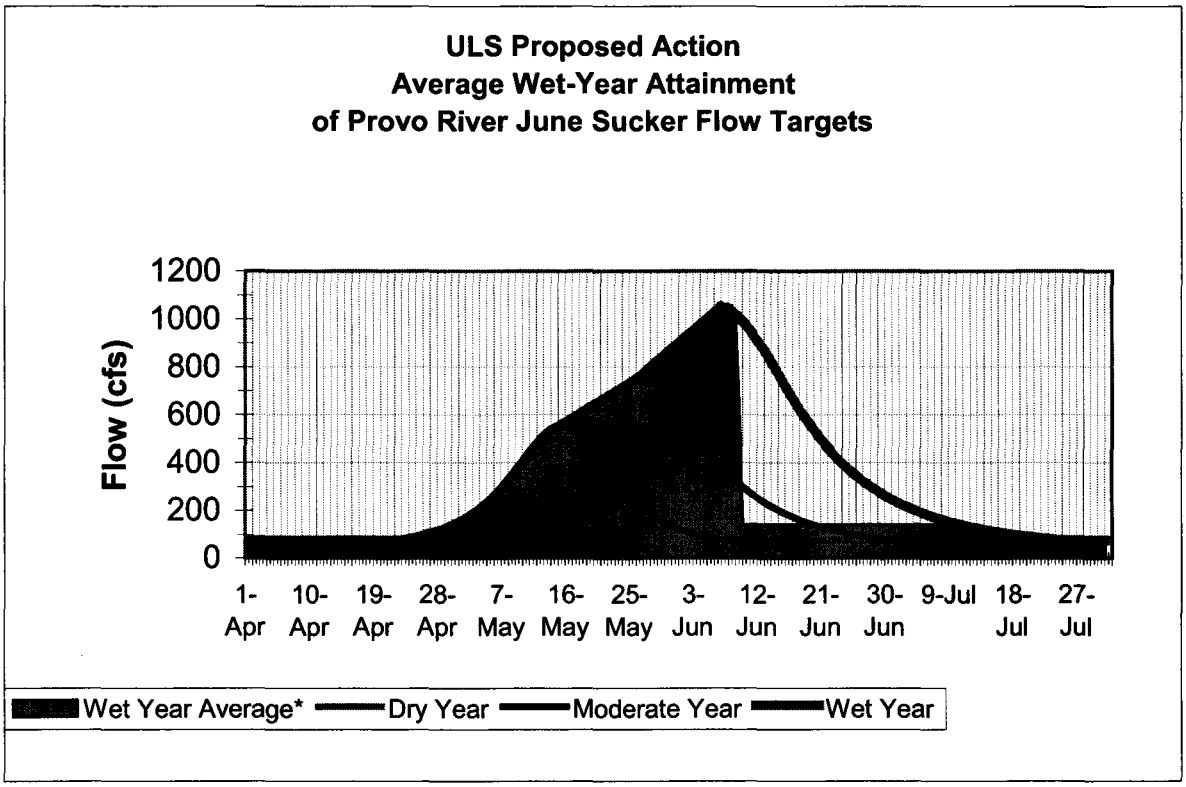


Figure F-3
ULS Proposed Action Average Wet-Year Attainment of Provo River June Sucker Flow Targets

population, but may need refinement depending on conditions in the river. If, on May 15, it appears that there is not sufficient space in reservoirs to capture the remaining runoff, flows would continue to increase targeting a peak of 750 cfs on May 26. Likewise, if the peak of 750 cfs is reached on May 26 and there is not sufficient space in reservoirs to capture remaining runoff, flows would continue to increase targeting 1,050 cfs on June 7. After May 15, however, decisions of whether to continue to increase flows would be made after frequent reviews of reservoir capacity, weather forecasts and system demands. Moderate and wet year scenarios provided are references for targeting flows in these types of years.

The benefits of this approach are: 1) it provides reservoir operators a target for planning and over-winter operations, and 2) it mimics the natural conditions in which June sucker evolved. For this approach to mimic natural conditions over the long-term, dry, moderate, and wet years should occur essentially in equal frequency.

Since 1999 the Workgroup has implemented this flow procedure to manage spring runoff in the lower Provo River in a manner that will protect and assist June sucker spawning. The flow procedure was adopted by the Workgroup as a practical improvement on prior flow management methods, but is recognized as an interim procedure in lieu of a minimum flow recommendation or other spawning flow regime sanctioned by the FWS. Such a flow recommendation must await a greater understanding of the biological and hydrologic needs of the spawning June sucker.

Each spring, the Workgroup meets with the operations staff of the District, the Provo River Commissioner and others to develop the specific flow regime consistent with the prevailing hydrologic conditions in the Provo River basin (expected runoff, reservoir capacities, available water in storage dedicated to June sucker, etc).

Table F-3 summarizes the flow decisions of the Workgroup for each year beginning in 1999 in the lower Provo River.

Table F-3
June Sucker Flows Workgroup Flow Decisions in the Lower Provo River

Water Year	April 1 to July 31 Runoff at Harbor Drive (acre-feet)[1]	Storage Water Required (acre-feet)[2]	Storage Water Percent of Runoff	Flow "Scenario" Adopted by June Sucker Flows Workgroup
1999	82,636	7,001	8.5	Wet
2000	34,252	17,634	51.5	Dry
2001	18,763	8,845	47	Dry
2002	27,514	13,960	51	Dry
2003	17,545	4,660	26.5	Dry

Notes:
[1] Data from CUWCD
[2] Data from Provo River Commissioner

Based on hydrologic conditions foreseen in early spring, 1999 was considered a "wet" year by the Workgroup and a flow regime consistent with the wet-year attainment flow procedure was followed. With the exception of an accelerated decline following the conclusion of June sucker spawning, this flow regime closely tracked the "wet" scenario shown in Figure F-3. This modification was adopted to

conserve storage water that had been acquired by the Federal government pursuant to the 1994 Biological Opinion on the Provo River Project (see Section F.5.2.1). Comparatively little storage water (8.5 percent) was required to augment abundant natural runoff to achieve the "wet" condition scenario.

Water year 2000 was the first of a series of "dry" years that have persisted up to the present. Drought conditions prevailed throughout Utah during 2000, requiring comparatively more storage water (51.5 percent) to maintain the flow conditions recommended by the Workgroup. The Workgroup coordinated efforts of the District to manage flow conditions to match a "dry" scenario, again, with the exception of an accelerated decline following spawning to conserve storage water for future spawning.

Continued severe drought and growing concerns for the adequacy of available storage water dedicated to June sucker spawning caused the Workgroup to adopt a very conservative flow management policy for 2001 and 2002. Conditions prevented meeting even the "dry" year flow procedure. In these two years, storage water releases for June sucker spawning made up half the flows in the lower river (Table F-3).

In addition, in 2002 the Workgroup accommodated a High Flow Study in the Provo River performed by the Mitigation Commission in support of ULS planning. This caused a marked deviation from the flow procedure with short-term flow peaks up to 800 cfs. However, this flow regime had the benefit of providing the scouring flow conditions in the lower river recommended to improve channel substrates for spawning.

In 2003, the persistence of severe drought and concern for available storage water for June sucker spawning caused the Workgroup to adopt a "minimal" flow condition for the lower river. A peak of just 150-cfs for 5 days was deemed prudent given the prevailing conditions. Due to this restriction, only 26 percent of flows in the lower river during June and July were maintained by water released to assist June sucker spawning.

In all years since 1999, June suckers have spawned successfully in the Provo River. While not likely acceptable for long-term management, even the minimal flow conditions of 2003 apparently provided the environmental cues necessary to initiate and sustain June sucker spawning. During the first five years of its implementation, this flow procedure appears to meet acceptable flow requirements for spawning June sucker in compliance with the 1999 Biological Opinion.

The period 1950 through 1999 was used to model the impacts of ULS on achieving the flow approach identified above. In this period, 17 years were considered dry years, 17 were considered moderate and 16 were considered wet years. Modeling efforts indicate that the above flow approach could be met 10 of the 50 years under baseline conditions. Of the 10 years that the approach is met, 7 are categorized as moderate and 3 are categorized as wet. Under baseline conditions modeling results indicate that the dry year scenario is not met. For those years when the above flow approach is not achieved under baseline conditions, modeling results indicate average deficiencies of 24,731 acre-feet in dry years, 30,681 acre-feet in moderate years, and 39,314 acre-feet in wet years.

Under the ULS Proposed Action, 12,165 acre-feet would be secured by the JLA for June sucker flows on an annual basis. Modeling efforts indicate that the flow approach could be met 17 of the 50 years under ULS operation. Of these 17 years, 2 are in the dry year category, 9 are in the moderate year category, and 6 are in the wet year category. For those years when the flow approach is not achieved under ULS operation, average deficiencies would be significantly reduced from baseline conditions. The average deficiency in dry years is 12,002 acre-feet (see Figure F-1), in moderate years is 21,244 acre-feet (see Figure F-2) and in wet years is 32,175 acre-feet (see Figure F-3).

Table F-4 shows the Department of the Interior's water acquired for June sucker spawning in the Provo River from 1995 through 2004. The water volumes varied between years because some of it was acquired on a temporary basis from year to year, and some was acquired on a permanent basis. The 12,165 acre-feet secured by the JLA will provide a permanent supply of water for June sucker spawning and rearing flows.

Table F-4
Department of the Interior Water Availability and Use for June Sucker Spawning in the Provo River
1995 to 2004
(acre-feet)

Year	New Water Available	Total Water Available (Remainder + New Water)[a]	Water Used	Remaining Water
1994	1,600	1,600	1,600	0
1995	5,000	5,000	760	4,240
1996	5,000	9,240	2,857	6,383
1997	5,000	11,383	3,208	8,175
1998	6,800	14,975	0	14,974
1999	5,000	19,975	7,001	12,974
2000	11,300[b]	24,274	17,634	6,640
2001	9,672[c]	16,312	8,845	7,467
2002	9,672[c]	17,139	13,960	3,179
2003	10,672[d]	13,851	4,660	9,191
2004	12,172[e]	21,363	--	--

Notes:
[a] Start of each new year
[b] 5,000 acre-feet (CUP) + 5,800 acre-feet (Conjunctive Use) + 500 acre-feet (Lindon)
[c] Includes 1,004 acre-feet Timpanogos Canal purchase + 223 Timpanogos Canal shares purchased by Mitigation Commission and credited by CUWCD in 2001
[d] Includes "American Fork Section 207" (1,000 acre-feet)
[e] Includes Highland Secondary (1,000 acre-feet) + 500 Jordan Valley Water Conservancy District (first water from demonstration garden Section 207)

2. The JLA, in cooperation with the FWS and the June Sucker Technical Workgroup, should determine the feasibility of restoring the lower Provo River to obtain past habitat characteristics and complexity. The lower Provo River historically had a complex delta system, which provided braided, slow, meandering channels. This delta system provided low velocity habitat as a refuge and rearing habitat for larval and juvenile June sucker. Reestablishment of the delta system may provide habitat needed by larval and juvenile June sucker to obtain sized needed to reduce predation by nonnative fishes.

   Status: A feasibility study for enhancing lower Provo River habitat was conducted under the JSRIP. A local environmental consulting firm was contracted to complete the study and a report was finalized and approved by the JSRIP in June 2002 (see BIO-WEST 2002).

3. The JLA, in cooperation with the FWS and the June Sucker Technical Workgroup, should determine the feasibility of the Spanish Fork River as an additional self-sustaining June sucker spawning run in Utah Lake. The June sucker Recovery Plan identifies the need for a second spawning run for delisting of the species. Completion of the Diamond Fork System allows the opportunity of the JLA to determine habitat needs and availability and flow requirements to establish a second river for a June sucker spawning run.

   Status: A study to examine the feasibility of establishing an additional spawning location for June sucker was conducted under the JSRIP (see Stamp et al 2002. Feasibility Analysis of Establishing an Additional Spawning Location to Benefit the Endangered June sucker. Submitted to the JSRIP Program Director). Based on field evaluations of all Utah Lake tributaries the American Fork River, Hobble Creek, and the Spanish Fork River were advanced for further consideration and more detailed analyses. Based on a number of factors presented in the report including the availability of high quality habitat for early life stages in Provo Bay and a comparison of relative cost/benefit of improvement measures needed, JSRIP committees decided to pursue the development of a spawning run on Hobble Creek and funded a study to develop habitat enhancement concepts for lower Hobble Creek (see Stamp et al 2003).

F.5.2.3 1999 Diamond Fork Final Supplement to 1990 Final EIS for the Bonneville Unit of the CUP

The following identifies the environmental commitments made for June sucker in the 1999 Diamond Fork Final Supplement to the 1990 Final EIS (1999 FS-FEIS) (CUWCD 1999a) and the status of meeting the environmental commitments. The environmental commitments in the 1999 FS-FEIS were based on the draft biological opinion provided by the FWS. The RPAs in the draft biological opinion were more extensive than those included in the final biological opinion.

1. The JLA will identify, acquire, and permanently provide a block of water for flows in the lower Provo River through critical habitat, in perpetuity, for June sucker.

   Status: The JLA have acquired water though willing sellers and CUPCA Section 207 conservation projects. Some of this water is available on a temporary basis and some is a permanent supply. Through implementation of the ULS, the JLA have identified a permanent block of water to be supplied for June sucker spawning and nursery flows that totals 12,165 acre-feet per year.

2. The District, in cooperation with the other Provo River water users, the FWS, and other members of the Provo River Flows Workgroup, will agree on operational scenarios that mimic dry, moderate and wet years. The District, with the support of the JLA and Provo River water users, will apply operational scenarios to the annual Provo River operation to benefit June sucker.

   Status: Operational scenarios to mimic dry, moderate and wet years have been developed by the District and coordinated through the Provo River Flows Workgroup (formed in 1995 to replace the Provo River Resource Team) since 1999. Successful spawning has been documented each year and as a result of stocking efforts from hatchery and refuge sources, numbers of spawning June sucker collected in the Provo River have increased. Fertilized eggs have been collected from stream-side spawning efforts to support brood stock development for future augmentation efforts.

3. The JLA, in cooperation with the State of Utah and the FWS, will work toward establishment of a refugium in Red Butte Reservoir for June sucker.

Status: The Final Environmental Assessment for the Property Transfer and Improvements of Red Butte Dam and Reservoir (SWCA 2003) and the Draft Preliminary Design and Cost Estimate for Rehabilitation of Red Butte Dam and Appurtenances (September 2002) were reviewed by the District's Board of Trustees at their October 2003 meeting where they accepted title to the facility and approved completing the necessary rehabilitation.

With the District's Board of Trustees accepting title and approving the completion of the necessary rehabilitation, the reservoir will be maintained and operated as a June sucker refuge facility until it is determined by the FWS that it is no longer needed for June sucker recovery purposes. The District, through coordination with the JSRIP, the Utah Division of Wildlife Resources, and the FWS, will develop a management plan for Red Butte Reservoir (JSRIP Project No. IV.04.03 – Prepare a Long-term Management Plan for Red Butte Reservoir) with the goal of implementing an adaptive management approach to provide conditions to promote June sucker spawning, recruitment, survival and growth while providing benefits to other species such as Bonneville cutthroat trout.

It is interesting to note that between 1994 and 2001 Utah Division of Wildlife Resources stocked 9,437 June sucker into Utah Lake and Provo River. Of these, 255 (2.7 percent) individuals have been recaptured, mostly through capture of spawning adults in Provo River. Individuals stocked from Red Butte Reservoir comprise 58 percent of the recaptures, but only 17 percent of the total number of stocked fish (Utah Division of Wildlife Resources Statement of Work submitted to JSRIP for 2004 Workplan).

4. The JLA will participate in the development of a RIP for June sucker.

   Status: The JSRIP was formally adopted in April 2002. The District was pivotal in developing the JSRIP by chairing both the Drafting Committee for the formal Program Document, and the Organizing Committee. The District contracted a local consulting firm to assist in an Environmental Assessment for federal participation in the Program. The District's Staff Biologist was honored at the signing ceremony with an award of appreciation from the FWS for "significant contributions to the recovery of the endangered June sucker and outstanding leadership of the JSRIP."

   The District, DOI and Mitigation Commission continue to lead the recovery effort for June sucker. District representatives have served as chair of the Administration Committee, chair of the Technical Committee and as Local Recovery Coordinator for the JSRIP. The District has established an account specifically to fund recovery activities and along with the JLA has contributed significant funds on an annual basis to the account.

   The JLA have committed funds and in-kind services annually to the implementation of recovery actions under the JSRIP.

5. Any future development of the Bonneville Unit of the CUP will be contingent on the RIP making sufficient progress towards recovery of June sucker.

   Status: "Sufficient progress" can only be determined by the FWS. The JLA have continued to move forward within their authorities to provide conditions to promote the recovery of the June sucker and have coordinated with partners to the JSRIP in funding and implementing other actions. However, it seems unlikely that full recovery of June sucker can be achieved without addressing and making efforts to control the threats posed by nonnative fish in Utah Lake.

F.5.3 Life History

The June sucker (*Chasmistes liorus*) is an endangered fish species endemic to Utah Lake and the lower Provo River. Once a locally abundant species, it was listed as endangered by the FWS in 1986, with 4.9 miles of the lower Provo River, from the Tanner Race diversion to Utah Lake, designated as Critical Habitat (51 FR 10857).

The number of adult June sucker remaining in Utah Lake is estimated each spring based on the number spawning in the Provo River (FWS 1995c). From 1979 to 1985, the number of spawners never exceeded 500 fish, and 1985 was the last year in which aggregations of 30 to 50 June sucker spawners were observed in the Provo River. During the 1990s, collections of June sucker spawners in the Provo River have been less than 100 fish, and occasionally were less than 50 fish. Recent estimates placed the wild population size at approximately 300 individuals (Keleher et al 1998). Recruitment to the adult population is thought to be poor as a result of predation by white bass and other introduced predators. Aging of various groups of June sucker collected in the 1980s and 1990s found few fish less than 10 years of age, suggesting recruitment and survival of juveniles is inadequate (FWS 1999).

The Provo River, the largest tributary of Utah Lake, historically has been the major spawning tributary for June sucker, but other tributaries were likely used prior to changes that made them unavailable or unsuitable for the species. Carter (1969) notes that early explorers and indigenous Native Americans also keyed fishing activities on the lower Spanish Fork River, Hobble Creek, and the mouth of Peteetneet Creek. All three of these streams have considerably reduced flows from pre-irrigation times. Radant and Sakaguchi (1980) noted adult June sucker in spawning condition near the mouth of the Spanish Fork River, but later studies failed to find either spawning suckers or suitable habitat in that stream. The Utah Division of Wildlife Resources found spawning June suckers in the lower Spanish Fork River in 2002. The lowermost irrigation diversion structure on the Spanish Fork River prevents the species from accessing potential spawning habitat (Radant and Shirley 1987). Peteetneet Creek no longer reaches Utah Lake, as it is dewatered near the High Line Canal. Flow in Hobble Creek has been significantly reduced and no longer provides suitable habitat for a large species such as the June sucker.

Various historic riverine habitat characteristics, many of which no longer exist, are presumed to be favorable to June sucker spawning success. These features include multiple, meandering channels at the inlet of tributaries to Utah Lake and riparian zones. These components are thought to create microhabitats that benefit June sucker as their ecological needs change associated with development through life history stages. Advantages of these habitats include cover from predators and slow, warm pools, which support larval growth.

Factors that have contributed to the reduction in June sucker numbers include changes that have occurred both in Utah Lake and in historical spawning tributaries. In the tributaries, these effects include water management (primarily irrigation use) that has reduced streamflows during critical spawning times, reductions in available spawning habitat caused by impassable barriers associated with irrigation diversions, introduction of exotic predators, introduction of other species (carp), loss of spawning habitat, poor water quality, reduced aquatic vegetation, and channelization or channel simplification. In Utah Lake, contributing factors include changes in chemical and physical habitat, introduction of exotic predators, and lake level management.

The life history of the June sucker involves both Utah Lake and its tributaries. One of only four "lake suckers," the mouth of the June sucker is terminal, and the lips and gill rakers of adults are adapted to feed on microscopic plankton. Adults live in Utah Lake, apparently moving about the lake considerably. Sexual maturity likely occurs at 5 to 7 years of age, but most adults are from older age classes (Scoppettone and Vinyard 1991). During June, reproductive adults move into the Provo River to spawn. During most water years spawning is limited to the lower 3 miles because of a partial passage barrier at the Fort Field diversion. However in very high water years adults have been seen above this partial barrier using the next 1.9 miles of habitat up to the Tanner Race diversion dam. Spawning typically occurs in mid- to late June, with the eggs hatching in 1.5 to 2 weeks. Adults move back into the lake shortly after spawning. A post-spawning aggregation of adult June sucker was found in Provo Bay by Radant and Shirley (1987) and recent findings based on radio-tagged June sucker confirm this (Crowl 2003). This portion of

Utah Lake has higher than normal plankton densities during this period, and the fish may be responding to this food source following relatively little feeding during their stay in the Provo River.

The early life history of the species is poorly understood. Larvae apparently drift down to the lake relatively quickly after spawning (Radant and Sakaguchi 1980; Radant and Shirley 1987; Modde and Muirhead 1990). It is thought that many of the spawning tributaries originally had deltas into the lake that would have provided young suckers with food, cover, and space for growing. These habitats no longer exist. It is thought that juveniles live in or around the lake. Recent research (Crowl 1994) indicates young are very susceptible to predation by white bass, although they will seek cover if it is available. Current thinking on limiting factors for the species suggests that predation on the young, either in the dredged lower Provo River channel, or in Utah Lake, is the major factor in poor recruitment to the adult population (FWS 1995c). Lack of hiding cover in the lower Provo River and in the lake may be a contributing factor to predation. Poor water quality conditions and a large carp population appear to be factors in young sucker survival.

F.5.4 Location in Effect Area of Influence

The June sucker inhabits Utah Lake and the Provo River, and is known to spawn in the lower Provo River. Spawning is generally restricted to the lower 3.5 miles of the Provo River, below the Fort Field diversion. The Fort Field diversion presents a migration barrier in most years. During very high flow years, June sucker adults may pass this barrier and continue 1.9 miles further upstream. At this writing, the Tanner Race diversion presents an impassable barrier to migration further upstream under all flow regimes (FWS 1999).

F.5.5 Baseline Conditions

Baseline conditions in the Provo River were assumed to be full operation of the M&I System as presented in the 1979 M&I System EIS. The M&I System has been partially operating since 1996 after the Syar Tunnel in the Diamond Fork System became operational and up to 30,000 acre-feet per year of Bonneville Unit water has been allowed to flow down Sixth Water and Diamond Fork Creeks into Utah Lake for exchange to Jordanelle Reservoir. When the Diamond Fork System is completed in 2004 and begins to operate in 2005, an average of 86,100 acre-feet per year of Bonneville Unit water will be delivered to Utah Lake for exchange to Jordanelle Reservoir. Therefore, when the ULS begins to operate in 2016, the M&I System will have been fully operating for approximately 10 years, which represents the baseline conditions for the ULS.

Past and ongoing human actions have had significant, detrimental effects on habitat availability, water quality, and river flow timing, magnitude and duration. The combination of these non-CUP-associated activities has reduced June sucker populations to critically low levels. Several major actions have had and continue to have significant, detrimental effects on June sucker, including depletion of Provo River flows by priority water right holders, introductions of non-native sport fish into the Provo River and Utah Lake, habitat alteration, and other direct mortality. These past and ongoing actions have influenced the baseline conditions for June sucker in the Provo River.

Table F-5 presents a summary of the June sucker collected on the Provo River during spawning runs from 1991 through 2003. During the years from 1991 to 1996, all of the spawning June sucker collected in the Provo River were wild. Starting in 1997, June sucker originating from a hatchery and released to the Provo River and Utah Lake were collected in addition to the wild fish. Starting in 2002, June sucker raised in Red Butte Reservoir and released to the Provo River and Utah Lake were collected in the Provo River during the spawning run. June sucker spawning data from 1998 through 2003 were provided by the Utah Division of Wildlife Resources (UDNR 2003b).

Table F-5 Number of June Sucker Collected During Spawning Runs on the Provo River				
Year	**Wild Fish**	**Hatchery Fish**	**Red Butte Reservoir Fish**	**Total Fish**
1991	35	0	0	35
1992	46	0	0	46
1993	38	0	0	38
1994	67	0	0	67
1995	24	0	0	24
1996	29	0	0	29
1997	13	1	0	14
1998	0	1	0	1
1999	0	1	0	1
2000	2	6	0	8
2001	2	4	0	6
2002	15	12	12	39
2003	34	23	59	116
Source: UDNR 2003b				

F.5.6 Water for June Sucker Under the ULS Proposed Action

The following water quantities and sources comprise the water that would be released under the ULS Proposed Action to the lower Provo River for June sucker spawning and rearing flows:

- 2,875 acre-feet Northern Utah County 207 project savings
- 1,000 acre-feet Upper East Union and East River Bottom canals piping
- 290 acre-feet Timpanogos Canal piping
- 8,000 acre-feet Provo Reservoir Canal seepage loss savings **or from other 207 projects** to be assigned to DOI

12,165 acre-feet total

An average annual volume of 12,165 acre-feet of water for June sucker will be provided each year, regardless of the source(s) of water in the Provo River drainage.

F.5.7 Construction Effects

None of the construction activities associated with this project alternative would affect Utah Lake or June sucker critical habitat in the lower Provo River.

F.5.8 Operation Effects

F.5.8.1 Methods

The Instream Flow Incremental Methodology (IFIM) was used in this study to assess the effects of flow manipulation in the Provo River on fish habitat (Radant et al 1987; Olsen et al 2003). IFIM is composed of a suite of analytical procedures that describe habitat features resulting from a specific flow scenario (Bovee et al 1998). One of these procedures is the microhabitat model component of the IFIM known as the Physical Habitat Simulation (PHABSIM). In this study, the PHABSIM component of the IFIM was used to predict the amount of fish habitat for spawning June sucker and other fish species under a range of possible flows in the Provo River. The major premise of the PHABSIM procedure is that the suitability of a species' habitat can be described by measuring selected physical variables in a stream. To address this assumption, extensive research was conducted for June sucker and other aquatic species in the Provo River to measure their requirements for depth, velocity and substrate (Radant et al 1987). Once these values were determined, the biological data was linked with the hydraulic properties of the river (depth and velocity at hundreds of individual points within a two-dimensional mesh developed by a detailed hydraulic model) to estimate the relationship between habitat availability and flow within study reaches.

Selected habitat parameters for the PHABSIM analysis were measured at two locations in the Provo River to evaluate June sucker habitat availability. Since June sucker only have access to habitat in the Provo River below Tanner Race Diversion for spawning, potential habitat was evaluated based on study sites taken at two locations (Site 1 and Site 2c) in the approximately 5 miles of the Provo River below the Tanner Race Diversion. The study station at Site 1 was situated downstream of the Fort Field Diversion. The study station at Site 2c was located between the Fort Field Diversion and Tanner Race Diversion.

During habitat modeling for the Provo River, fish species with similar habitat requirements were grouped together into eight distinct habitat niches (Olsen et al 2003). In this analysis, habitat requirements for the spawning life stage of June sucker was best represented by the moderate/mid-depth habitat niche, and the larval/young-of-year life stages were assigned to the backwater/edge and slow/shallow niches (Olsen et al 2003). Although fish habitat changes were predicted for many fish species in the Provo River, only habitat niche results related to the spawning, larval, and young-of-year life stages of June sucker are presented herein because of the regulatory status of this species. Predicted changes in habitat within these three habitat niches were used to indicate a potential change in June sucker spawning and/or rearing habitat in both reaches from Utah Lake to the Tanner Race Diversion.

Two modeling approaches were used during this study to estimate habitat availability for June sucker. In the first approach, a PHABSIM model was run for the spawning life stage of June sucker that included habitat suitability for depth, velocity, and substrate. Assumptions of the IFIM model are habitat-based and do not consider the presence and influence of non-native fish in the habitat. In the second approach, habitat niche modeling was conducted based only on depth and velocity habitat suitability criteria (Olsen et al 2003). The habitat niche modeling approach was preferred for June sucker because this species has demonstrated plasticity in the types of spawning substrate they use for reproduction (Crowl, 2003).

After the integration of biological and physical habitat components, modeling projected the amount of habitat available to June sucker in terms of Weighted Usable Area (WUA). For these purposes, WUA can be defined as the total area per unit length of river that would be expected to provide usable habitat for a selected habitat niche. Habitat was modeled as WUA (ft^2) per 1,000 linear feet of stream. In this analysis, a modeled average monthly flow generated a monthly WUA value. For a record of 50 years (1950-1999), May, June (spawning) and July (larval/young of year) average monthly flows under a project alternative were used to predict a corresponding value of monthly WUA for each modeled habitat niche. An average WUA for each month over the period of

record (1950-1999) was then calculated for alternative comparison. WUA was the measure of habitat used to assess potential impacts to June sucker under the project alternatives. Predicted habitat for June sucker at Site 2c was extrapolated to the reach of the Provo River between Tanner Race Diversion and Fort Field Diversion. Modeled habitat for June sucker at Site 1 was extrapolated for the reach of the Provo River between Fort Field Diversion and Utah Lake.

F.5.8.2 Effects

Changes in hydrology in Utah Lake under the Proposed Action would be within the current range of operations. It is therefore assumed that there would be no effects on adult June sucker individuals or populations in Utah Lake. Hydrologic changes that could affect June sucker would occur in the lower Provo River.

The average monthly flows in the Provo River downstream of the Murdock Diversion under the Proposed Action represent a projected increase compared to baseline conditions (Table F-6 and Table F-7). Under the Proposed Action, the reach of the Provo River between Murdock Diversion and Fort Field Diversion would receive flow increases in all months (Table F-6). Flows in this reach were used to predict habitat availability for June sucker between Tanner Race Diversion and Fort Field Diversion. The reach of the Provo River between Fort Field Diversion and Utah Lake would receive higher flows compared to baseline conditions in all months, with the highest proportional flow increases projected to occur in August and September (Table F-7). Increased flow during May, June (spawning) and July (larval/young-of-year/out migration) in both of these reaches was designed to benefit June sucker spawning and early life history. Instream flows would be targeted during summer months to support incubation and facilitate out-migration of juvenile suckers to Utah Lake.

Table F-6
Estimated Average Flow (cfs) and Percent Change in Provo River from Murdock Diversion Dam to Fort Field Diversion for the Spanish Fork Canyon-Provo Reservoir Canal Alternative Compared to Baseline Flows (average water year)

	Month											
Flow Condition	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Baseline	88	72	59	55	70	147	199	476	527	182	149	134
Proposed	129	90	77	74	86	158	251	553	563	231	196	182
% Change	47	25	31	35	23	7	26	16	7	27	32	36

Table F-7
Estimated Average Flow (cfs) and Percent Change in Provo River from Fort Field Diversion to Utah Lake for the Spanish Fork Canyon-Provo Reservoir Canal Alternative Compared to Baseline Flows (average water year)

	Month											
Flow Condition	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Baseline	32	76	56	51	64	142	168	347	374	42	4	6
Proposed	77	94	75	69	81	153	222	445	433	110	61	62
% Change	141	24	34	35	27	8	32	28	16	162	1,425	933

In the reach of the Provo River between Tanner Race Diversion and Fort Field Diversion (Site 2c), predicted spawning habitat for June sucker during May-June would be higher under the Proposed Action. In this alternative, the moderate/mid-depth habitat niche would increase 192 percent in May and 122 percent in June compared to baseline conditions (Table F-8). The Fort Field Diversion is a partial passage barrier during June sucker spawning. During very high water years, adults can utilize 1.9 miles of habitat up to the Tanner Race diversion dam. In summary, monthly average flows in May and June described under the Proposed Action would produce significant increases in the amount of June sucker spawning habitat in the reach of the Provo River between Tanner Race Diversion and Fort Field Diversion compared to baseline conditions. Furthermore, the total amount of available spawning habitat in the Provo River would slightly increase under the Proposed Action.

Table F-8
PHABSIM Predictions for Moderate/Mid-depth Habitat Niche under Proposed Action Flows in the Provo River from Tanner Race Diversion to Fort Field Diversion [a,b,d]

Flow Scenario	Month	Average Monthly Flow (cfs)	Moderate/Mid-Depth Habitat Niche	
			Average WUA (ft^2)	Percent Change from Baseline
Existing Condition[c]	May	332	8,639	--
	June	384	6,610	--
Baseline Condition	May	352	3,198	--
	June	381	3,409	--
Proposed Action	May	441	9,326	192
	June	429	7,565	122

Notes:
[a] WUA results were expressed as square feet per 1,000 feet of river
[b] Results from Site 1 were extrapolated to represent habitat throughout this Provo River reach
[c] Existing condition data taken from USGS Gage Provo River at Provo during 1950-1999
[d] Average monthly flow and average WUA calculated over period of record (1950-1999)

Additional habitat niche modeling in the reach of the Provo River between Tanner Race Diversion and Fort Field Diversion indicated that predicted backwater/edge and slow/shallow habitat in July would decrease under the Proposed Action compared to baseline conditions.

The 50-year average WUA values for the backwater/edge habitat niche would decrease by 61 percent under the Proposed Action compared to baseline conditions (Table F-9). Projected habitat for the slow/shallow habitat niche would decrease by 8 percent under the Proposed Action. Although the backwater/edge habitat niche was predicted to experience a large proportional decrease in predicted habitat, the actual magnitude of the decrease was relatively small (2,007 ft^2) compared to the amount of habitat available in the slow/shallow habitat niche (14,637 ft^2).

June sucker in their early life history stages would be expected to use habitat in both slow-flow niches. The total habitat decrease in both niches was predicted to be 3,226 ft^2 under the Proposed Action, with total available habitat in both of these niches decreased by approximately 20 percent compared to baseline conditions. Predicted decreases in habitat for early life stages may be offset by gains in spawning habitat for adult June sucker, particularly since available literature indicates larval June sucker drift downstream immediately after emerging (Modde and Muirhead 1990).

Table F-9
PHABSIM Predictions for Slow Flow Habitat Niches in July Under Proposed Action Flows in the Provo River from Tanner Race Diversion to Fort Field Diversion [a,b,d]

Flow Scenario	July Average Monthly Flow (cfs)	Backwater/Edge Habitat Niche		Slow/Shallow Habitat Niche	
		WUA (ft^2)	Percent Change from Baseline	WUA (ft^2)	Percent Change from Baseline
Existing[d]	56	2,471	--	15,844	--
Baseline	57	3,311	--	15,856	--
Preferred	58	1,304	-61	14,637	-8

Notes:
[a] WUA results were expressed as square feet per 1,000 feet of river
[b] Results from Site 1 were extrapolated to represent habitat throughout this Provo River reach
[c] Existing condition data taken from USGS Gage Provo River at Provo during 1950-1999
[d] Average monthly flow and average WUA calculated over period of record (1950-1999)

In the lower Provo River from Fort Field Diversion to Utah Lake (Site 1), simulated habitat during May-June (spawning niche) would be higher under the Proposed Action, with the moderate/mid-depth habitat niche increasing 96 to 181 percent compared to baseline conditions (Table F-10). Habitat in this niche was projected to increase 181 percent in May and 96 percent in June. Under the Proposed Action, the increased flows would produce significant increases in June sucker spawning habitat in the reach of the Provo River between Fort Field Diversion and Utah Lake.

Table F-10
PHABSIM Predictions for Moderate/Mid-depth Habitat Niche under Proposed Action Flows in the Provo River from Fort Field Diversion to Utah Lake [a,b,d]

Flow Scenario	Month	Average Monthly Flow (cfs)	Moderate/Mid-Depth Habitat Niche	
			Average WUA (ft^2)	Percent Change from Baseline
Existing Condition[c]	May	332	16,253	--
	June	384	13,164	--
Baseline Condition	May	347	6,570	--
	June	374	7,011	--
Proposed Action	May	445	18,467	181
	June	433	13,763	96

Notes:
[a] WUA results were expressed as square feet per 1,000 feet of river
[b] Results from Site 1 were extrapolated to represent habitat throughout this Provo River reach
[c] Existing condition data taken from USGS Gage Provo River at Provo during 1950-1999
[d] Average monthly flow and average WUA calculated over period of record (1950-1999)

In general, hydrologic changes in July under the Proposed Action would have potential positive effects on the early life history stages of June sucker. Projected flow increases during July of 68 cfs would aid the dispersal of June sucker larvae as they drift downstream to Utah Lake. Habitat modeling of the backwater/edge and slow/shallow habitat niches in July from 1950 to 1999 indicated another benefit to early life stages of June sucker. Additional flow to this reach under the Proposed Action resulted in modeled average monthly flows for July that never declined to zero. Under baseline conditions, 31 of 50 modeled July average monthly flows would be zero. Based on historical flows and habitat modeling during the month of July, a significant benefit to the early life history stages of June sucker would be achieved under the Proposed Action because water would be available in the Provo River downstream of Fort Field Diversion every year.

Habitat niche modeling over the entire period of record indicated that backwater/edge and slow/shallow habitat niches showed negligible changes in the Proposed Action compared to baseline conditions (Table F-11). Average WUA values for these niches would change less than two percent over the entire time period. Although 50-year averages of flow and available habitat in July would experience minor changes between baseline conditions and the Proposed Action, a significant benefit to the early life history stages of June sucker would be achieved under the Proposed Action because water would be available in the Provo River downstream of Fort Field Diversion every year.

Table F-11
PHABSIM Predictions for Slow Flow Habitat Niches in July Under Proposed Action Flows in the Provo River from Fort Field Diversion to Utah Lake [a,b,d]

Flow Scenario	July Average Monthly Flow (cfs)	Backwater/Edge Habitat Niche		Slow/Shallow Habitat Niche	
		WUA (ft^2)	Percent Change from Baseline	WUA (ft^2)	Percent Change from Baseline
Existing[d]	56	9,757	--	16,764	--
Baseline	57	9,647	--	16,885	--
Preferred	58	9,638	No Change	17,079	1

Notes:
[a] WUA results were expressed as square feet per 1,000 feet of river
[b] Results from Site 1 were extrapolated to represent habitat throughout this Provo River reach
[c] Existing condition data taken from USGS Gage Provo River at Provo during 1950-1999
[d] Average monthly flow and average WUA calculated over period of record (1950-1999)

Based on modeling results for all three habitat niches used by June sucker in the Provo River, total available habitat under the Proposed Action would significantly increase compared to baseline conditions. Habitat niche modeling in both reaches of the Provo River indicated that the moderate/mid-depth habitat niche would experience significant increases under the Proposed Action, although predicted habitat increases in the moderate/mid-depth habitat niche could cause some indirect negative effects on June sucker by improving habitat suitability for predatory fish species, such as brown trout, white bass and walleye. In contrast to moderate flow habitats, slow water habitats were projected to decrease significantly under the Proposed Action in the reach between Tanner Race Diversion and Fort Field Diversion, and less significantly in the reach between Fort Field Diversion and Utah Lake compared to baseline conditions. In both reaches of the Provo River, the small magnitude of projected habitat decreases for early life stages would be offset by large predicted habitat gains for

spawning June sucker. July flow increases in both reaches of the Provo River would provide a benefit to young-of-year June sucker by restoring the hydrograph to a more natural condition.

The Utah Division of Wildlife Resources issued a final management plan for the Provo River in August 2003 (UDNR 2003a). The management plan for the lower 4.9 miles of the Provo River is focused on special fish species – June sucker. The management plan identifies six objectives: 1) to provide a recreational sport fishery that meets public demands; 2) meet goals and objectives established in conservation agreements developed for sensitive species through implementation of identified conservation actions; 3) implement or assist in the actions required for recovery of June sucker; 4) obtain population, distribution, and/or life history information for native fish, amphibians, reptiles, and mollusks that occur in this hydrological unit with emphasis on sensitive species communities; 5) Identify and enhance aquatic habitats cooperatively through watershed improvement projects; and 6) coordinate actions taken in Objectives 1 through 5 in order to avoid conflicts. This management plan does not address the problem of predatory fishes in Utah Lake and the lower Provo River, and it does not address the effect of predatory fishes on June sucker recruitment and how the Division of Wildlife Resources would correct this problem to achieve recovery of the June sucker.

Brown trout, walleye, and white bass occur in the two Provo River reaches being managed for June sucker, and these and other non-native species are likely predators on June sucker larvae. Objective 3 of the management plan includes monitoring effectiveness of any non-native control methods implemented in the Provo River. The summary of actions needed to meet Objective 3 for June sucker recovery is taken from the June Sucker (*Chasmistes liorus*) Recovery Plan (FWS 1999). The non-native control action is to investigate feasibility of mechanically controlling non-native fish predators within the Provo River. If this action is determined to be feasible, then mechanical means would be used to control non-native fish predators in the Provo River. A second task identified as a needed action is to assist in providing flows that minimize non-native fish use of the Provo River. A third task identified as a needed action is to monitor effectiveness of non-native control methods in the Provo River.

Continued operation of the Bonneville Unit of the CUP is dependent upon the JSRIP making sufficient progress toward recovery of the June sucker. The JLA have no authority over the control of non-native fish in the Provo River and actions that would control predation by non-native fish on June sucker larvae. The authority for control of non-native fish lies with the Utah Division of Wildlife Resources, which is a partner to the JSRIP through the Utah Department of Natural Resources.

The JLA are actively involved in the JSRIP and they have dedicated budgets and programs to accomplish the actions listed in recovery plan. The JLA are actively working with other partners in the JSRIP to provide flows and habitat conditions to help achieve June sucker recovery. The flows that would be provided under the ULS are only part of the actions needed to achieve species recovery, and other inter-related actions include non-native fish control and habitat restoration and enhancement. The JSRIP's role is to ensure a diversified and balanced approach to recovery. The flows are one component of the actions needed to recover June sucker.

F.5.9 Conclusion

In conclusion, construction and operation of the Proposed Action may affect, but is not likely to adversely affect the June sucker.

F.6 Bald eagle (Threatened)

F.6.1 Life History

The FWS recently reclassified the bald eagle (*Haliaeetus leucocephalus*) as threatened throughout most of the country, including the state of Utah (FWS 1994a). Bald eagles have ranged historically throughout North America except for extreme northern and southern latitudes (FWS 1994a). They nest on both coasts from Florida to Baja California in the south and from Labrador to the western Aleutian Islands and Alaska in the north. At the time Europeans first arrived in North America, there were an estimated quarter- to half-million bald eagles (Gerrard and Bortolotti 1988). Populations began to decline in the mid-to late-1800s as the result of declines in prey populations, loss of nesting habitat, and shooting. These factors continued to reduce populations until the 1940s when the Bald Eagle Protection Act (16 U.S.C. 668) was passed. Shortly after World War II, the pesticide dichloro-diphenyl-trichloroethane (DDT) became popular for controlling mosquitoes along coastal and other wetland areas (Carson 1962). In the late 1960s, researchers determined that dichlorophenyl-dichloroethane (DDE), the principal metabolite of DDT, accumulated in the fatty tissues of eagles following ingestion of contaminated prey and impaired calcium production during egg-shell formation, thus inducing egg-shell thinning and reproductive failure. As a result, eagles south of the 40th parallel were listed as endangered under ESA in 1973 (FWS 1994a). The protection afforded under ESA, together with a 1972 ban on the use of DDT in the United States and the implementation of regional recovery plans, has resulted in a dramatic increase in the North American bald eagle population in recent years. Numbers of nesting pairs in the lower 48 states rose from 417 in 1963 to more than 4,000 in 1993 (FWS 1994a). In Utah, however, breeding habitat has always been limited, and Henny and Anthony (1989) noted that nesting by bald eagles was not documented in Utah until 1984, when one pair was discovered in the southeastern part of the state. However, Henny and Anthony's report conflicts with Henshaw (1875), who considered the bald eagle to be a permanent breeding species around Utah Lake. Currently, there are three known nesting territories in Utah in the southeastern part of the state. Two of these territories were active in 1994 (Bunnell 1994).

Wintering eagle populations in Utah are substantial, with 1,263 recorded in 1985 at scattered locations during the National Wildlife Federation's midwinter survey (Henny and Anthony 1989). Counts conducted by the Utah Division of Wildlife Resources also indicate a general increase in wintering eagles (Bunnell 1994). Individuals are seen commonly in small numbers within the effect area of influence from October through March (Smith and Murphy 1973, Reclamation 1988). During this period, eagles are frequently observed around Utah Lake, Mona Reservoir, and lower Diamond Fork Creek, as well as in scattered wetlands throughout central Utah (Reclamation 1988). Night roosts are located sparsely throughout the area, including timbered canyons and in groves of trees within the valley. They are often occupied by several to many eagles at once. Known roosting sites are located at Utah Lake, Mona Reservoir, and within cottonwood stands along lower Diamond Fork Creek near Palmyra Campground. Bald eagles frequently use trees around Utah Lake as daytime perches. The primary food sources for this species are fish, rabbits, waterfowl, and carrion (Smith and Greenwood 1983). There is also a bald eagle nesting territory near the Great Salt Lake in northern Utah.

The bald eagle is the only sea eagle occurring regularly on the North American Continent (American Ornithologists' Union 1983). It is primarily a bird of aquatic ecosystems (Marshall and Nickerson 1976) and frequents estuaries, large lakes, reservoirs, major rivers, and some seacoast habitats. Suitable habitat must have an adequate food base (which consists of fish), perching areas, and nesting sites that meet specific requirements for the species (FWS 1994a).

Bald eagles generally nest in large, dominant live trees with open branchwork. Preferred nesting sites are usually located in stands with less than 40 percent canopy cover with some foliage shading the nest. They often select the largest tree in a stand on which to build a stick platform nest. The nesting period extends from January to September, with peak activity from March to June. Clutch size ranges from one to three eggs with two eggs being most common. Eagles become sexually mature at 4 to 5 years and are monogamous. Wintering eagles often congregate at traditional sites that are generally close to open water and that provide large trees for perching and night roosts.

F.6.2 Location in Effect Area of Influence

No nesting pairs of bald eagle have been found in the effect area of influence. Bald eagle occasionally forage in the lower part of Diamond Fork Creek on an infrequent basis.

F.6.3 Construction Effects

Construction of the Proposed Action would have no direct or indirect effect nesting bald eagles. Nesting territories within Utah occur in the southeastern and northern part of the state outside of the effect area of influence. ULS construction would have no effect on wintering bald eagles.

F.6.4 Operation Effects

Operation of the project would have no effect on bald eagle breeding habitat, as the species does not nest in the effect area of influence. Important winter roost sites and foraging habitat that could be affected by operation of the project occur in Sixth Water Creek, and Diamond Fork Creek below Three Forks. The CUPCA-required minimum streamflows during fall and winter in Sixth Water and Diamond Fork Creek below Three Forks, plus the reduction of unnaturally high irrigation flows in these creeks during spring and summer, would benefit the bald eagles in the following ways. The more stabilized flow regime in Sixth Water and Diamond Fork Creeks would result in nearly a twofold increase in trout biomass, thus creating more prey for the eagles. The decrease in sustained high flows in these two streams would reduce turbidity and make it easier for the eagles to locate fish. The Proposed Action's restoration of a more natural peak flow in May is designed to maintain and restore Diamond Fork Creek's riparian corridor of cottonwood trees used by the eagles as roosting sites.

F.6.5 Conclusion

In conclusion, construction and operation of the Proposed Action may affect, but is not likely to adversely affect the bald eagle.

F.7 Canada lynx (Threatened)

F.7.1 Life History

The FWS listed the Canada lynx (*Lynx canadensis*) as a threatened species in March 2000. In the western U.S., lynx habitat occurs in spruce/fir forests at higher elevations. Downed logs and windfalls provide cover for denning sites, escape, and protection from severe weather. The lynx range in the contiguous United States includes 16 states-Oregon, Idaho, Washington, Montana, Wyoming, Utah, Colorado, Maine, New Hampshire, Vermont, New York, Michigan, Wisconsin, and Minnesota. Lynx infrequently dispersed into Nevada, North Dakota, South Dakota, Iowa, Indiana, Ohio, and Virginia (FWS March 2000). Lynx are believed to currently remain in small populations in only three states-Montana, Washington, and Maine (ENN 1999).

Mid-successional forest stages provide habitat for the lynx's primary prey, the snowshoe hare (*Lepus americanus*). Snowshoe hare are known to be sedentary animals, living in a limited home range. The area where they live depends on the availability of food. This limited range, normally less than 25 acres, allows hare to become well-acquainted with the habitat characteristics. They prefer a habitat of mid-successional forest (20 to 40 years old) dispersed among dense brushy cover. Snowshoe hare remain in thickets during the day; at night, they forage around the thickets and forest edges. During summer months, snowshoe hare consume mostly green succulent vegetation such as grasses, ferns, clovers and forbs; dozens of different herbs; and tender twigs. During winter, snowshoe hare usually eat bark, twigs, buds and evergreen leaves of woody plants (Kolbe nd). Palatable

deciduous species include maple, birch, rose, hazel and willow, whereas jack pine, white pine, larch, and cedar are favored conifers (Canadian Wildlife Service nd). These plant community types do not occur in the project impact area of influence.

The FWS has inadequate information to determine whether resident lynx populations occurred historically or currently within New York, Vermont, Michigan, Wisconsin, Idaho, Utah, and Oregon (FWS March 2000). It has been 68 years since a lynx was last officially spotted in Utah (ENN 1999). The official State status of the lynx in Utah is Sensitive; information is inadequate to determine whether a resident population existed historically or currently (FWS March 2000). There are records of lynx occurrence in the Uinta Mountain Range. A few records also exist from the Wasatch Range and the Manti La Sal. The last verified records of lynx from Utah were in 1977 for physical remains and 1982 for tracks. The lynx has been protected from harvest in Utah since 1974 (Forest Service et al 2000).

There are only 10 verified records of lynx in Utah since 1916. Nearly all of the reports are from the Uinta Mountain Range along the Wyoming border (McKay 1991). Four of the records correlate to cyclic population highs in the 1960s and 1970s. Although sightings of the Canada lynx in Utah over the past twenty years are exceedingly rare, the Forest Service recently announced that Canada lynx hair was found in the Manti-La Sal National Forest south of the impact area of influence during 2002 (UDNR 2003c). Recent DNA results documented the presence of a lynx in Utah. There is no evidence of lynx reproduction in Utah. The FWS considers that any lynx occurring in Utah are dispersers from other populations rather than residents, because most of the few existing records correspond to cyclic population highs, there is no evidence of reproduction, and boreal forest habitat in Utah is remote and far from source lynx populations (FWS 2003).

F.7.2 Location in Effect Area of Influence

The Proposed Action would be constructed and operated in an area that ranges from 2 to 8 miles west of the Canada lynx key linkage route through the Wasatch and Uinta ranges. The primary features that would be constructed and operated in proximity to the lynx key linkage route would be the Sixth Water Power Facility and the Sixth Water Transmission Line. The Sixth Water Power Facility would be located at the existing Sixth Water Flow Control Structure along Sixth Water Creek about 4 miles from the lynx key linkage route and about 10 miles southwest of the closest historical sighting. The Sixth Water Transmission Line upgrade would run parallel to and about 2 miles west of the lynx key linkage route for about 4 miles, and then would run southwest away from the lynx key linkage route. The upgraded transmission line would be about 9 miles southwest of the closest historical sighting.

F.7.3 Construction Effects

Construction of the Proposed Action would have no effect on the key linkage route, lynx habitat, or lynx since there is no documented historical use of the area by lynx and there are no known lynx populations or individuals in the effect area of influence.

The effect area of influence contains no primary or secondary snowshoe hare habitat. The plant community types preferred by snowshoe hare for cover, reproduction, and food do not occur in the vegetation types that would be disturbed by the project construction. The project elevations are lower than those described for snowshoe hare and potential lynx habitat in Utah. The project construction would not affect snowshoe hare habitat.

F.7.4 Operation Effects

Operation of the Proposed Action would have no effect on the key linkage route, lynx habitat, or lynx since there is no documented historical use of the area by lynx and there are no known lynx populations or individuals in the

effect area of influence. The operation activities would involve vehicle transportation over existing National Forest System roads to and from the Sixth Water Power Facility and along the Sixth Water Transmission Line. The facility elevations are lower than those described for snowshoe hare and potential lynx habitat in Utah. The project operation would not affect snowshoe hare habitat.

F.7.5 Conclusion

In conclusion, construction and operation of the Proposed Action may affect, but is not likely to adversely affect the Canada lynx.

F.8 Ute ladies'-tresses (Threatened)

F.8.1 Background

This orchid, *Spiranthes diluvialis*, was Federally listed as a threatened plant species through the ESA on January 17, 1992. The major reason for listing was due to habitat loss and modification and that it has a low reproductive rate. Since its listing, considerable efforts have been put forth by agencies (including the District), universities, and public entities to gather information on the biology, habitat requirements and distribution of the Ute ladies'-tresses. A Draft Recovery Plan for this species was developed by the FWS in 1995. The District produced a status update on Ute ladies'-tresses in 1996. Based upon this report, the District requested that the FWS initiate action to delist *S. diluvialis*. The data contained in the status update report suggests that the FWS erred in the listing of this orchid and that the body of knowledge regarding the population size was at the time of listing unknown and therefore a major error occurred with the species listing. Since listing, additional populations have been located in Utah. Populations have also been documented in Washington, western Montana, Idaho, Wyoming, Colorado and western Nebraska. The orchid also historically occurred in eastern Nevada.

The FWS 1994 Biological Opinion on the PRP concurred with Reclamation's finding that there was no effect on Ute ladies' tresses, but provided conservation recommendations for the species. These were:

1. Areas potentially impacted by water and land management activities should be surveyed for the orchid prior to initiating management changes. Particular attention should be given to areas where hydrologic changes are likely to occur.

2. Management planning and implementation should be coordinated with the orchid Recovery Team to ensure compatibility with Recovery Plan goals and guidelines. Orchid recovery is dependent upon watershed and stream management that maintains, restores, or enhances natural stream dynamics, including movement of streams within their floodplains. Therefore, proposed management activities within affected watersheds should be reviewed for their compatibility with these goals. Activities also should be evaluated for their potential to create or exacerbate problems with noxious plant species and recreational use in potential orchid habitat.

The FWS issued a biological opinion for the Diamond Fork System of the Bonneville Unit of the CUP on August 24, 1999. They concluded that the project "is not likely to jeopardize the continued existence of the Ute ladies'-tresses orchid." This finding was based on the commitment of the JLA to implement the conservation recommendations, which were included as a part of the proposed action.

The Record of Decision for the Diamond Fork System (October 13, 1999) included the following mitigation and monitoring commitments for the Ute ladies'-tresses:

1. A commitment is made to continue monitoring during the construction period prior to project operation to establish a credible baseline.

2. Data collection following project implementation should include measurements of actual stream elevations relative to ULT colony locations. This will allow the Service to verify the model and its results. If there are significant discrepancies, the model should be modified and additionally, a new impact assessment completed. Additionally, the JLA should perform aerial mapping at a resolution sufficient to record stream channel geomorphology, vegetation community, and orchid colony locations in several-year intervals to help better understand changes and evaluate their significance in relation to restoration and conservation goals.

3. Changes in vegetation communities in occupied or potentially suitable orchid habitat should be measured along Diamond Fork Creek and Spanish Fork Canyon.

4. The natural variation in Ute ladies'-tresses orchid demography, population vigor, and habitat should be characterized under baseline conditions. The natural variation in Ute ladies'-tresses orchid demography, population vigor, and habitat should be characterized following implementation of proposed operation flows.

5. The Three Forks colony should be monitored to better understand the process of loss of viability and eventual extirpation of colonies. Monitoring should focus on the rate of loss, identifying which parameters are best to measure to determine if loss is occurring, etc.

6. Conservation measures in addition to altering flows and rescue/transplant should be considered, such as vegetation manipulation, providing supplemental water to colonies, and mechanical reconfiguration of portions of the stream channel or floodplain surfaces, if monitoring data show streamflow hydrology is adversely affecting the Ute ladies'-tresses orchid population.

7. If pollination is determined to be a limiting factor to long-term orchid viability and successful colonization of new habitats, then the JLA will consider actions to enhance pollinator habitat or numbers as appropriate.

8. A methodology should be developed that would monitor changes in Ute ladies'-tresses orchid habitat quality, and the methodology should be used to establish habitat quality parameters of the population.

9. Population viability parameters and "red-flag" conditions should be established for the habitat quality parameters.

10. The accuracy of the predicted effects analysis should be measured.

11. Timing for performing the most accurate canyon-wide Ute ladies'-tresses orchid counts should be evaluated.

12. The relationship between river hydrology, depth to soil water, soil moisture, soil characteristics and Ute ladies'-tresses orchid colonies should be correlated.

The District has continually made efforts to survey for and avoid impacts to the Ute ladies-tresses to the extent practicable and has been involved in contributing toward the completion of a status review report for this orchid. As a conservation measure for the Uinta Basin Replacement Project Section 203 Alternative, the District committed to contributing toward completion of an agency and public review draft status report of the Ute ladies'-tresses orchid. The primary intent of the status review report is to compile information necessary to evaluate eligibility of the orchid for delisting, or failing to find that delisting is warranted, identification and prioritization of actions necessary to accomplish recovery. A draft status review report was distributed in November 2002. This report is in the process of being finalized by the FWS.

F.8.2 Life History

Spiranthes diluvialis (Ute ladies'-tresses) belongs to a large diverse genus of orchids with over 300 species distributed throughout the temperate regions of the world (Cronquist et al 1977; Williams and Williams 1983; Dressler 1990). General characteristics of the genus include their terrestrial habit, clustered tuberous roots, basal leaves (rosettes) and tubular creamy-white colored flowers that are spirally arranged in a congested terminal spike (Williams and Williams 1983; Welsh et al 1993). The species' common name (ladies'- tresses), in use for over 200 years, refers to the spiral arrangement of the flowers on the inflorescence that resembles braided hair (Cronquist et al 1977).

The Ute ladies'-tresses is a perennial terrestrial orchid usually 8- to 20-inches tall with fleshy, tuberous roots. It has long, narrow basal leaves (up to 1.5-inches long by 0.6-inch wide) which are reduced to bractlets upward on the stem. The tubular creamy white flowers are 0.3- to 0.6-inch long and arranged spirally on the stem. Some flowering stalks have only a few flowers while others may be packed with flowers. The orchid usually blooms between late July and the end of August. However, it has been observed blooming in early July and found in flower as late as early October (FWS 1995a; Welsh et al 1993).

Marcus E. Jones originally collected *Spiranthes diluvialis* in Salt Lake City, Utah in 1880. Over a century later, Charles J. Sheviak (1984) described the species after much deliberation over herbarium specimens and field studies of the species in its native habitat. He based his determination on the major morphological and cytological characters of specimens that were collected in Utah and Golden, Colorado, the collection site of the first western plants of the species that were sent to him for verification. Sheviak concluded that *S. diluvialis* (2n=74) probably originated from the hybridization of *S. magnicamporum* (2n=30) and *S. romanzoffiana* (2n=44) during the Pleistocene when the climate was much cooler and wetter. As aridity increased, *S. diluvialis* became restricted to isolated wetlands in the west. Arft and Ranker's (1993) electrophoretic research corroborates Sheviak's findings *that S. magnicamporum* and *S. romanzoffiana* are *S. diluvialis'* putative parents. Sheviak (1984) reported that *S. diluvialis* has morphological characteristics that are intermediate between those of both probable parents. Sheviak (1984) maintains and Arft (1995a) agrees that *S. diluvialis* be recognized as a distinct species. However, Welsh et al (1993) treats the species as a variety of S. romanzoffiana in their treatment of the Utah Flora.

The small size of orchid seeds promotes their dispersal by wind and water (Stoutamire 1992). However, because they are so small, orchid seeds are almost impossible to trace in the soil. Little is known about the fate of terrestrial orchid seeds from the time of dispersal until seedlings emerge above ground (Rasmussen and Whigham 1993). However, it is known that terrestrial orchids generally require the presence of a fungus in the soil before they germinate in the field (Wells 1981). Apparently, terrestrial orchid seeds germinate only after they have been penetrated by fungal hyphae. Like other terrestrial orchids, germination of the Ute ladies'-tresses in its natural habitat may be dependent upon the association with a mycorrhizal fungus. Germination in the lab is extremely difficult due to the orchid's fungal dependence. Germination information on this species is lacking.

Seeds of *S. diluvialis* have never been successfully germinated in the laboratory and seed viability has not been tested. Attempts by Therese Meyer, Red Butte Garden's Endangered Plant Horticulturist, and Jim Coyner, Utah Orchid Society, to propagate the orchid by tissue culture also have been unsuccessful, thus far (Coyner and Hreha,

1995). Red Butte Garden maintains a collection of *S. diluvialis* in cultivation that was rescued from the Steineker Dam borrow pit near Vernal, Utah in 1993 as a seed source for future germination and tissue culture research.

The life history and underground phenology of *S. diluvialis* remains a mystery to orchid biologists (FWS, 1995). According to Wells (1981) who has worked on other species of the genus, especially *S. spiralis*, following germination, juvenile orchids remain underground as a colorless mycorrhizome, devoid of chlorophyll, and dependent on the fungus for nutrition. At this time, the mycorrhizome is subject to drought, waterlogging, mechanical damage and predation. The time underground varies from species to species (usually greater than one year and perhaps as long as 15 years). The mycorrhizome is eventually replaced by a root tuber that is infected by the fungus that transfers water and nutrients from the soil to the plant. After the first green leaf is produced, the plant becomes autotrophic and starts producing its own food.

Little is known about the mycorrhizome stage of the orchid life cycle because it is hard to find in the soil. Wells (1981) also reported that the plant remains green throughout the winter as a rosette (visible above ground) which usually has between four and eight leaves. In the spring, the rosette starts to grow, an inflorescence is formed, it flowers and by mid-June it dies. Underground the tuber that supported the rosette and inflorescence also starts to shrivel up and die. By September, a new rosette and inflorescence forms from a new tuber. Many terrestrial orchids renew their vegetative parts every year by producing new tubers. The tubers have no roots but they are covered with fungal mycelia that absorb water and nutrients from the soil. Although *S. diluvialis'* flowering phenology is different (early July through September) from that described by Wells (1981) for *S. spiralis, .S. diluvialis* and *S. spiralis* may have similar life cycles (Coyner 1991; FWS 1995b).

Germination and establishment biology is important for conservation of orchid species (Mehrhoff 1989b). Knowledge of orchid phenology is necessary for the effective management of the orchid's habitat (Wells 1981). There have been no definitive studies to track the life cycle of *S. diluvialis* in the field. Most of the available life history information comes from field observations by orchid researchers in Colorado and Utah.

Several authors have reported variation in annual flowering frequencies for terrestrial orchids (Curtis and Greene 1953; Wells 1967; Tamm 1972). Tamm (1972) attributes these variations in flowering frequencies to land use changes, fluctuating weather conditions, changes in plant competition within the orchid's habitat and variations in mycorrhizal activity. Wells (1967) reported that *S. spiralis* plants may pass at least one season or more underground and produce a flower the next season. He suggests that mycorrhizae may play an important role in the nutrition of the mature plant during dormancy as well as the seedling during germination. Additionally, there may be a high resource cost to the plant due to flowering and fruiting. Sipes (1995) observed that plants that flowered and produced fruits in 1991 did not flower in 1992. There is a possibility that removal of photosynthetic tissue by grazing cattle and herbivory by voles during one growing season may limit resource allocation for floral development in the next.

Mehrhoff (1989a) found 20 percent dormancy in his populations of terrestrial orchids. He observed that plants were absent for at least one season and for as long as three seasons. No plants reappeared after being absent for more than 3 years. The Ute ladies'-tresses orchid seems to exist vegetatively underground for many years.

Plant size may influence flowering potential in terrestrial orchids. Mehrhoff (1989a) reported that large orchid plants tend to flower while small plants remain vegetative or die. Mehrhoff (1989a) observed that flowering individuals were always the largest in the population while sterile or vegetative plants were always the smallest.

Mehrhoff (1989a) concluded that increased adult mortality and recruitment failure contributed to orchid population decline. Wells (1981) reported three causes of orchid mortality: 1) trampling by cattle hooves, 2) destruction of the orchid tubers by beetle larvae, and 3) competition by dense tussocks of grass (*Bromus* sp.). Cattle in some areas heavily graze *S. diluvialis*, voles eat the stems and it can be out-competed for light by the succession of associated vegetation. However, the effects of these activities on orchid mortality and population

decline have not been fully determined for this species. Arft (1995a) has studied some effects of vole activity in *S. diluvialis* plots maintained by the Boulder, Colorado Open Space Program.

Spiranthes diluvialis is primarily pollinated by bumblebees *(Bombus sp.)* while a few are pollinated by *Anthophora* (sp.) bees (Sipes and Tepedino 1994, 1995, 1996). Dominant pollinators may fluctuate from year to year and from site to site. Bees work from the bottom to the top of the inflorescence (Cronquist et al 1977; Sipes 1995). Sipes (1995) determined that *S. diluvialis* is self-compatible and according to Sipes and Tepedino (1994, 1995), *S. diluvialis* offers only nectar, no pollen, as a reward to pollinators. Reproductive success is probably closely tied to the presence of other pollen producing species associated with *S. diluvialis,* offering a more diverse reward thus attracting more pollinators. Therefore, pollen-producing species within the *S. diluvialis* habitat are essential to the preservation of this rare orchid. Pollination is necessary to maintain the genetic diversity of the species (Sipes 1995).

Spiranthes diluvialis produces several hundred to tens of thousands of seeds per fruit. A single individual can produce as many as 100,000 seeds in a season (Sipes and Tepedino 1994; Sipes 1995). Arft (1995b) stressed the importance of fruit set in the perpetuation of the species. *S. diluvialis* has average to relatively high fruit set compared to other species of orchids (Sipes and Tepedino 1994). Many researchers working in Colorado and Utah have reported flowering and fruiting data for *S. diluvialis* (Stone 1993; Arft 1995b; Sipes 1995; Sipes and Tepedino 1994, 1995, 1996).

During the 1992 field season, Sipes found greater fruit set in *S. diluvialis* flowers at the bottom of the flowering stalk compared to those towards the top of the flowering stalk. This pattern in fruit and seed set may reflect the bees' pollination pattern; they start at the bottom and work their way to the top of the inflorescence. Sipes (1995) concluded that fruit set fluctuated from site to site and from year to year. Flowering phenology may affect fruit set. Frost damaged flowers and fruits were observed on plants that flowered late in the season. A reduction in potential pollinators was also observed late in the season. *S. diluvialis'* reproductive success may vary from flowering season to season due to resource availability and pollinator density.

An understanding of seed bank dynamics is necessary to assess population demographics (Kalisz and McPeek 1992). Information concerning the seed bank of this species is scarce. The seeds of *S. diluvialis* are relatively short lived, as are those of most orchids (Sipes 1995). Orchid seeds are extremely difficult to locate in the field due to their small size. Pollination is necessary to maintain the genetic diversity of the seed bank that needs to be renewed annually.

Some epiphytic, as well as, terrestrial orchids appear to tolerate stressful conditions very well. Some terrestrial orchids tolerate a degree of water shortage that would be damaging to other species. The habitats of epiphytic orchids are often deficient in nutrients (Dressler 1990). While orchids are usually not the first plants to appear after vegetation is cut or burned, some orchids do show definite weedy tendencies. Several species of *Spiranthes* are scarce and very localized in undisturbed habitats but have multiplied greatly in disturbed areas (Sheviak 1974). *S. diluvialis* exhibits many r-selected characteristics or strategies (i.e., numerous small seeds, which are short-lived and dispersed over a wide area in temporary or unpredictable habitats resulting in fluctuating populations). *S. diluvialis* exhibits characteristics usually associated with r-selected species, which is unusual because most orchids tend not to exhibit these traits (Dressler, 1990). In cultivation, the orchid appears not to be very competitive and quickly is replaced by other more aggressive species that are found growing with it (Meyer 1994).

The orchid has been found between 1370-2085 m in various mesic habitats including wet meadows, riparian areas, especially along meandering streambeds, abandoned oxbows and point bars, marshes and raised bogs. Spiranthes grows most often in sandy/silty loam soils that are wet 1.5- 2.0 feet below the surface. Usually, the orchids grow in full sunlight with other riparian species. In Utah, the associated species include: horsetail (*Equisetum* spp.), the grasses (*Agrostis stolonifera* and *Poa pratensis*), sedges and rushes (*Carex* sp., *Eleocharis*

sp., *Juncus arcticus* and *Scirpus* sp.), and forbs (*Melilotus officinalis*, *Castilleja exilis*, *Aster hesperius* and *Solidago occidentalis*). The following trees and shrubs: *Alnus incana, Betula occidentalis, Elaeagnus angustifolia, Shepherdia argentea, Salix exigua, S. lutea and Populus angustifolia* also have been observed in the habitat (UNHP 1994, Welsh et al 1993).

At the time of listing in 1992, *S. diluvialis* populations were located in three regions of the western United States: the eastern region (east of the Continental Divide in Colorado), the central region (Eastern Utah), and the western region (Great Basin of Western Utah and Eastern Nevada). Habitat types where populations were located were similarly described as riparian meadow habitat, differences to this are noted for each region. Totaled populations numbered 15, 5 of which (33 percent) were presumed extirpated, as listed below.

Two populations were reported in the eastern region: 1) Boulder Creek population in Boulder, Colorado; and 2) Clear Creek population in Golden and Wheat Ridge, Colorado. Habitat types in the eastern region were primarily relict tall grass meadows.

Six populations were identified within the central region: 1) Browns Park population along Green River in Daggett County; 2) Dinosaur National Monument population along Cub Creek in Uintah County; 3) Whiterocks population along Uinta and Whiterocks Rivers in Duchesne and Uintah Counties; 4) Duchesne population along Duchesne River in Duchesne County; 5) Capitol Reef National Park population along the Fremont River in Wayne County; and 6) Deer Creek population along Deer Creek in Garfield County. Major habitat types in the central region were understory meadows of riparian woodlands.
Seven populations were identified within the western region: 1) Ogden population in Weber County, Utah, assumed extirpated; 2) Jordan River population along Jordan River in Salt Lake County, Utah, assumed extirpated; 3) Red Butte Canyon population near Salt Lake City, Utah, assumed extirpated; 4) Callao population in Willow Springs, near Tooele, Utah, assumed extirpated; 5) Panaca population along Meadow Valley Wash near Panaca, Lincoln County, Nevada, assumed extirpated; and Utah Lake populations (6 and 7), both then viable populations adjacent to Utah Lake in Utah County, Utah. Habitat types in the western region included lake and spring-side mesic and wet meadows.

Since the species was listed, the known range of the species has expanded. Two populations were identified in Wyoming in Goshen and Converse Counties, in the central and southeastern portions of the state. In Wyoming, the species occurs typically on sandy to coarse-sandy, sub-irrigated benches along streams, commonly restricted to a narrow zone between cattails and adjacent upland vegetation. Fertig (1995) of the Wyoming Natural Diversity Database estimated that at the time the state population of *S. diluvialis* at approximately 150 individuals.

Additionally, Bonnie Heidel (1995) of the Montana Natural Heritage Program identified a population of *S. diluvialis* in Piedmont Swamp, a 500-acre wetland in the Jefferson River Valley, located southwest of Whitehall, in Jefferson County. The swamp has no inlets, and is fed by groundwater recharge. In 1994, 71 flowering individuals were identified, and in 1995, 26 flowering individuals were located at this site.

In recent years according to Ben Franklin, Botanist at the Utah Natural Heritage Program, new Utah locations for *S. diluvialis* have been found around Utah Lake near American Fork in Utah County and in Heber Valley in Wasatch County. Additionally, the distribution of *S. diluvialis* has been extended to three new states in the west: 1) in Idaho along the Snake River below Paradise Dam in Swan Valley, 2) in Okanogan, Washington on the east side of the Cascades, and 3) near the Niobrara River in Nebraska. (Per. Comm. Ben Franklin 1999; Per. Comm. Dr. Lucy Jordan, FWS, 1999).

The range of *S. diluvialis* has expanded in the last few years, following funding for searches, to include seven states (Colorado, Idaho, Montana, Nebraska, Nevada, Washington, and Wyoming) besides Utah. Range-wide, the total population is estimated at more than 60,000+ flowering individuals with one population in Utah (Diamond Fork Canyon) numbering at least 16,000 in 1998 (FWS 1999). This figure is conservative, in that it does not take into account vegetative or dormant (below-ground) individuals.

F.8.3 Location in Effect Area of Influence

The area of potential effect is along the Spanish Fork River from the confluence with Diamond Fork Creek downstream to the Castilla gaging station. There are a total of seven known occurrences along this reach of river. Five of the known occurrences are on island gravel bars and low floodplains adjacent to the main channel. These are located within approximately 0.5 mile of the confluence. Additionally, there are two known occurrences of ULT located between the Covered Bridge Canyon residential area access bridge, and the Castilla gaging station. These colonies are located in or around an old oxbow near the Cold Springs gaging station and are believed to be supported by secondary hydrology and seepage not associated with river flows.

F.8.3.1 Surveys

All known occurrences of ULT, and potential habitats that could potentially be affected by construction and/or operation of the Proposed Action were surveyed. These surveys were restricted to areas within the area of project influence that are riparian/wet meadow habitats that had the potential for supporting ULT. There is low potential for negative impact on this species.

F.8.4 Construction Effects

The proposed project short-term effects on ULT would be those resulting from construction activities. Short-term effects would be identified if construction from the Proposed Action were to directly disturb occupied or potential ULT habitat.

The area analyzed consisted of the Spanish Fork River from the confluence with Diamond Fork Creek, downstream to the Castilla gaging station.

There are no planned construction activities in known or potential ULT habitat. There is no potential to affect ULT habitat or individual plants.

F.8.5 Operation Effects

The analysis of potential operation effects involved using two flow comparisons at two cross sections on the Spanish Fork River between the confluence with Diamond Fork Creek and the Spanish Fork Diversion Dam. One comparison was made between the ULS baseline condition and the ULS Proposed Action flows. The other comparison was made between the historic condition and the ULS Proposed Action flows. The analysis was focused on changes in Spanish Fork River flows during the ULT flowering season (July – September) which could affect ULT individuals or habitat.

F.8.5.1 Evaluation Criteria. It is recognized that the FWS has sole authority to determine significance of effect threatened and endangered species ("effect" or "no effect"). For this analysis, three categories of "potential for effect" were developed - High, Moderate and Low. It is suggested that a habitat described as having a "High potential for effect", be considered as a "may effect" on the population, for purposes of this document. An occupied habitat was placed into one of the three categories for "potential for effect" according to the following criteria:

LOW POTENTIAL

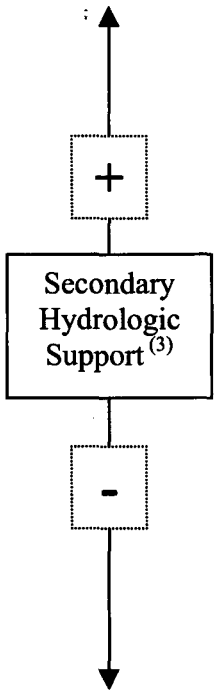
- Low to Moderate drying or wetting [1] in the first two critical depths during growing season
- Secondary Hydrologic Support
- Knowledge of Site Characteristics [2]

MODERATE POTENTIAL

- Moderate to High drying [1] in the first two critical depths during growing season
- Secondary Hydrologic Support
- Knowledge of Site Characteristics [2]

HIGH POTENTIAL

- High drying [1] in three or four critical depths
- No Secondary Hydrologic Support
- Knowledge of Site Characteristics [2]



[1] **Drying/Wetting:**
The proposed project would result in flow changes. Flow changes in a riverine system will result in a change in the amount of time a particular elevation would be inundated. A drying is a negative change in the percent of time a particular elevation is inundated; a wetting is a positive change in the percent of time an elevation is inundated.

[2] **Site Characteristics:**

- Geomorphology - oxbows, bars, floodplains etc.
- Microtopography
- Piezometer readings within a colony
- Manmade structures - berms, dikes, culverts

[3] **Secondary Hydrologic Support - (May increase or decrease the categorical placement):**

- Site location in relation to river geometry
- Head source
- Proximity to bank
- Spring or seeps present

These criteria are based upon the specific habitat and hydrologic data collected for the occupied habitats along the area of potential effect.

F.8.5.2 Effects. The effects analysis was performed by simulating the changes in Spanish Fork River flow using a HEC-RAS analysis of two Spanish Fork River cross sections (CUWCD 1999b). The historic, baseline and Proposed Action flows (see Table F-12) were evaluated in the HEC-RAS analysis. Historic condition flows represent the Spanish Fork River flows prior to the 1999 Diamond Fork FS-FEIS and 1999 Biological Assessment, and are representative of flows that will continue until the ULS would begin to operate in 2016. The ULS baseline flows represent how the Spanish Fork River would flow if the 1999 Diamond Fork Interim Proposed Action was the last development stage of the Bonneville Unit. The District would not discharge flows to

the Spanish Fork River as described for the Interim Proposed Action in the 1999 Diamond Fork FS-FEIS and 1999 Biological Assessment, however, this is the baseline condition for NEPA compliance purposes under the ULS EIS. The Proposed Action flows in the Spanish Fork River would begin to occur in 2016. Surface water hydrology model simulations used in the 1999 Diamond Fork FS-FEIS and 1999 Biological Assessment were based on hydrology developed for the period 1930 through 1973. The surface water hydrology model simulation for the ULS EIS and this Biological Assessment are based on an updated period of hydrology from 1950 through 1999. The HEC-RAS results, which include river flow and stage, water velocity and backwater elevation at each cross section, indicate that there would be no Spanish Fork River stage differences between the Proposed Action and historic condition flows at both cross sections during the ULT flowering period from July through September. The HEC-RAS results for the differences between baseline conditions and the Proposed Action indicate that reduced flows during the ULT flowering months would result in lower Spanish Fork River stages at the two cross sections ranging from 0.1 to 0.7 feet. This simulated change in river stage would not be expected to change the hydrology around the Spanish Fork River ULT colonies because they are situated above the direct influence of these river stages and are supported by secondary hydrology (drainage from off-channel ponds or springs and seeps). One of the Spanish Fork River ULT colonies may be supported by subsurface flow draining through the alluvium, and if the potential lower river stage were to decrease the moisture in the side channel, then the ULT colony likely would emerge further down the side channel where the moisture conditions would be most favorable. However, these potential effects are not expected to occur since the "baseline flows" were calculated for a 50-year period, i.e. worst case scenario, because in the 1999 FS-FEIS, it was not known how long the Diamond Fork System would operate before a final plan would be prepared for utilizing the Bonneville Unit water. The ULS construction is scheduled to occur through 2015, and interim operation of the Diamond Fork System to convey water to Utah Lake is unknown during the ULS construction period and will depend on the actual hydrology during that period.

Table F-12
Estimated Average Spanish Fork River Flow (cfs) and Percent Change From Historic and Baseline Diamond Fork Creek to Spanish Fork Diversion Dam Under the Proposed Action

	Month											
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Historic	93	70	68	67	82	113	247	465	405	363	283	178
Baseline	158	191	201	215	248	285	425	740	645	546	457	258
Preferred	134	130	124	125	138	171	296	578	452	356	305	180
Percent Change Preferred from Historic	+44	+86	+82	+87	+68	+51	+20	+24	+12	-2	+8	+1
Percent Change Preferred from Baseline	-15	-32	-38	-42	-44	-40	-30	-22	-30	-35	-33	-30

As shown in Table F-12, the Proposed Action flows in Spanish Fork River would be decreased from baseline conditions and generally increased from historic conditions during the ULT flowering period. The river flows shown in Table F-12 for the Proposed Action are derived from data and analysis included in the Draft Surface Water Hydrology Technical Report for the Utah Lake Drainage Basin Water Delivery System (CUWCD 2004). The Proposed Action river stage decreases would range 0.1 to 0.7 feet from baseline conditions and would not change from historic conditions. A total of 29 plants in two colonies along this reach of the Spanish Fork River would not be affected by the Proposed Action. Extrapolating to all the known colonies along this reach, a total of

528 plants in 10 colonies would not be affected (Table F-13). All ten colonies receive secondary hydrologic support and do not appear to be directly influenced by river stages, except at extremely high flows beyond the flows that would occur under Proposed Action.

Table F-13
Estimated Number of Flowering Plants in the Spanish Fork River (Diamond Fork Creek to Castilla Gaging Station)

Potential for Effect	Individuals	
	Numbers	Percent
High	0	0%
Moderate	0	0%
Low	528	100%
Total	**528**	**100%**

F.8.6 Conclusion

In conclusion, construction and operation of the Proposed Action may affect, but is not likely to adversely affect the Ute-ladies' tresses orchid.

F.9 Western Yellow-billed Cuckoo (Candidate)

F.9.1 Life History

The Yellow-billed cuckoo (*Coccyzus americanus occidentalis*) is often located in open woods and thickets, but usually considered a riparian obligate and are usually found in large tracts of cottonwood/willow habitats with dense sub-canopies (below 33 feet). It feeds mostly on hairy caterpillars, however, its diet can include insects such as cicadas, beetles, grasshoppers, crickets, and may include berries, frogs, and lizards. Nest sites for yellow-billed cuckoos are usually located in riparian thickets. The cuckoo nesting characteristics are a nest of twigs, lined with leaves, grasses, mosses, rootlets, placed in the horizontal limb of a tree or bush 3- to 20-feet high. These birds are heard more than they are seen and are quite shy. The cuckoo stays in the dense canopy of trees or tangles of undergrowth.

F.9.2 Location in Effect Area of Influence

The Spanish Fork – Santaquin Pipeline corridor would pass within one-half mile of a recorded cuckoo nest site at the Brigham Young University Agricultural Station and within one mile of a site in Santaquin City.

There are narrow patches of riparian habitat scattered along the Mapleton Lateral, but these are not considered to be high quality cuckoo nesting habitat because of the absence of mature cottonwood overstory in most of the areas and because of their small size and narrow profile. No cuckoo nest sites have been recorded in the construction corridor based on records research and field surveys.

There are historic records of yellow-billed cuckoo occurrences within one mile of the proposed Spanish Fork – Provo Reservoir Canal Pipeline corridor through Provo City, including records on the Brigham Young University campus and the Provo City cemetery.

F.9.3 Construction Effects

The construction standard operating procedures would prevent construction from affecting any potential nesting sites within the Spanish Fork-Santaquin pipelines. Construction activities would not remove riparian habitat in the nesting area. It is highly unlikely that pipeline construction would cause adverse effects on yellow-billed cuckoo populations throughout any pipeline corridor. The construction of the Mapleton – Springville Lateral Pipeline would not affect any known yellow-billed cuckoo populations or suitable habitat. Additionally, the degree of current human presence and activity in these areas, and especially along the proposed pipeline corridor through Provo City would make additional disturbance from pipeline construction immaterial. Pipeline construction would not affect yellow-billed cuckoo populations.

F.9.4 Operation Effects

Operation of the Proposed Action would have no measurable effect on yellow-billed cuckoo populations. There would be no operation activities performed in any known cuckoo nesting areas or other life-stage habitats.

F.9.5 Conclusion

In conclusion, construction and operation of the Proposed Action may affect, but is not likely to affect the yellow-billed cuckoo.

F.10 Conservation Measures and Monitoring

F.10.1 June Sucker

Conservation measures for June sucker that were identified in the recovery plan (FWS 1999) are being coordinated through the JSRIP. The District, DOI and Mitigation Commission have been participating in the JSRIP to support June sucker recovery.

Stated in the June Sucker (*Chasmistes liorus*) Recovery Plan (FWS 1999) as a criterion necessary for June sucker to be delisted is the "establishment of an additional self-sustaining spawning run of June sucker in Utah Lake" which "will require adequate protection of in-stream flows and available habitat, as well as successful recruitment to the spawning run of June sucker naturally produced in the Lake…" In 2001, the JSRIP funded a study to examine the feasibility of establishing an additional spawning location in the Utah Lake system. All tributaries draining into Utah Lake were examined preliminarily and three tributaries, American Fork, Hobble Creek, and Spanish Fork River, were carried forward for detailed analyses (Stamp, et al 2002). Based on the results of the feasibility analysis, the JSRIP decided to pursue establishing an additional spawning run in Hobble Creek, primarily because of the amount of suitable spawning habitat, the high quality of nursery habitat available where Hobble Creek enters Provo Bay, depths and velocities over spawning beds that are similar to those observed in the Provo River, and opportunities for securing necessary flows through the ULS project. Figure F-4 shows the average monthly dry-year flow in Hobble Creek under the ULS Proposed Action. 4,000 acre-feet of water would be provided each year to Hobble Creek as a firm supply (without supplement) shown in Figure F-4. This firm supply would be supplemented in dry years with Bonneville Unit water through the Mapleton-Springville Lateral Pipeline discharged to Hobble Creek to meet the target flows shown in Figure F-4. The Bonneville Unit water would flow down Hobble Creek to Utah Lake for exchange to Jordanelle Reservoir. Figure F-5 shows the average

monthly flow in Hobble Creek under the ULS Proposed Action. During an average year, the natural flow during the June sucker spawning and rearing period plus the firm supply of 4,000 acre-feet would meet the target flows for June sucker in Hobble Creek. Figure F-6 shows the average wet-year flow in Hobble Creek under the ULS Proposed Action. During a wet year, the natural flow and firm supply of 4,000 acre-feet would exceed the target flows for June sucker in Hobble Creek. One shortcoming of Hobble Creek for establishing a spawning run is a disconnection between the mouth of the stream and Provo Bay that would limit access of adult June sucker and the transportation of larval June sucker to suitable rearing habitat. In 2002, the JSRIP funded a study to investigate and develop habitat enhancement concepts for lower Hobble Creek. A final report of this study's findings has been submitted to the JSRIP Technical Committee (Stamp et al 2003). Flows that would be provided through the ULS would be one necessary component toward meeting the delisting criterion referenced above. To fully meet this criterion, the JSRIP is pursuing habitat enhancement opportunities and developing concepts for nonnative fish control.

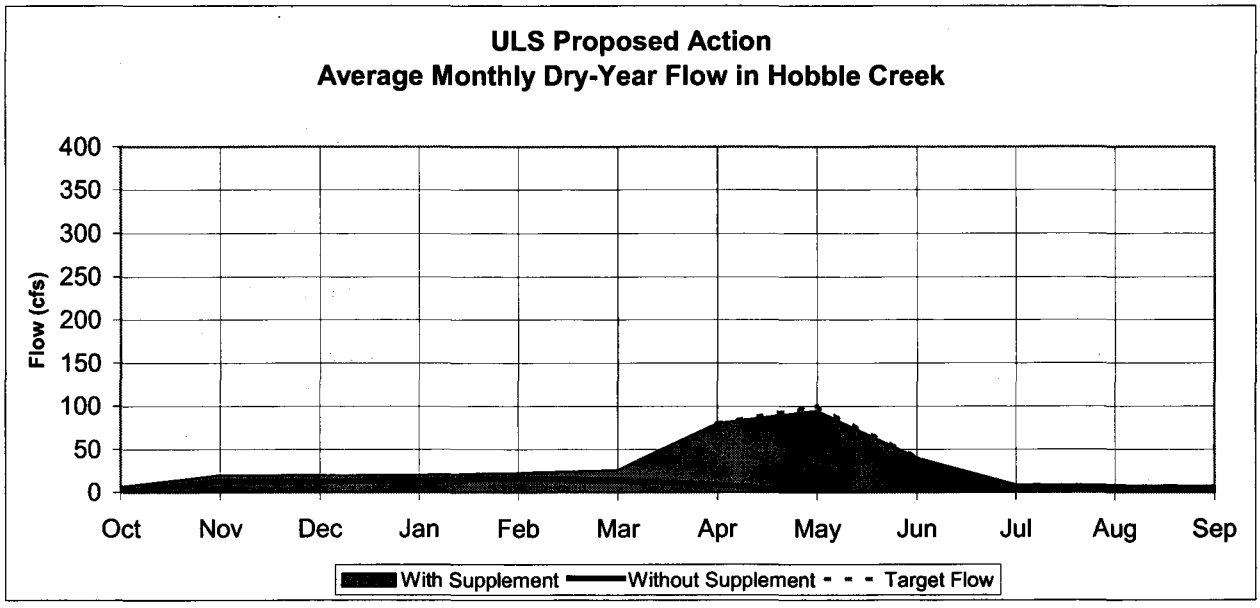


Figure F-4
ULS Proposed Action Average Monthly Dry-Year Flow in Hobble Creek

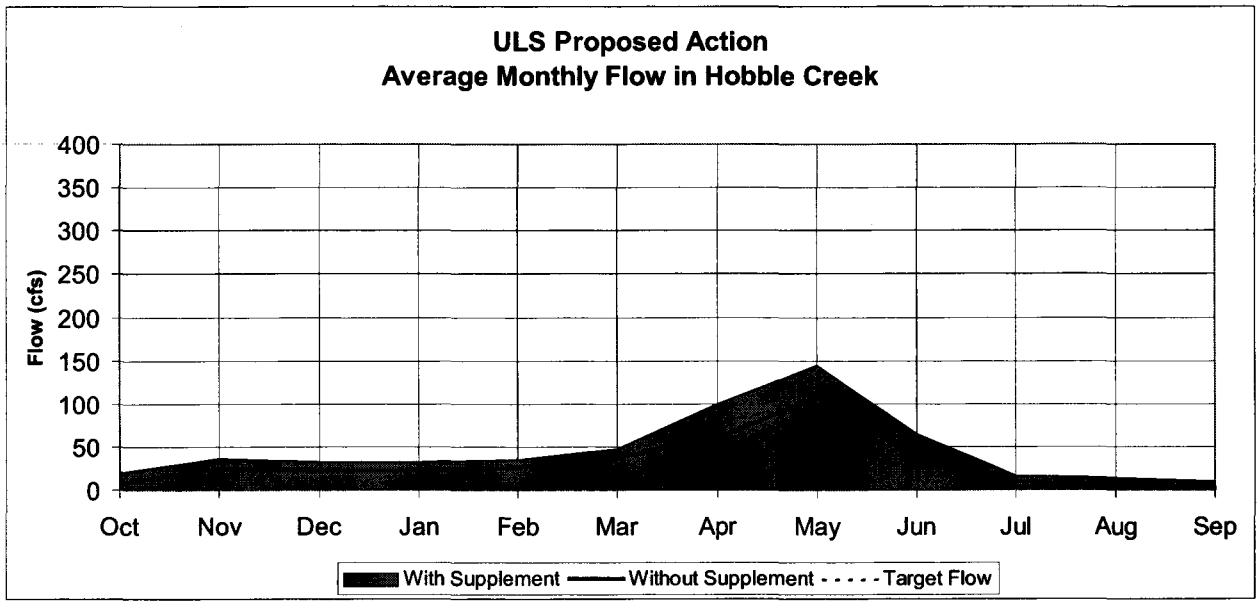


Figure F-5
ULS Proposed Action Average Monthly Flow in Hobble Creek

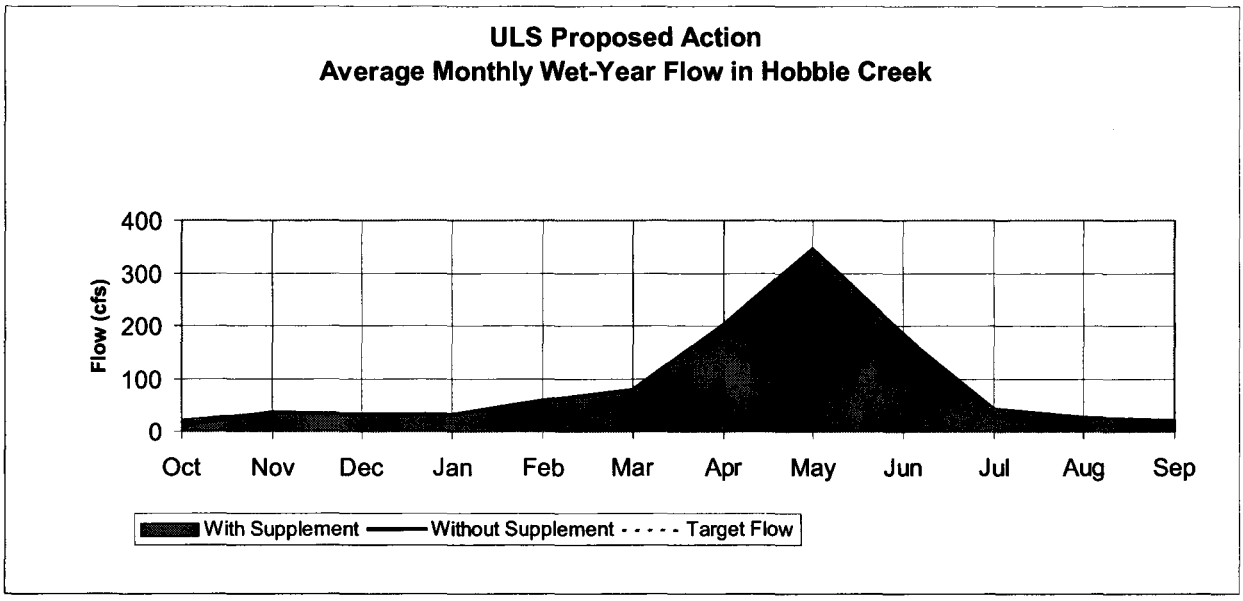


Figure F-6
ULS Proposed Action Average Monthly Wet-Year Flow in Hobble Creek

F.10.2 Ute ladies'-tresses Orchid

Many years of monitoring, research and presentations to academic societies have already been committed to increase the body of knowledge for the Ute ladies'-tresses orchid. It is proposed that this contribution be recognized as conservation measures already performed for this species.

The monitoring program should be carried forward for a number of years (to be determined jointly by the District, Mitigation Commission, and FWS) similar to the pre-operation study. If the changes to the ULT population in Spanish Fork Canyon exceed the variation expected from pre-operation analysis and the critical values established, management guidelines presented in the 1999 Diamond Fork System Biological Assessment may be implemented to mitigate for effects.

If post-operation monitoring results in measured parameters exceeding pre-set critical values, the Diamond Fork System operation has the flexibility to supplement flows in Spanish Fork River. Additionally, a rescue/transplant program could be initiated.

Additional conservation measures would increase the knowledge for this species and meet the following two specific objectives.

- Understand ULT population demography by precisely mapping the existing locations of ULT colonies within the effect area of influence and locations of suitable habitat.
- Document any habitat movement and river course changes and physical changes in ULT habitat on existing maps.

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