JUNE SUCKER RECOVERY IMPLEMENTATION PROGRAM

Program Accomplishments
Calendar Year 2003

December 16, 2004

Program Director's Office

Accomplishments Report 2003

Prepared by the
June Sucker Recovery Implementation Program
Program Directors Office, Technical and Administrative Committees

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Special thanks to:

Emily Sanderson of the Utah Division of Wildlife Resources for drafting and distributing the minutes of TC meetings.

June Sucker Recovery Implementation Program
2003 Program Accomplishments

December 16, 2004

The following work plan summary includes all the work scheduled for the June Sucker Recovery Implementation Program (JSRIP) for calendar year 2003. Although some $1.5 million was shown as available for expenditure almost one third was set aside for land acquisition and National Environmental Policy Act (NEPA) compliance that has been carried over into 2004. In addition, large expenditures for Red Butte Dam Repair and funds for acquiring flows in the Lower Provo River were available with some accomplishment but funds not expended were carried over for future use once projects are finalized and appropriate NEPA compliance is completed. These projects will be noted as accomplishments in the year they are completed, but were not listed as proposed projects in 2003 because they have multiple purposes.

Some research efforts in 2003 were continued into 2004 because drought conditions impaired our ability to collect data in areas such as Provo Bay. In spite of this natural occurrence a number of on-going research activities including annual monitoring of June sucker spawning, establishing spring flow recommendations, and public outreach became established features of June sucker recovery. Conceptual planning for nonnative fish removal in 2003 also set the stage for pilot projects to be planned in 2004 and implemented in 2005.

Hatchery expansion and planning continued in 2003 with an interim production facility planned at the Fishery Experiment Station (FES) in Logan. June sucker stocking in 2003 used sources from several refugia including Camp Creek and Red Butte, however, most of the real contribution to Utah Lake numbers will begin in 2004 and beyond. All June suckers transferred to Utah Lake were certified by FES and approved by the Utah Fish Health Board.

Program participants provided countless hours of in-kind support to the JSRIP through attendance at committee meetings, participation on the recovery team, and assistance at workshops and in workgroups. Because of the on-going drought, meager flows were available for June sucker spawning and recruitment in 2003. Regardless, the Provo River flow work group planned and scheduled available water, which was provided as requested by the operators of the Provo River's storage facilities.

Budget Summary for June Sucker Recovery Implementation Program for Operational Year 2003

FINAL WORKPLAN

July 14, 2003

Project Number	Project Title (Task)	OY 2003 Total	JSRIP Account	Direct Transfer*	In-Kind Services	Comments
I. Nonnative and Sportfish Management						
I.03.01	Concept Development – Nonnative Fish Control to Benefit June Sucker in Utah Lake: Promoting Recruitment by Establishing a Spawning and Nursery Refuge Area in Provo Bay	$5,000 (NTE)	$5,000			SOW PDO/JSRIP
	* II.03.07 Develop Contour Map of Provo Bay Footprint Using Existing Aerial Photography	($50,000)				
	* IV.03.04 Experimental Development of Mona Reservoir as a June Sucker Refuge	($29,000)				
	* V.03.10 Investigation of Ecological Difference of Utah Lake Suckers	($56,800)				
	* V.03.11 Movement Patterns and Habitat Preference of the Endangered June Sucker in Utah Lake	($97,300)				
II. Habitat Development and Maintenance						
II.03.01	Federal Funds and Non-Federal Matching Funds for Land Acquisitions in the Lower Provo River and Lower Hobble Creek Historic Flood Plains for Habitat Enhancement Projects (Section 6 and Local Match)	$452,000		$113,000 DNR $339,000 USFWS		NO SOW REQUIRED

Project Number	Project Title (Task)	OY 2003 Total	JSRIP Account	Direct Transfer*	In-Kind Services	Comments
II. Habitat Development and Maintenance						
II.03.02	National Environmental Policy Act Compliance for Lower Provo River Flood Plain Enhancement	$100,000	$100,000			PLACEHOLDER PDO/JSRIP CONTRACT CUWCD
II.03.03	Concept Development – Lower Hobble Creek Habitat Enhancement Feasibility	2002 Funded	2002 FUNDED			BIOWEST CONTRACT $106,356.38 CONTRACT CUWCD
II.03.04	Investigation of Opportunities to Provide Fish Passage or Remove Diversion Structures on the Lower Provo River	COST COVERED			PDO/JSRIP	INCLUDED IN III.03.01
II.03.05	Investigation of Opportunities to Provide Fish Passage or Remove Diversion Structures on Lower Hobble Creek	COST COVERED			PDO/JSRIP	INCLUDED IN III.03.01
II.03.06	Coordination with Division of Water Quality, DEQ on Utah Lake TMDL Development	COST COVERED			PDO/JSRIP	INCLUDED IN VII.03.01
II.03.07	Develop Contour Map of Provo Bay Footprint Using Existing Aerial Photography	($50,000)				NOT APPROVED HELD IN ABEYANCE
III. Water Management and Protection to Benefit June Sucker						
III.03.01	Refine Flow Requirements to Maintain and Enhance June Sucker Spawning and Recruitment	COST COVERED			BOR LEAD	SOW
III.03.02	Acquire and Protect Flows in the Provo River	COST COVERED			DOI LEAD	SOW

Project Number	Project Title (Task)	OY 2003 Total	JSRIP Account	Direct Transfer*	In-Kind Services	Comments
III. Water Management and Protection to Benefit June Sucker						
III.03.03	Monitoring Aspects of Flow Deliveries on the Lower Provo River (Associated with Water Quality Monitoring Station)	COST COVERED			CUWCD	NO SOW REQUIRED
III.03.04	Investigation of Opportunities to Secure a Conservation Pool in Mona Reservoir (Conducted in Conjunction with ULS Planning)	COST COVERED			CUWCD, DOI, URMCC PDO/ JSRIP	NO SOW REQUIRED
III.03.05	Develop Contour Map of Mona Reservoir Footprint Using Existing Aerial Photography	($50,000)				PDO/JSRIP PLACEHOLDER NOT APPROVED HELD IN ABEYANCE
III.03.06	Participation in Utah Lake System Planning Efforts	COST COVERED			CUWCD, DOI, URMCC, USFWS, DNR, BOR & OTHERS	PDO/JSRIP INCLUDED IN VII.03.01
III.03.07	Provo River Gage Maintenance Currant Creek Gage Provo River Gage (Geneva Road)	$12, 000 ($6,000) ($6,000)	$12,000			INCLUDED IN VII.03.01 CUWCD/PDO
IV. Genetic Integrity and Augmentation						
IV.03.01	Brood Stock Development through Collection of June Sucker Eggs and Larvae from the Provo River	$54,883		$54,883 URMCC		SOW/CONTRACT UDWR
IV.03.02	Genetics Management Plan for June Sucker in Captivity/Genetics Conservation Workshop	$13,740		$13,740 DOI		SOW/CONTRACT UDWR
IV.03.03	Secure Red Butte Reservoir as a Refuge Site	COST COVERED				$6,000,000 US DEPT OF ARMY

Project Number	Project Title (Task)	OY 2003 Total	JSRIP Account	Direct Transfer*	In-Kind Services	Comments
IV. Genetic Integrity and Augmentation						
IV. 03.04	Experimental Development of Mona Reservoir as a June Sucker Refuge	$28,933		$28,933 DNR		SOW DNR/UDWR
IV.03.05	Conduct NEPA Analysis for Warm Water Fish Hatchery	COST COVERED			URMCC UDWR	SOW URMCC/UDWR $162,500
IV.03.06	Fish Experiment Station Operation and Maintenance for June Sucker	$90,037		$90,037 URMCC		SOW/UDWR
IV.03.07	Hatchery Culture and Augmentation Workshop: Techniques and Issues	$2,000		$2,000 URMCC		SOW URMCC
V. Research, Monitoring, and Data Management						
V.03.01	Genetic Analysis of June Sucker Collected in 2002	$20,700		$20,700 DOI		SOW/UDWR CONTRACT USU DOI
V.03.02	June Sucker Feed Study	$1,100		$1,100 URMCC		SOW/UDWR
V.03.03	Monitoring Trends in Adult June and Utah Sucker Populations in Utah Lake and Tributaries in 2003	$78,121		$78,121 USFWS/DNR		SOW/UDWR (SECTION 6)
V.03.04	Evaluation of the Importance of Substrate and Vegetation to the Growth of Early Life Stages of June Sucker in Utah Lake	$33,200		$33,200 DOI		SOW/UDWR CONTRACT BYU

Project Number	Project Title (Task)	OY 2003 Total	JSRIP Account	Direct Transfer*	In-Kind Services	Comments
V. Research, Monitoring, and Data Management						
V.03.05	Investigation of Feeding and Spawning Behavior of Adult June Sucker in Red Butte Reservoir	**$49,450**	**$49,450**			**SOW/CUWCD CONTRACT USU**
V.03.06	**Development of Macrophytes in Utah Lake: Large-Scale Macrophyte Additions and Carp Exclusions**	**$51,750**	**$51,750**			**SOW/CUWCD CONTRACT USU**
V.03.07	**Use of Luteinizing Hormone with Dopamine Blocker to Induce Increased Maturation of Gametes in June Suckers**	**$944**		**$944 URMCC**		**SOW/UDWR**
V.03.08	**Fisheries Experiment Station Technical Services for June Sucker Fish Health Program**	**$11,395**		**$11,395 USFWS/DNR**		**SOW/UDWR**
V.03.09	**Heritability Study for Morphometric Characters of Utah Lake Suckers**	**$34,650**		**$34,650 DOI**		**SOW/UDWR CONTRACT BYU**
V.03.10	**Investigation of Ecological Differences of Utah Lake Suckers (Related Project V.03.09)**	**$56,735**	**$56,735**			**RFP/CUWCD CONTRACT USU**
V.03.11	**Movement Patterns and Habitat Preferences of the Endangered June Sucker in Utah Lake**	**$97,215**	**$97,215**			**RFP/CUWCD CONTRACT USU**
V.03.12	**Database Review – Technical Committee Demonstration and Workshop (Included in VII.03.01)**	**$6,325**	**$6,325**			**SOW/CUWCD CONTRACT USU**
V.03.13	**Monitor June Sucker Refuge Populations and Use as Source for Transfers**	**$12,233**		**$12,233 DOI**		**SOW/UDWR UDWR**

Project Number	Project Title (Task)	OY 2003 Total	JSRIP Account	Direct Transfer*	In-Kind Services	Comments
V. Research, Monitoring, and Data Management						
V.02.10	**Development of a Life/Stage Model for June Sucker**	**FUNDED IN 2002**				**2002 PROJECT**
VI. Information and Education						
VI.03.01	**Implement Public Outreach and Media Relations Plan**	**$75,000**	**$75,000**			**PLACEHOLDER RFP/PDO CUWCD**
VI.03.02	**Operation and Maintenance of JSRIP Web Page**	**FUNDING FROM FY2002 $8,000**			**USFWS**	**COORDINATE WITH VI.03.01 USFWS**
VI.03.03	**Distribution of JSRIP Book - Historic Accounts of Utah Lake with Emphasis on the Native Fish Community (Extension of Project VI.02.03)**	**$58,500**	**$58,500**			**SOW VANGUARD/ CARTER**
VII. Program Management						
VII.03.01	**Program Director's Office Management**	**$160,000**		**$100,000 DNR $60,000 CUWCD**		**SOW/PDO**
VII.03.02	**Participation in Program Committee Meetings**	**COSTS COVERED**			**INKIND ALL PARTICIPANTS**	**NO SOW REQUIRED**
Totals	**$1,505,911**					

* Funds transferred directly from participating agency to implementing entity.

I. NONNATIVE AND SPORTFISH MANAGEMENT

Project Number: I.03.01

Concept Development – Nonnative Fish Control to Benefit June Sucker in Utah Lake: Promoting Recruitment by Establishing a Spawning and Nursery Refuge Area in Provo Bay

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Project Summary:

To effectively control non-native fish impacts on June suckers, several conceptual control options were developed by a small working group. The idea of the group was to put together these concepts, get TC review and then plan for outside review by interested and concerned individuals and groups followed by appropriate National Environmental Policy Act (NEPA) compliance and outreach. Concepts considered included (1) Diking of Provo Bay (2) Creating a Provo River Nursery Refuge with an In-lake barrier and non-native fish removal (3) Creating a Provo River Nursery without non-native fish removal (4) Enhancing spawning and nursery habitat coupled with stocking (5) Lake-wide mechanical control and (6) No action.

Each concept was evaluated considering affected resources, issues (such as land ownership and access), data needs, data availability, and filling in information gaps. Investigating the various concepts exposed the extensiveness and challenges associated with nonnative fish control and helped focus priorities. The final report describes the interaction of nonnative benthivorous fish, nutrient loading and lake level fluctuation in eliminating aquatic vegetation, which is important for balancing predator/prey interactions. The report includes concepts and specific issues related to the concepts as an appendix. The final report should be used as a foundation for formulating potential projects, pilot studies, and developing research to support decisions regarding long-term control of problem nonnative fish species.

Accomplishments:

Concepts outlined in the draft document are being further reviewed and additional information collected to get a feeling for the potential feasibility of each concept. The concept report has generated much discussion and this, along with past and ongoing efforts to understand nonnative control issues and feasibility, will serve as the basis for moving forward with nonnative control in the 2005 Program Guidance.

Project Status:

A draft report entitled *Utah Lake Nonnative Fish Control Feasibility, Need, Concepts and Issues* was completed in 2003 and a final report is scheduled for August of 2004.

Budget Status:

Funds Provided: $5,000
Funds Expended: accomplished in kind
Remaining Balance: $5,000

Develop Contour Map of Provo Bay Footprint Using Existing Aerial Photography – See II.03.07

Experimental Development of Mona Reservoir as a June Sucker Refuge – See IV.02.04

Investigation of Ecological Difference of Utah Lake Suckers – See V.03.10

Movement Patterns and Habitat Preference of the Endangered June Sucker in Utah Lake – See V.03.11

II. HABITAT DEVELOPMENT AND MAINTENANCE

Project Number: II.03.01 **Federal Funds and Non-Federal Matching Funds for Land Acquisitions in the Lower Provo River and Lower Hobble Creek Historic Flood Plains for Habitat Enhancement Projects (Section 6 and Local Match)**

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Project Summary:

Land acquisitions or easements will be necessary to create historic flooded bottomlands in either the lower Provo River or the Lower Hobble Creek. Feasibility studies have been completed for each area and lands for possible wetland creation have been identified. Landowners will be approached on a “willing seller” basis to acquire lands for possible flooding and wetland creation.

The federal government under its recovery lands program has provided 3 to 1 matching funds for JSRIP participants to approach landowners to purchase easements or acquire lands for recovery purposes. The Program solicited and received two grants totaling some $600,000. The purpose of this program is to provide some $200,000 in CY 2003 and 2004 for the non-federal match.

Project Status:

Funds to cover the two years of federal funding have been set aside for the easement or acquisition of selected properties in 2004.

Accomplishments:

Properties along lower Hobble Creek have been identified, land appraisals are underway and discussions with the landowners are on going.

Budget Status:

Funds Provided: $113,000 (non-federal match)
Funds Expended: $113,000
Remaining Balance: $0

Project Number: II.03.02 **National Environmental Policy Act Compliance for Lower Provo River Flood Plain Enhancement**

Placeholder – No funds have been expended at this time.

Project Number: II.03.03 **Concept Development – Lower Hobble Creek Habitat Enhancement Feasibility**

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Project Summary:

Hobble Creek has been determined to be the next suitable area to the Provo River for potential spawning and rearing of June sucker. Because stream flows in Hobble Creek will be enhanced by the final phase of the Central Utah Project (CUP), Utah Lake System (ULS), an evaluation of existing habitat and impediments to spawning was solicited by the JSRIP in 2002.

Bio-West, an environmental consulting firm from Logan, Utah, submitted the best proposal for the work and was awarded the contract in late 2002. The proposal included an analysis of restoration designs, summarization of past and present conditions of Hobble Creek and an assessment of costs and benefits of each option.

Project Status:

Initiated in 2002, a draft report on the feasibility of several enhancement alternatives was completed in August 2003. The draft report was reviewed and approved for finalization by the June sucker TC shortly thereafter. A final report was issued by Bio-West on November 2003.

Accomplishments:

Based on the Bio west report, and the availability of private properties in the Hobble Creek/Utah Lake interface, some 50-acres along lower Hobble Creek have been identified for wetland development, land appraisals are underway and discussions with the landowners are on going.

Budget Status:

Funds Provided: $106,356.38
Funds Expended: $106,356.38
Remaining Balance: $0

Project Number: II.03.04 **Investigation of Opportunities to Provide Fish Passage or Remove Diversion Structures on the Lower Provo River**

PROJECT ACCOMPLISHMENTS INCLUDED IN PROJECT NUMBER III.03.01.

Project Number: II.03.05 **Investigation of Opportunities to Provide Fish Passage or Remove Diversion Structures on Lower Hobble Creek**

PROJECT ACCOMPLISHMENTS INCLUDED IN PROJECT NUMBER III.03.01.

Project Number: II.03.06 **Coordination with Division of Water Quality, DEQ on Utah Lake TMDL Development**

PROJECT ACCOMPLISHMENTS INCLUDED IN PROJECT NUMBER VII.03.01.

Project Number: II.03.07 **Develop Contour Map of Provo Bay Footprint Using Existing Aerial Photography**

THIS PROJECT HAS NOT BEEN APPROVED. NO EXPENDITURES FOR FY 2003.

III. WATER MANAGEMENT AND PROTECTION TO BENEFIT JUNE SUCKER

Project Number: III.03.01 **Refine Flow Requirements to Maintain and Enhance June Sucker Spawning and Recruitment**

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Project Summary:

Long-term protection and eventual recovery of the June sucker is dependent on the maintenance of adequate flows in the Provo River, particularly within the designated critical habitat. The goal of the June Sucker Flow Workgroup (Workgroup) is the provision and maintenance of flows in the lower Provo River in the quantity, duration, and times necessary to ensure successful June sucker reproduction while allowing for ongoing and future water projects in the ULS and its tributaries. This effort is accomplished through collaborative efforts of members of the Workgroup. Priority consideration is given to providing an adequate flow regime in the river during the period April through July. Ideally, sufficient water must be supplied to achieve a peak attraction flow of no less than 700 cfs for a period of approximately four days in May, followed by a steady decline to a steady flow of about 100 cfs through June, followed by a minimum flow of about 25 cfs through July. This is an idealized regime that is rarely achieved but is intended to describe the approximate magnitude and timing of the project goal. The minimum flow of water through July is believed to be particularly critical to sustain larval fish. It is also the most difficult to maintain, because in normal years, natural runoff has subsided and irrigation diversions from the lower river are at a peak.

Project Status:

A document titled, *Approach for Providing Flows for June Sucker Spawning in the Lower Provo River* was developed in 1998 by the Workgroup and was revised for the 1999 runoff period. This approach was designed to mimic trends of the natural hydrograph for the river. The Workgroup cooperatively

implemented it during the 1999 through 2003 runoff periods. The Workgroup has deemed these efforts a success. The attached graph shows the 2003 hydrograph for flows measured at Harbor Drive on the Provo River.

Providing flows for June sucker requires a continued effort each annual runoff period to achieve long-term protection of June sucker habitats in the river.

Accomplishments:

The end product is a yearly flow plan that aids in the recovery of the June sucker.

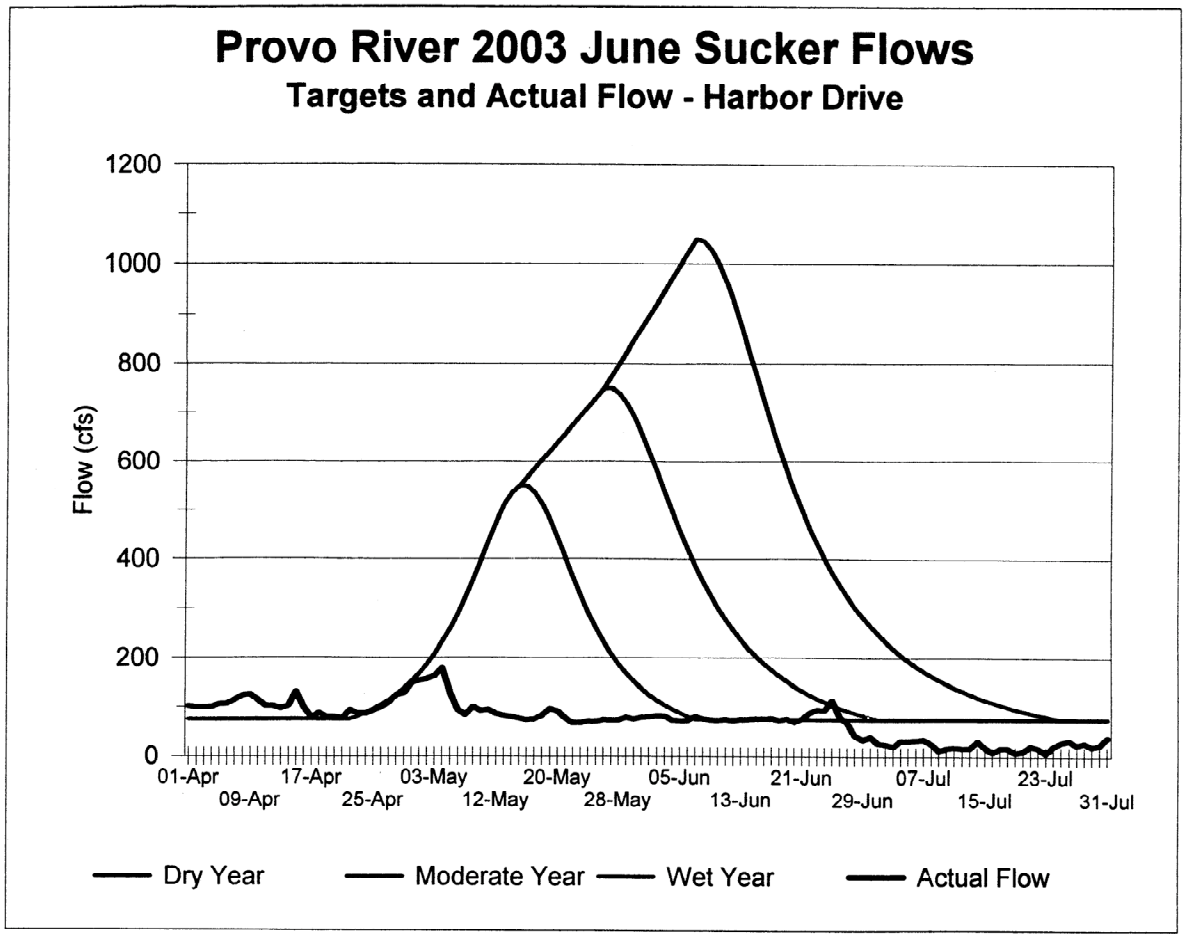
Drought conditions prior to and during the 2003 runoff period, caused low water levels in the systems reservoirs. Consequently, early in the process of determining specific flows for the June sucker, the Workgroup found that it would not be prudent to follow any of the proposed hydrographs (i.e. dry, moderate, or wet year) presented in the above-mentioned approach. Instead, the team revised the flow plan. Actual flows consisted of a small peak flow beginning on April 26th from approximately 100 cubic feet per second (cfs) to approximately 125 cfs on April 28 th. Flows peaked at 180 cfs on May 4th. This was followed by a decline to a minimum flow near 94 cfs by May 6 th. Flows then remained between 70 and 80 cfs until June 27th when flows were reduced to near 40 cfs and remained at this level during the rest of the runoff season.

The 2003 Provo River hydrograph provided good conditions for the Utah Division of Wildlife Resources (UDWR) to conduct their June sucker population, brood stock augmentation, and larval fish collection work in the lower Provo River. Flow fluctuations were kept to a minimum

Since 1994 flows have been provided that have maintained an adequate flow regime.

Budget Status:

Funds Provided: In-kind services
Funds Expended: In-kind services
Remaining Balance: In-kind services



Project Number: III.03.02 **Acquire and Protect Flows in the Provo River**

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Project Summary:

The purpose of the project is to secure a sufficient volume of water (through water shares, water rights or other) to ensure an adequate flow in the Provo River (magnitude and timing) to assist recovery of the June sucker. (Recovery Plan Task 3.1.3, Priority 1) To date, priority has been on maintaining sufficient instream flows during the adult June sucker-spawning period—approximately April through July. Maintaining a minimum flow in the lower Provo River through July is believed important to sustaining larval fish in the river after spawned adults have returned to Utah Lake. Achieving the proper flow regime is complicated by natural low flow conditions in summer, severe habitat alternations in the spawning reaches of the lower river, and by irrigation diversions, which often reach a maximum in July. Without a secure water supply coupled with flow management, this can result in harmful irregular flows and possibly a dewatered channel, even in average water years.

Typically, three methods have been used to acquire water for June sucker: Open market purchase of private water from willing sellers, conserved water secured under the Central District's Water Management Improvement Program, and Federal water project sources. See the 2001 Annual Report for this project (Project III.01.05) for more discussion of the current methods for securing water.

Project Status:

The Program is in a very favorable position with respect to water acquisitions for the June sucker in the Provo River. Since 1994, a significant amount of water has been acquired and released to supplement natural runoff when necessary, and to maintain an adequate, if not ideal, flow regime to assist spawning June sucker.

The Central District, URMCC, and Department of Interior (DOI) remain committed and active in pursuing water acquisitions from willing parties in the Provo River basin. The Joint Lead Agencies completing the CUP (DOI, CUWCD, Mitigation Commission) have accepted the responsibility (from the June Sucker Flow Workgroup) to complete a study and determination as to the quantity of water that will need to be acquired to complete this Recovery Plan Task (3.1.3). This will help establish a target (goal) for water acquisition, to be managed in conjunction with natural flows, to complete this and other flow-related related Recovery Plan obligations.

It is currently unknown when the JSRIP will be able to secure sufficient permanent water to achieve June sucker recovery under Recovery Plan Task 3.1.3.

Accomplishments:

A total of 21,363 acre-ft. of acquired water was available under the Program for June sucker in 2003. Of this**,** 12,172 acre-ft. was secured for 2003. (The remained is “banked” water acquired, but not used, in previous years.) A portion of this water was released into the Provo River and managed to meet the flow regime recommended by the June Sucker Flow Workgroup in accordance with the Recovery Plan goals. The flow recommendation for 2003 mirrored that for 2002 due to the continued severe drought conditions.

The CUWCD continued pursuit of open market purchase of water, using funds provided through Section 302(a) of CUPCA in 2003. However, no additional acquisitions were completed. See Tables 1 and 2 of the 2001 accomplishment report (Project III.01.05) for the current status of water acquired under this program.

During Operational Year 2003, no additional water has been secured under the CUWCD’s Water Management Improvement Program (CUPCA Section 207). Efforts have been continuing, however, and approved projects that are expected to yield water for the program are anticipated. In addition, no water was acquired directly from Federal water project sources during 2002. Thus, the water acquisitions program remains as depicted in the 2002 Annual Report for this project.

Budget Status:

Funds Provided: No JSRIP funds were expended. All funds were from Federal Appropriations under Sections 207 and 302(a) of the CUP Completion Act (P.L. 102-575).
Funds Expended: $1,939,908 was expended in 2003 for water for June sucker. These funds were expended as credits against the CUP repayment obligation of the CUWCD. These credits represent CUP project costs the CUWCD would

otherwise have repaid the Federal government. An additional $70,329 was paid for operation and maintenance (O&M) expenses. These funds reimburse expenses incurred for the storage and delivery of water provided for June sucker. A total of $2,010,237 was expended to accomplish this Project in 2003.
Remaining Balance: N/A

Project Number: III.03.03 **Refine Flow Requirements to Maintain and Enhance June Sucker Spawning and Recruitment (Monitoring Aspects to Flow Deliveries on the Lower Provo River**)

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Project Summary:

The Harbor Drive water quality station on the Lower Provo River was established as a result of the 1994, Biological Opinion for the Provo River Project. The Biological Opinion for the Provo River Project stated that "it is the Service's [U.S. Fish and Wildlife Service] 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 Reasonable and Prudent Alternative (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 three-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 following summarizes the RPA's identified in the USFWS's 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 USFWS 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 reasonable and prudent alternative. Reclamation and the USFWS would share co-lead for ensuring timely Team meetings, discussions, and actions.

A permanent water quality monitoring station was established within critical habitat to fulfill the requirements identified under RPA number 3. The water quality monitoring station was installed and has been maintained by the CUWCD.

Project Status:

Water quality monitoring within critical habitat while June sucker are present in the river is an ongoing project. The station is monitored and maintained by District personnel throughout the June sucker-spawning period.

Accomplishments:

In 2003, the water quality station was in operation from April 17 through July 28. Temperature, dissolved oxygen, pH, conductivity, and flow were continuously monitored. The data are available at the District in hourly averages, and will eventually be incorporated into the JSRIP database.

Budget Status:

Funds Provided: In-kind services to complete this project were provided by the CUWCD. No JSRIP funds were expended.

Project Number: III.03.04 **Investigation of Opportunities to Secure a Conservation Pool in Mona Reservoir (Conducted in Conjunction with ULS Planning)**

PROJECT HELD IN ABEYANCE. THIS PROJECT IS PENDING RESEARCH ON JUNE SUCKER IN MONA RSERVOIR. NO EXPENDITURES FOR FY 2003.

Project Number: III.03.05 **Develop Contour Map of Mona Reservoir Footprint Using Existing Aerial Photography**

PLACEHOLDER – THIS PROJECT HAS BEEN HELD IN ABEYANCE. THIS PROJECT WAS NOT APPROVED FOR FY 2003.

Project Number: III.03.06 **Participation in Utah Lake System Planning Efforts**

PROJECT ACCOMPLISHMENTS INCLUDED IN PROJECT NUMBER VII.03.01.

Project Number: III.03.07 **Provo River Gage Maintenance (Currant Creek Gage and Provo River Gage at Geneva Road)**

PROJECT ACCOMPLISHMENTS INCLUDED IN PROJECT NUMBER VII.03.01.

IV. GENETIC INTEGRITY AND AUGMENTATION

Project Number: IV.03.01 **Brood Stock Development through Collection of June Sucker Eggs and Larvae from the Provo River**

Contact Persons:

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Project Summary:

The goal of this project was to collect fertilized eggs from June suckers in the Provo River in sufficient numbers and diversity to assure genetic integrity of broodstock at culture facilities and to provide larval June suckers from the Provo River to augment fish produced from eggs.

Project Status:

This project consists of ongoing-revised monitoring.

Accomplishments:

The Provo River was surveyed at night between the weir and the Geneva Road Bridge with spotlights between April 14 - June 10, 2003. Suckers were observed and captured on the first night of spotlighting. A total of 353 suckers were captured: 40 wild June suckers (*Chasmistes liorus*) (16 for the first time), 177 Utah (*Catostomus* ardens) or hybrid suckers (Utah x June), and 136 stocked fish.

Streamside spawning produced three family lots and two sib lots (June sucker female crossed with two June sucker males). However, one family and one sib lot did not hatch out. Twenty crosses were also produced for research conducted under project number V.03.09 by BYU. Approximately 177,000 eggs were fertilized and transported to the FES for incubation.

Active light trapping was conducted from 28 May to 20 June 2003, and approximately 900 larval suckers were captured. Approximately 10 percent of captured larvae were fixed in formalin to be keyed later. The remaining (n= 780) was transported to cages in Provo Bay. As of 20 June 2003, no surviving suckers were found in the cages.

We recommend continuing collection of fertilized eggs from June sucker in the Provo River in sufficient numbers and diversity to assure genetic integrity of broodstock and to aid in developing as many family lots as possible.

Budget Status:

Funds Provided: $54,883
Funds Expended: $54,883
Remaining Balance: 0

Project Number: IV.03.02 **Genetics Management Plan for June Sucker in Captivity/Genetics Conservation Workshop**

Contact Person:

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Project Summary:

June sucker have been brought into captivity since the mid-1980s by various workers using a variety of techniques and with variable goals. This plan has been developed as in interim step to help direct and standardize captive propagation of June sucker, addressing the concerns and interests not only of the UDWR, the agency with the primary responsibility for managing the captive stocks, but for all Program participants, as well. The Recovery Plan for June sucker presents a number of goals that are at least partially addressed by this plan, including developing protocols to protect the genetic integrity of the captive fish, maximizing available diversity, and developing brood stocks and augmentation plans. A complete list of recovery goals addressed is included in the plan. The best available science has been applied to help address these needs in the current plan.

Project Status:

The plan was drafted during 2003 and was reviewed by Program participants. A meeting of Program participants was held in November to address comments and edits in detail. Those comments and edits were incorporated and a final plan was delivered to all Program participants in August 2004 (UDWR publication 04-26). Hard and electronic versions of the plan and its appendices are available on request from the UDWR.

Accomplishments:

The current iteration of the plan describes three different methods of producing June sucker to supplement the wild population in Utah Lake. Two of these methods are currently being actively used, brood lot production and refuge production. Brood lot production is the active collection of brood stock, crossing

representatives of those stocks to yield progeny, and releasing the progeny into Utah Lake. This method has led to the release of June sucker to Utah Lake in 2003 and 2004. Fish produced in refuge locations by spawning of adult fish held there has also yielded young fish that have been released into Utah Lake. The plan describes some of the information needs for these fish, especially a more accurate characterization of the genetic make-up of these stocks and potentially augmenting the stocks so that diversity can be maximized. A third method described in the plan is referred to as the Collect, Rear, and Release (CRR) method. This method would collect fertilized eggs during the annual spawning run, as is done currently, but would rear these fish in a refuge location, e.g., a reservoir, pond, or other predator-free environment, until they reach a size to avoid predation, at which time they would be released into Utah Lake. The CRR method is being considered, but sufficient facilities are not available at this time.

One shortcoming of the current plan is the lack of accurate genetic characterization (molecular information) regarding the various stocks. In the absence of these data, we assume that each brood stock collected is genetically distinct from all others, a tenuous assumption. More robust genetic data are actively being developed by other researchers with Program support and will be used to support the next revision of this plan. Early results of these studies suggest that we will be able to distinguish between various June sucker stocks using available genetic markers, and this information can be used to help us guide our propagation efforts.

One of the objectives of the scope of work for this project was conducting a workshop with academic personnel near the completion of the project. The TC discussed this concept and agreed that the additional genetic data described above would be very important for helping such a workshop develop meaningful recommendations that could be implemented. The difficulties inherent in assembling wide-spread, busy professionals for such a workshop also contributed to the decision to delay the workshop until another time, and highlighted the importance of planning far in advance for such an event to be well-attended.

Budget Summary:

Previous iterations of this plan were sponsored by the UDWR and by the Department of Natural Resources. Those iterations were completed for less than the budgeted amount and excess funds were de-obligated. This iteration of the plan was sponsored by the DOI. Not all the budgeted funds were required to complete the August 2004 plan.

Funds Provided: $13,800
Funds Expended: $3,711
Remaining Balance: $10,089

Project Number: IV.03.03 **Secure Red Butte Reservoir as a Refuge Site**

Contact Person:

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Project Summary:

The National Defense Authorization Act for Fiscal-Year 2000 provides for the conveyance of Red Butte Dam and Reservoir, and limited funds, to conduct appropriate studies and rehabilitate Red Butte Dam.

Approximately 3200 June sucker from the 1987, 1989 and 1991-year classes were introduced into Red Butte Reservoir in 1992. Monitoring efforts in 1996 confirmed that June sucker had spawned in the reservoir in 1995. Subsequent monitoring efforts have confirmed that in addition to the 1995-year class, at least four additional year classes have been successfully produced in Red Butte Reservoir.

As stated in the Recovery Plan:

> "The existence of only one natural spawning run of June sucker [in the ULS] makes the species extremely vulnerable to extinction from catastrophic events. Therefore, it is important to establish an additional stock of June sucker that contains the natural genetic diversity of the species. Until a permanent propagation facility is completed, naturally propagated June sucker from the refuge source can also serve to enhance the wild population in Utah Lake. A reproducing population has been established within the Great Salt Lake historic drainage in Red Butte Reservoir, Salt Lake City, Utah . . . Permanent protection of this refuge population of wild adults and their offspring will secure the June sucker from extinction."

And,

> "The site selected for introduction of June sucker must be purchased or otherwise secured for a long-term commitment. The precarious status of

the species indicates that the refuge population will be essential to the survival of the June sucker for many years. If outright purchase of the refuge site is not an option, a binding long-term agreement with the landowner or management agency must be obtained before June sucker can be introduced. The future control of Red Butte Reservoir is unknown to date and should either be finalized, or an alternative site must be established."

The National Defense Authorization Act for Fiscal-Year 2000 authorized limited funding, not to exceed $6 million, for the purposes of the improvement of Red Butte Dam and Reservoir to meet the standards applicable to the dam and reservoir under the laws of the State of Utah. In addition, the conveyance of Red Butte Dam and Reservoir to the CUWCD was authorized.

In 2001, $400,000.00 was provided to District, as per the National Defense Authorization Act for Fiscal Year 2000, to complete feasibility studies on the rehabilitation of Red Butte Dam and to complete NEPA compliance and documentation. A draft '*Preliminary Design and Cost Estimate for Rehabilitation of Red Butte Dam and Appurtenances: 30% Design Report'* (September 2001, revised September 2002) was prepared for the District. The *Draft Environmental Assessment (EA) for The Property Transfer and Improvements of Red Butte Dam and Reservoir* was released for public review in August 2002.

Project Status:

The status of this project is ongoing until it is completed. Though there have been a number of delays, it is anticipated that the title transfer and dam construction will be completed by the fall of 2005.

Accomplishments:

Public comments were received and incorporated into the draft EA and it was finalized with a finding of no significant impact in November 2003. It is anticipated that the reservoir, access road and surrounding area will be transferred from federal ownership to the District in 2004.

Budget Status:

Funds Provided: $6 million non-JSRIP funds
Funds Expended: $400,000.00
Remaining Balance: $5.6 million

Project Number: IV.03.04 **Experimental Development of Mona Reservoir as a June Sucker Refuge**

THIS PROJECT HAS BEEN DELAYED TO CY 2004.

Project Number: IV.03.05 **Conduct NEPA Analysis for Warm Water Fish Hatchery**

Contact Person:

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Project Summary:

This project is conducted by the Mitigation Commission and cooperating agencies, UDWR, USFWS, Bureau of Land Management, DOI, Office of the Secretary, under the ongoing implementation of the *1998 Revised Fish Hatchery Production Plan* (Plan). To meet the identified warm-water fish culture need, the Plan EA proposed action included constructing a new warm-water hatchery at either Gandy Warm Springs in Millard Co., or at Goshen Warm Springs in Utah Co., Utah. To meet the short-term June sucker needs, a new alternative to add a recirculating facility at the existing UDWR FES in Logan was added to the EA process for the Interim Hatchery.

It is an ongoing Project and helps to fulfill the following Recovery Plan Tasks under the augmentation recovery element.

4.0 Enhance June sucker population Utah Lake and its tributaries.

4.1 Refine and continue to implement procedures augmenting the existing June sucker population in Utah Lake.

4.1.1 Establish a hatching and rearing facility to propagate June sucker for introduction into Utah Lake.

4.1.2 Develop propagation procedures for captive brood stock.

The project goal and objective is to provide adequate NEPA analysis to allow for a decision on the preferred alternative for the warm-water sport fish and native aquatic species hatchery and an interim June sucker hatchery. Publication of an EA for the interim hatchery and an Environmental Impact Statement (EIS) for the production facility was planned.

Project Status:

BIO-WEST, Inc., a private consulting firm, has been retained to complete the NEPA analysis. The updated schedule for completion of the two documents is:

For the warm-water production hatchery EIS:

Draft EIS: September 2004
Public meeting: October 2004
Final EIS: December 2004
Decision: February 2005

For the June sucker interim facility EA:

Draft EA: Completed October 2003
Final EA and Record of Decision: March 2004

Accomplishments:

An internal administrative *Draft Environmental Impact Statement* for the warm-water production hatchery has been developed and is being reviewed by the cooperating agencies.

The EA public review process for the Interim June Sucker Hatchery was completed in 2003. The preferred alternative to add a recirculating facility to the existing June sucker building at the FES has been selected. Planning and design will begin during 2004.

Budget Status:

Funds Provided: $275,000
Funds Expended: $ 60,000 (as of December 31, 2003)
Remaining Balance: $215,000

Project Number: IV.03.06 **Fish Experiment Station Operation and Maintenance for June Sucker**

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Project Summary:

The June sucker responsibilities at the FES are increasing significantly. An additional June sucker facility was constructed at the FES and was completed on December 21, 2001. We also received a full-time AL position to help with extra demands and needs of the June sucker recovery program.

The main goal of having the new facility is to allow us to hold up to 25 or more family lots of June sucker for a future brood stock and to receive and hatch eggs taken from the June sucker spawn on the Provo River. The new facility is also being used for research studies, such as evaluating feed types and the use of HCG to induce spawn. We also prepared the new facility with the proper plumbing and tanks to allow us to raise fish and do studies. We received a total of 11 circular tanks at 50 cu. ft. each from the Egan Hatchery. These were older tanks that they replaced and did not need. Without these tanks, we would not have been able to hold the number of brood lots needed to meet the goals of the June sucker recovery program. We also operated and maintained both June sucker facilities and the grounds related to the June sucker at FES.

Project Status:

The O&M of this facility is ongoing. The goals have been completed or are still in process as outlined in our stocking, feed and HCG SOWs.

Accomplishments:

We installed plumbing, valves, aquaria and tanks in the new facility to allow us to hatch eggs, raise larval fish hold brood stock and do our HCG and feed studies. We also reconfigured the piping as needed.

During the summer of 2003, insulation was placed inside the new metal building to help reduce the condensation levels during the winter months. The cost of insulating the building was $11,100. A propane heater and 500 gallon tanks was also installed for $2835.00.

This year we received 25 separate lots from the Provo River egg take from May 13-June 4, 2003. Twenty of these lots were used for BYU heritability studies. We raised the fish for about five weeks at initial feeding, before BYU personnel transported the fish to a BYU lab and Utah Lake for their studies.

Survival as of 12/1/2003 on brood lots received in 2003:

Lot Number	Number of Eggs Received	% Hatch	# on Hand as o 12/1/2003	% Survival after Swim-Up
SKJN PR21	23,750	39.46	3714	39.63
SKJN PR22	32,487	53.53	11,863	68.21
SKJN PR23	4350	0	0	0
SKJN PR24	4522	0	0	0
SKJN PR25	31,529	5.81	993	54.20
Totals	**96,638**	**29.59**	**16,570**	**57.95**

Notes: The last 3 groups of eggs received were very poor eggs. It looked like a high percentage of these eggs did not get fertilized. Not sure if this was due to poor egg or milt quality.

Survival as of 12/1/2003 on progeny lots taken from the FES brood stock in 2003:

Lot Number	Number of Eggs Received	% Hatch	# on Hand as of 12/1/2003	% Survival after Swim-up
SKJNFE01	6875	56.07	1291	33.49
SKJNFE02	7497	29.60	338	15.23
SKJNFE03	8162	64.70	3502	66.31
Totals	**22,534**	**50.39**	**5131**	**45.19**

The following is the inventory of June sucker that were raised at FES during 2003.

June Sucker Inventory December 1, 2003

Lot number			number on hand	f/lb	Length "
89SKJNUSU	Brood Lot	~	44	0.64	16.01
91SKJNBYU	Brood Lot	~	44	0.64	16.01
91SKJNUSU	Brood Lot	~	42	0.64	16.01
92SKJN	Brood Lot	~	15	0.64	16.01
93SKJNlot2	Brood Lot	~	45	0.64	16.01
Totals			**190**		
94SKJNLot-4	Brood Lot	~	140	0.68	15.6
94SKJNLot-11	Brood Lot	~	102	0.72	15.53
Lot number			**number on hand**	**f/lb**	**Length "**
94SKJNLot-6	Brood Lot		100	0.58	16.45
95SKJNlot4	Brood Lot	~	44	0.77	15.07
94SKJNlot8	Brood Lot	~	26	0.90	14.31
Totals			**412**		
990618SKJNPR01	Brood lot larval fish from Provo River 1999		**47**	0.56	16.73
000509SKJNPR01	Brood Lot		1,023	4.75	8.39
000525SKJNPR04	Brood Lot		188	3.56	9.03
000525SKJNPR05	Brood Lot		717	10.89	6.28
000601SKJNPR07	Half Sib Hatchery Male Progeny lot 89SKJNUSU female 91SKJNUSU		612	3.74	9.23
000527SKJNFE01	Male		8	1.38	12.86
Totals			**2,548**		

Lot number		number on hand	f/lb	Length "
			Stocked	
000523SKJNPR02	Brood lot larval fish from Provo River 2000	0	0.00	0
000601SKJNPR06	Brood Lot	0	0.00	0
000602SKJNPR08	Brood Lot	0	0.00	0
010518SKJNPR08	Sib lot hatchery female	0	0.00	0
Totals		**0**		
010424SKJNPR01	Brood Lot	194	8.79	7.24
010426SKJNPR02	Brood Lot	138	11.70	6.58
010502SKJNPR03	Brood Lot	3056	14.13	6
010515SKJNPR04	Brood Lot	59	6.66	7.94
010516SKJNPR05	Brood Lot	463	9.43	7.07
010516SKJNPR06	Brood Lot	844	4.41	9.11
010518SKJNPR07	Sib lot hatchery male	34	6.32	8.08
Totals		**4,788**		
020430SKJNPR01	Brood Lot	36	63.93	3.85
020501SKJNPR02	Brood Lot	7	25.00	5.26
020506SKJNPR03	Brood Lot	153	73.95	3.66
Lot number		**number on hand**	**f/lb**	**Length "**
020520SKJNPR04	Brood Lot	5722	38.76	4.52
020521SKJNPR06	Brood Lot	4433	22.47	5.45
020521SKJNPR07	Brood Lot	5291	48.72	4.21
020528SKJNPR08	Brood Lot	465	39.64	4.51
020604SKJNPR10	Brood lot Larval fish from Provo River 2002	1260	55.61	4.03
Totals		**17367**		
030528SKJNPR21	Brood Lot	3714	961.95	1.51
030528SKJNPR22	Brood Lot	11863	1536.08	1.33
030604SKJNPR25	Brood Lot	993	1330.89	1.4
030616SKJNFE01	Progeny Lot	1291	2072.13	1.21
030617SKJNFE02	Progeny Lot	338	1691.85	1.29
030617SKJNFE03	Progeny Lot	3502	1921.03	1.24
Totals		**21701**		
Totals		**47,053**		

~ Numbers estimated by percentage at last pit tag reading

* Estimate no total inventories taken to date

Other items of concern that we evaluated were:
We hatched eggs in 60 F and 64 F water, which resulted in similar hatch rates.
1. Bentonite was used on eggs to help reduce fungus and clumping.
- Eggs received from the Provo River were placed in a bentonite slurry for one minute then rinsed.
- Eggs from the FES brood were placed in a bentonite slurry for the first 15 minutes after fertilization.
2. Eggs were treated with formalin. We used a 1464 ppm bath treatment on the eggs for 15 minutes to help control fungus. Treatments began one day after fertilization and then treated for another three to four consecutive days. We had varied results due to poor egg quality.
3. Hank's Balanced Salt Solution (HBSS) was used as an extender on the eggs and milt to reduce the chance of activating the sperm with water before fertilizing the eggs.
4. We evaluated the time it takes for the eggs to water harden after fertilization. We determined that it takes about one hour for the eggs to water harden. After one hour it is safe to transport the eggs.

To meet future goals we will need to continue with annual O & M operations at FES. We need to continue with additional research as needed to improve upon existing June sucker culture techniques such as: feed studies and the use of hormones to induce spawning in a hatchery environment. We also need to further evaluate the use of sperm extenders and diluents.

Maintenance of the facility will include repairs as needed and any electrical work to be done will be done by a professional. The bidding process for maintenance and repairs will be conducted on items over $1000.

Budget Status:

Funds Provided: OY 2003 = $83,000.00
Funds Expended: $78,936.79 (Jan 1, 2003 – Dec. 31, 2003)
Remaining Balance: $4063.21 as of Dec 31, 2003

Personnel: $49,568.55
Travel: $175.35
Total Lab: $413.13
Rental of Equipment: $56.90
Motor Pool: $2163.52
Utilities: $868.66
Total Chemical: $351.11
Total Small Tools: $619.59
Building and Grounds: $11,420.09 (This included insulating the metal building)
Total for Other Equipment: $3267.74 (This includes oxygen)
Books and Office Supplies: $278.37
Total Small Equipment: $2975.00 (This includes the heater that was installed at $1995 and the propane tank at $840.00)
Feed Cost: $4485.91 (This includes feed for the feed study)
Medical and Surgical: $1789.37 (This includes hormones for HCG Study)

Project Number: IV.03.07 **Hatchery Culture and Augmentation Workshop: Techniques and Issues**

Contact Person:

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Project Summary:

This was a new project completed to review techniques used by fish culturalists working with species closely related to the June sucker. It specifically addresses the Recovery Plan (USFWS 1999) objective: 4.1.2: Develop propagation procedures for captive brood stock. The purpose of the workshop was to share information to help increase the fitness and broodstock management of June sucker.

Project Status:

A workshop with others who have had experience in captively rearing species similar to the June sucker was held on February 25 and 26, 2003. Presentations were made on the first day, and the second day, an onsite visit was made to the FES in Logan, Utah to review those facilities. A description of the presentations and list of attendees is found in the attached workshop agenda.

Accomplishments:

Valuable information on rearing large-bodied warm water suckers and chubs was made available to those working with June sucker at FES and for future hatchery design and operation purposes. Workshop materials were summarized and are on file at the Mitigation Commission and the JSRIP Office (PDO).

Budget Status:

Funds Provided: $2,000
Funds Expended: $500
Remaining Balance: $1500

Attachment

Native Aquatic Species Culture Workshop Agenda
Sponsored by the June Sucker Recovery Implementation Program
February 25-26, 2003
Salt Lake City and Logan, Utah

February 25, 2003, Department of Environmental Quality Auditorium Room #101, 168 North 1950 West, Salt Lake City, Utah (driving directions below); 9:30 – 4:30

Introduction (Maureen Wilson, Utah Reclamation Mitigation and Conservation Commission and Reed Harris, JSRIP)
9:30-9:45 am
FES, Logan, Utah 9:45-Noon

Brief history of June sucker at the FES (Doug Routledge, UDWR, FES)

Water quality and facilities (past and present)

Production methods
Hatching methods, hatch rates
Rearing techniques
Feeding (times/day, feed sizes, brine shrimp)
Fish transportation methods

Disease Problems (treatments used)
Costia, Ich
Bacterial Hemorrhagic Septicemia

Feeds used in the past (Results)

Feed studies in 2002 – 2003 (Eriek Hansen, UDWR, FES)

Use of HCG to induce spawn (Doug Routledge, UDWR, FES)
Dosage rates
Spawning methods

Evaluating diluents and sperm extenders (Ronney Arndt, UDWR, FES)

June sucker at the Wahweap Hatchery

Klamath Hatchery production methods review (Doug Routledge, UDWR, FES)

Lunch; 12-1:30 (On your own)

Afternoon Session

Ouray National Fish Hatchery, Ouray Utah (Steve Severson, USFWS, Ouray National Fish Hatchery); 1:30 – 2:00 pm

Dexter National Fish Hatchery, Dexter, New Mexico; (Manuel Ulibarri USFWS, Dexter National Fish Hatchery); 2:00-3:00 pm

John R. Mumma Native Aquatic Restoration Facility, Alamosa,Colorado; (Jenn Logan, Colorado Division of Wildlife, Mumma Native Aquatic Restoration Facility); 3:00-4:00pm

Open discussion and questions, 4:00 – 4:30pm

Topics to be reviewed:

General hatchery background

Hatchery capacity

Species reared: fish and others

Water supply characteristics: volume, temperature, general quality

Water treatment use-on-supply and/or discharge

Annual stockings made in terms of numbers or pounds

Holding densities

Feeding regimes

Fish health

Brood stock management

Environmental conditions (light, water and/or air temperatures)

February 26, 2003, Site visit to the FES, Logan, Utah.
Attendees:

Craig Addley, Utah State University
Matthew Andersen, Utah Division of Wildlife Resources
Ronney Arndt, Utah Division of Wildlife Resources
Thad Bingham, U.S. Fish and Wildlife Service
Mike Davis, Utah State University

Russ Findlay, U.S. Bureau of Reclamation
Eriek Hansen, Utah Division of Wildlife Resources
Reed Harris, June Sucker Recovery Implementation Program
Mark Holden, Utah Reclamation Mitigation and Conservation Commission
Chris Keleher, Central Utah Water Conservancy District/JSRIP
Rick Larson, Utah Division of Wildlife Resources
Brenda Landureth, Utah Department of Natural Resources
Jenn Logan, Colorado Division of Wildlife
Steve Meismer, Virgin River Recovery Program
Tim Miles, Utah Department of Natural Resources
Mike Montagne, US Fish and Wildlife Service
Hal Raymond, Freemont High School
Josh Rasmussen, Utah Division of Wildlife Resources
Doug Routledge, Utah Division of Wildlife Resources
Steve Severson, U.S. Fish and Wildlife Service
Clair Steinquist, Freemont High School
Ralph Swanson, Department of the Interior
Manuel Ulibarri, U.S. Fish and Wildlife Service
Joe Valentine, Utah Division of Wildlife Resources
John Weber, BIO/WEST Inc.
Chris Wilson, Utah Division of Wildlife Resources
Maureen Wilson, Utah Reclamation Mitigation and Conservation Commission

V. RESEARCH, MONITORING AND AUGMENTATION

Project Number: V.03.01 Genetic Analysis of Spawning June Sucker

Contact Person:

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Project Summary:

The goal of this project is to describe the patterns of genetic variance that exist in the wild population of June Suckers in Utah Lake, to relate that variance to the variance present in Utah suckers, in Utah Lake and in other locations, and to monitor and manage genetic diversity in the recovery process.

Project Status:

Scope of Work	Current Status	Date of Completion
AFLP Analysis	Lab analysis completed, data analysis ongoing	June 30, 2004
Mitochondrial Sequencing Analysis	Scope of work approved, but UDWR contract pending	Two years from contract award date
Microsatellite Development & Analysis	Scope of work approved, but UDWR contract pending	Six months from contract award date

Accomplishments:

Accomplishments to Date - To date, DNA extraction and AFLP analysis have been performed on fin clips taken from 163 individual June and Utah Suckers from Utah Lake: a) 24 wild Provo River, JS morph, b) 39 wild Provo River, hybrid morph, c) 10 wild Provo River, US morph, d) 4 wild Provo River, no morph available, e) 19 from Red Butte, f) 25 fish of hatchery origin, g) 10 from Lehi, h)12 from Jordan River, i) 9 from Wahweap, j) 1 from Camp Creek, and k) 10 FES full sibs (positive control). These fish are also represented by detailed photographs from several angles, allowing a direct comparison between

morphology and genetic structuring. AFLP analysis yielded 116 polymorphic loci, which were scored for all individuals. These results were combined with an

ongoing study (funded by UDWR) of the Utah Sucker, which included 102 Utah suckers from 8 populations outside Utah Lake in Utah and Idaho. This work is particularly valuable since it combines data on June Suckers with data on Utah Suckers and morphometric data (Todd Crowl, USU) collected in other studies.

The important findings and accomplishments to date are as follows:

- Fin clips representing over 400 individual suckers from Utah Lake have been collected and archived at Utah State University.
- The positive controls form a tight group in AFLP analysis, suggesting that the AFLP methodology is sensitive enough to detect family groupings.
  -The methodological error rate, based on replication of 20 percent of the samples, was estimated at 1.51 percent, which is quite low.
  -There is a large genetic divergence between Snake River and Bonneville Basin Utah Suckers, consistent with patterns found in other fish (Utah chub, Leatherside chub).
  -There is smaller, but detectable divergence between the Utah Suckers in the Sevier River basin and Utah Lake Suckers (including both morphs)
  -There seems to be a low level of detectable genetic divergence between the June sucker morphometric types and the hybrid and Utah sucker morphometric types. This linkage could be due to a low level of assortative mating along morphological lines. This is a particularly exciting and unprecedented finding.

Summary of Ongoing Work - Additional statistical analysis is underway to further characterize the genetic differentiation between the Utah Sucker and June Sucker morphs in Utah Lake. Mitochondrial sequencing will also commence this spring to provide further information about these genetic differences.

Recommendations for Future Research - A proposal has been submitted for the development of microsatellite markers and the use of these markers in June Suckers. Microsatellites are a rapidly evolving molecular marker that can provide a very sensitive indicator of population subdivision and changes in diversity due to population bottlenecks. Although the initial development phase is time consuming, this marker system has the advantage over AFLPs of being highly repeatable from year to year (over varying reagents and reaction conditions), and is an excellent marker type for long-term monitoring. Microsatellites are clearly the marker of choice for monitoring genetic diversity in refugium populations and for establishing broodstock that is representative of the genetic diversity in wild stocks. My laboratory has proposed to develop a set of microsatellite markers specifically for use in June Suckers, and to use these markers to characterize existing refugium populations and broodstock. The microsatellite data on the wild population will become a baseline, which can be reference as the population in Utah Lake changes over time.

Budget Status:

Funds Provided: $ 20,700
Funds Expended & Committed: $ 20,700
Remaining Balance: $0

Project Number: V.03.02 June Sucker Feed Study

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Project Summary:

The June sucker (*Chasmistes liorus*) is an endangered fish endemic to Utah Lake, Utah. To aid in recovery efforts a warm-water sportfish and native aquatic species hatchery is scheduled to be built. Proper fish culture techniques for rearing June sucker are relatively unknown. With a few exceptions, techniques modified from standards for rearing rainbow trout have been used in the past. To meet the production goals of 350,000 eight-inch fish annually from the new Warm Water Fish Hatchery, research needs to be conducted to determine the most appropriate methods for rearing June sucker.

It is not clear, what the proper diet for the June sucker is. Various artificial diets have been evaluated in the past at the FES. However, due to lack of space a true feed study with various treatments, replicates, and controls, was not possible.

Various types of feeds, both natural and artificial, and feeding regimes need to be evaluated to determine which diet, or combination of diets, provides the nutritional requirements June suckers need. Prior to 2002 we were feeding the June sucker at FES the BioKyowa diet, which is very expensive. A low cost feed that will provide the nutrients needed for good growth, health, and reproductive success needs to be determined. We need to do follow up evaluations from the feed studies we have done in 2002. From previous studies, it is clear that feeding brine shrimp at initial feeding is very beneficial. What we don't know is the number of days that would be best for feeding the brine shrimp. Since the Razorback diet has been the most promising diet to date, we used this as our control and varied the number of days we were feeding the brine shrimp.

The objective of the following study was to determine the proper diet needed to provide the required nutrients for good growth and health and also to determine the number of days to feed brine shrimp. The goal of the following study was to

improve intensive culture methods to increase production and improve fish health.

Project Status:

This study began in June 2003 and will be completed in January 2004.

Accomplishments:

Significant differences using ANOVA were found in the mean length, weight, condition factor (Ktl), total percent mortality (Table 2), within the percent cumulative mortality by month (Figure 1), and mean weight by month (Figure 2). The mean length ranged from 37 to 47 mm with fish fed Brine Shrimp 56 being the longest. Mean weight ranged from 0.32 to 0.82 g with fish fed Brine Shrimp 56 being the heaviest. The mean condition factor (Ktl x 10^5) ranged from 0.6725 to 0.7350 with suckers fed Brine Shrimp 56 being the largest. The total mean percent mortality ranged from 38.16% to 75.93% with the lowest percentage occurring in Brine Shrimp 56.

Table 2. Comparison of fish performance between study feed regimes. Matching subscripts depict no significant difference for a given variable.

Feed Regime	Razorback	Brine Shrimp 28A	Brine Shrimp 56	Zeigler	Brine Shrimp 28B
Length	37.18_y	39.39_y	46.97_z	38.01_y	41.09_y
S.D.	6.36	7.9	6.29	25.27	7.82
Weight (TL)	0.39_{xw}	0.48_{yx}	0.82_z	0.32_w	0.54_y
S.D.	0.22	0.29	.30	0.15	.30
Condition Factor (K*10^5)	0.6822_{zy}	0.6731_y	0.7350_z	0.7000_{zy}	0.6725_y
S.D.	0.2184	0.1625	0.0993	0.1647	0.1620
Mortality (%)	72.97_x	71.61_x	38.16_z	53.82_y	75.93_x
S.D.	.05	.03	.05	.04	.02

Figure 1. Comparison of cumulative percent mortality between feed regimes by study days. Matching letters depict no significant difference among treatments within a given month.

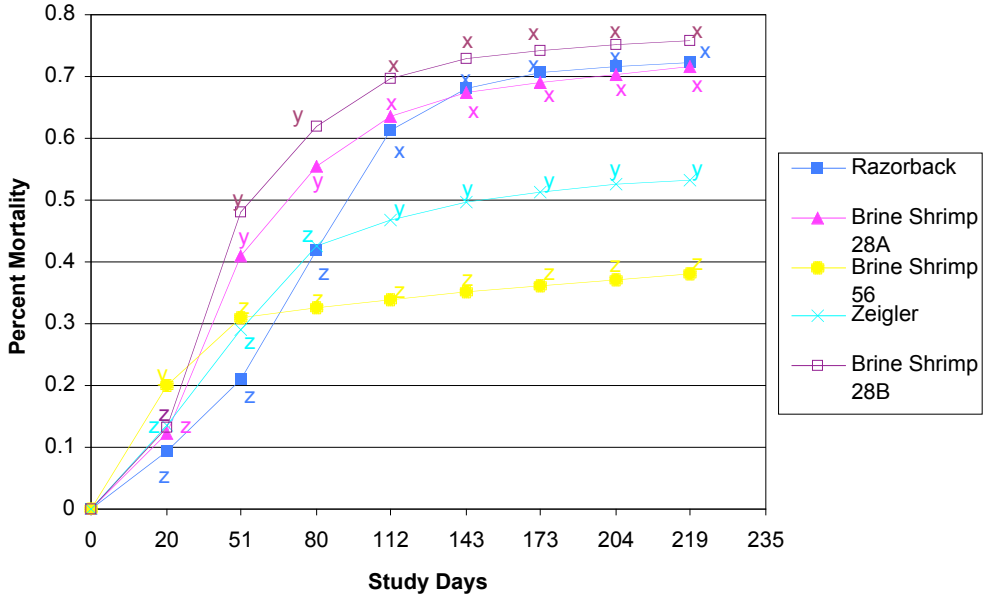
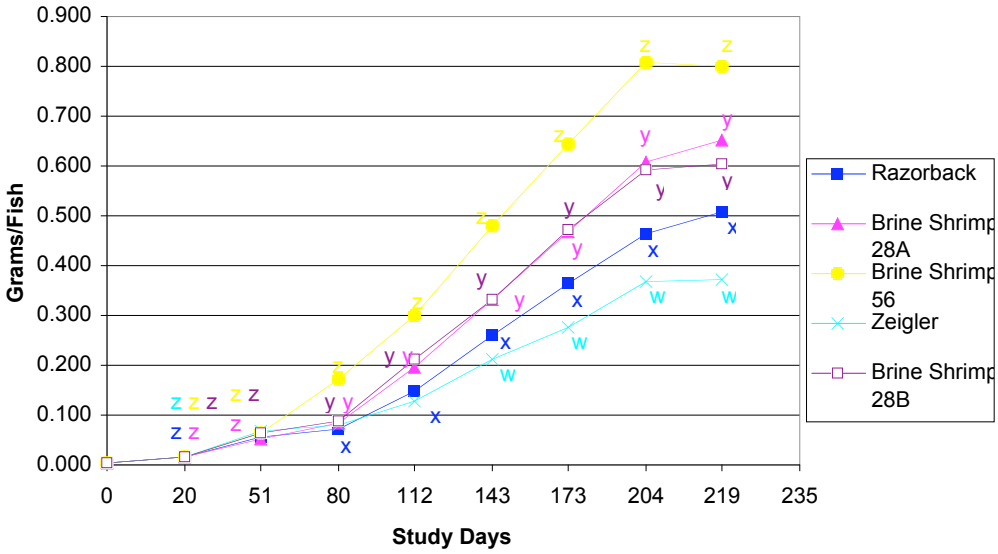


Figure 2. Comparison of mean weight among feed regimes by study days. Matching letters depict no significant difference among treatments within a given month.



Significant differences using chi-square tests were found in the variables eye anomalies, opercle shortening, fin deformities (Fin Deformity Index), opercular deformities (Deformity Index), vertebral deformities (Deformity Index), and Deformity Index (Table 3). The percentage of eye

anomalies ranged from 1.7% to 23.3%, with the fewest occurring in Zeigler. The percent opercle shortening ranged from 80.0% to 95.0% with the lowest occurrence in Razorback. The percent fin deformities ranged from 1.7% to 23.3 with fewest occurring in Brine Shrimp 28A and Brine Shrimp 56. The percent opercle deformities ranged from 0.00% to 10.00% with no occurrence in Brine Shrimp 56, Zeigler, and Brine Shrimp 28B. The percent vertebral deformities ranged from 0.0% to 30.0% with no occurrence in Zeigler. The percentage of deformities in the Deformity Index ranged from 6.70% to 45.00% with the lowest occurrence in Brine Shrimp 56.

Table 3. Comparison of the percentage occurrence of eye anomalies, opercle shortening, vertebral deformities, opercular deformities, and fin deformities

Feed Regime	Razorback	Brine Shrimp 28A	Brine Shrimp 56	Zeigler	Brine Shrimp 28B
Eye Anomalies (%)	23.30_{x}	10.00_{y}	5.00_{zy}	1.70_{z}	8.30_{zy}
Opercle Shortening (%)	80.00_{z}	88.30_{zy}	93.30_{y}	83.30_{z}	95.00_{y}
Fin Deformities (%)	15.00_{yx}	1.70_{z}	1.70_{z}	23.30_{x}	8.30_{zy}
Opercular Deformities (%)	10.00_{y}	1.70_{z}	0.00_{z}	0.00_{z}	0.00_{z}
Vertebral Deformities (%)	30.00_{w}	8.30_{yx}	5.00_{y}	0.00_{z}	16.70_{xw}
Deformity Index (%)	45.00_{x}	15.00_{zy}	6.70_{z}	23.30_{y}	23.30_{y}

Summary:

The results show that Brine Shrimp 56, i.e., brine shrimp for 56 days with the Razorback diet, was the significantly better diet in the study. Primarily the length and weight were significantly larger and the mortality was significantly lower than the other four diets. This regime also performed well for the other variables in comparison to the other diets. Overall, fish on the feed regime Brine Shrimp 56 out performed the other regimes and should be incorporated into future production procedures for juvenile June sucker. This diet, as well as others evaluated, are still lacking in the reduction of opercle shortening (Figure 3). Due to this result, feed trials should be continued to address this condition.

Budget Status:

Funds Provided: OY 2003 = $1100.00
Funds Expended: $1100.00
Remaining Balance: $0.00

Literature Cited:

Hansen, E. 2003. Comparison of Feed Regimes for Rearing Juvenile June Sucker (*Chasmistes liorus).* Utah Division of Wildlife Resources: Fisheries Experiment Station, Logan, Utah.

Project Number: V.03.03 **Monitoring Adult June Sucker Populations in Utah Lake and Provo River in 2003**

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Project Summary:

The goal of this project was to monitor trends of adult June (*Chasmistes liorus*) and Utah sucker (*Catostomus ardens*) populations in Utah Lake and tributaries.

Project Status:

This project consists of ongoing-revised monitoring which follows activities outlined in the *June Sucker Standardized Monitoring Program: Rationale and Proposed Sampling Protocols* (Project number V.01.03).

Accomplishments:

June sucker populations were sampled using trapnets in Utah Lake during July 2003. Total counts of spawning adults were conducted using snorkel-sampling methods in the Provo, and American Fork rivers, and Hobble Creek during the spawning period from mid-April through June 2003. June suckers were also sampled for using electrofishing equipment in the Spanish Fork River from mid-April through June 2003.

June sucker eggs and larval suckers were collected with light traps and drift nets in May, June and July 2003.

Progress and results will be reported for the following tasks in the annual report:

Task 1: Monitor trends in the adult populations of June and Utah suckers in Utah Lake:

Trapnet sampling throughout Utah Lake

Task 2: Determine total number of adult June and Utah suckers present in the Provo River and tributaries during the spawning period:

Snorkel surveys in the Provo River
Snorkel surveys in Hobble Creek and American Fork River
Electrofishing in Spanish Fork River, Mitchell hollow and Spring Creek

Task 3: Monitor trends in distribution and relative abundance of larval June and Utah sucker:

Light Trap sampling in the Provo River
Drift Net sampling in the Provo River

Budget Status:

Funds Provided: $78,121
Funds Expended: $78,121
Remaining Balance: $0

Project Number: V.03.04 **Evaluation of the Importance of Substrate and Vegetation to the Growth of Early Life Stages of June Sucker in Utah Lake**

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Project Summary:

The recovery plan for June suckers includes two main tasks that depend on a clear understanding of growth rates of young June suckers in Utah Lake - 1) Evaluate and minimize factors limiting recruitment of June sucker, and 2) Enhance June sucker population in Utah Lake and its tributaries (USFWS, 1999). Factors limiting recruitment include juvenile survival and adult reproduction. Growth rates can have a profound influence on mortality and reproduction. Understanding how growth rates are affected by density of conspecifics and location or habitat in the lake, is critical for choosing among Provo River restoration alternatives, and for determining appropriate habitat restoration activities in Utah Lake. Similarly, understanding growth rates in Utah Lake is important for determining the best method for raising June suckers for release into the lake. Enclosure sizes and designs, and the role of vegetative structure in determining growth rates, all must be understood before we can design a successful program to enhance June sucker populations.

This proposal is a continuation of the project started summer 2002 in Utah Lake. Last year in the Provo Bay site we observed a significant effect of stocking density on growth. Although last years data were useful in determining the effect of density, we suggest that we need to better understand the influence of access to the substrate and vegetative structure on growth of young June sucker. Last year all enclosures had open bottoms that allowed access to the substrate. This cage design presented some difficulties in high-energy environments with shallow or hard substrates. If young June suckers are not using the substrate, then other cage designs might be developed to better withstand the physical environment. Second, we need to understand the interaction between vegetative structure and growth of young June sucker. Future plans may include addition of plants to Utah Lake and it is important to determine how feeding and growth might be affected by such habitat manipulations. We proposed to experimentally

evaluate effects of access to the substrate and vegetation on growth rate and survival of June sucker in Utah Lake over their first summer.

Project Status:

We have nearly completed analysis of diet, prey availability, and selectivity from the 2002 data. A report detailing that study will be completed by May 2004. This summer we continued exploration of factors that affect survival and growth of young June suckers. We designed and carried out an experiment to evaluate the effect of vegetation and access to the substrate on young June sucker. The experiment consisted of placing fish in enclosures in Utah Lake about one month after they hatch and begin feeding to test for effects of various habitats and densities. The experiment followed a fully crossed, factorial design combining the five substrate/vegetation treatments with two levels of density (15 and 30). This design resulted in 10 treatment combinations and each was replicated six times for a total of 60 enclosures. Originally, we intended to place enclosures in Provo Bay because of the good survival and growth of suckers in Provo Bay last year. However, extremely low lake levels forced us to move the experiment to the main lake near the entrance to Provo Bay. Fish were maintained in the treatment enclosures for 6-1/2 weeks. Temperature and water depth were monitored during the entire experiment and low water levels forced the termination of the experiment. Some of the enclosures were compromised by wave action in the lake. However, the majority of enclosures were maintained during the entire experiment. Unfortunately, survival of June suckers was extremely low. Only five of the original 60 enclosures had any surviving fish, and even where there were fish left, there were only a few individuals left alive (typically one or two per cage). These data suggest that the environment in the main lake is not conducive to survival of young June sucker (for whatever reason). These results corroborate poor survival noted last year in locations other than Provo Bay, and poor survival of larvae in enclosures placed by UDWR in the main lake.

Accomplishments:

Although the experiment failed because of poor survival, the results suggest that there may be relatively few good nursery areas in the entire lake. Investigation of larval survival in various areas of the lake would be an important extension of this project.

Budget Status:

Funds Provided: $33,200
Funds Expended: $33,200
Remaining Balance: 0

Project Number: V.03.05 **Investigation of Feeding and Spawning Behavior of Adult June Sucker in Red Butte Reservoir**

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Project Summary:

Objective 1: Identify characteristics of spawning sites within Red Butte Reservoir.
We will use egg nets, egg traps, and modified drift nets to identify spawning sites and spawning duration. We will start sampling regimes at the end of April and beginning of May using egg nets and egg traps, setting nets and traps at random sites covering most areas of the reservoir. Drift nets will be modified to function as trawls; the net will be towed over substrates during spawning season at randomly selected sites in attempt to capture eggs that have been released. Substrate at all sites will be quantified using a Wentworth substrata-scoring method. Also, we will quantify sites using physical, biological, and chemical parameters, including micro-temperature characteristics to determine if groundwater sources are present. Site characteristics will be compared between sites with spawning and sites without spawning to determine if June suckers have a preference for habitat types, substrate, both, or neither. June suckers spawning in Provo River as well as other fish species show preferences in spawning sites based on sets of parameters including temperature, substrate, distance from shoreline, and macrophytes. Light traps will be used in addition to egg nets and traps to determine if egg nets and traps are effective; if larvae are captured before eggs, nets and traps are either ineffective or at the wrong sites. Data from both will be used to estimate length of spawning. Based on light trapping during the spring of 2002, we predict spawning will begin at the middle or end of May and last until the end of June. If the reservoir is clear enough, we will attempt to video spawning behavior at sites where eggs are collected.

Objective 2: Quantify feeding behaviors and diet composition of adult suckers.
We will use observations to determine feeding behaviors of adult fish. Observations will occur throughout the spring, summer and fall and be performed at dawn, mid-morning, afternoon and dusk to determine if suckers show feeding

periodicity. In addition, once feeding swarms are observed, we will sample the zooplankton and phytoplankton available in those areas and compare them to data obtained from sites where feeding was not observed. Plankton samples will be quantified in a spatially specific manner by using a Van Dorn sampling apparatus. This type of sampler allows one to lower a horizontal sample bottle to a desired depth and then close both ends using a surface released messenger. In this way, we can identify food availability at specific depth strata to determine what food types are being selected.

To fully quantify diets and possible diet shifts in these fish, we will use stable isotope analyses. Because we cannot directly remove stomach contents from these fish, we will match isotopic signatures from micro-tissue samples taken from the fish with those obtained from macroinvertebrates, zooplankton, and phytoplankton samples. Zooplankton and phytoplankton have different stable nitrogen and carbon isotopic ratios because of their form of production (photosynthesis versus herbivory) and because of their position within the food web. Carbon isotope signature, only enriched by about 1% during trophic transfer from prey to predator, is considered a dietary tracer while the nitrogen isotope signature, enriched by three to four percent in consumer relative to prey, is used as an indicator of trophic position. Habitat data for juvenile sucker from the 2002 field season will be used to identify potential prey types for this age group. Isotopic signatures from prey and sucker will be measured to determine which prey juveniles are selecting.

Objective 3. Identify potential crayfish control methods for Red Butte Reservoir. We will conduct a series of studies of possible mechanisms of controlling or eradicating crayfish to determine which will be the most effective in Red butte Reservoir. We will assess the effectiveness of various types of trapping, including those we used this past summer and those used by others (Rach and Bills 1989). We hope to identify a mechanism for controlling crayfish not only to restore the ecosystem in Red Butte Reservoir but also to protect the June sucker population that has thrived so well here.

Objective 4. Synthesize existing data for Red Butte limnology.
We will synthesize as much limnological and biological data as we can find for Red Butte Reservoir. Heather Thomas did a series of experiments and collected data as did Kresta Butts. We will use this information to quantify the changes that have occurred in Red Butte over the past eight years.

Objective 5. Evaluate the population ecology of Bonneville cutthroat trout in Red Butte Reservoir. In conjunction with June sucker studies, we will study the population ecology of Bonneville cutthroat trout in Red Butte Reservoir. This will include a study of population size, which will include a size class component, to determine growth and condition of the population. Population size will be determined using a mark recapture estimate after the spawning run has been completed. Using stable isotope analysis and stomach contents, we will study the

feeding ecology to determine the trophic level of the trout compared to June sucker. Using data from feeding studies of the two species, we will provide estimates of overall carry capacity for this refugium.

Project Status:

See project accomplishments section.

Accomplishments:

Objective 1: Egg traps and nets were set around the reservoir, including the inlet, on May 12 and checked weekly until they were pulled on July 22. Spawning behavior was observed at the south end of the dam along the spillway from June 10 through July 8; eggs were captured from June 18 through July 15. Eggs were also captured in the cove on the north side of the reservoir on June 24 and July 1. However, spawning behavior was not observed at this site. Although we have no evidence, egg captures here might have been caused by the mark recapture study: ripe June suckers were tagged from a rowboat in the cove before eggs were first captured. Eggs were captured again the next week making it unclear if they were from the mark recapture study or from actual spawning. From this study, we found no evidence that spawning was associated with the inflowing stream. Our findings suggest that the June sucker's requirements for spawning habitat are plastic in terms of the need for flowing water (not an obligate river spawner). Instead, requirements might be based primarily on substrate or other variables. Further analyses will be conducted to determine what some of these variables might be.

Objective 2: We collected additional stable isotope samples of organisms in Red Butte Reservoir to confirm results from 2002 that showed June suckers ate primarily copepods. We also collected muscle and stomach samples from June suckers sacrificed for disease certification by the UDWR to compare stomach contents to stable isotope analysis. These samples are still being processed, and results will be presented in a final report in June 2004. In conjunction with field studies, a feeding experiment is being conducted to determine isotopic enrichment in June suckers. We are using two food types (frozen brine shrimp and bloodworms) that represent similar prey (copepods and chironomids) available to suckers in the wild.

Objective 3: After a month of marking individuals, with florescent epoxy to tag the crayfish, an initial population estimation was calculated (Caught = 148, Recaptures = 23, Marked = 1147) to equal 7381 crayfish. After this initial estimate, we removed 3932 unmarked crayfish throughout the summer. We then had another large recapture effort, from which we have calculated our final population estimate of 11660 crayfish (Caught = 1230, Recaptures = 121, Marked = 1147). Our removal methods of summer and fall 2003 were not

successful, as the population estimate increased. Future removal plans include a longer removal season.

Objective 4: We are currently organizing all limnological and biological data for Red Butte Reservoir as well as collected the last samples for this year. Once organized, we will quantify changes that have occurred over the past eight years. We will also make this data available in the June Sucker Database.

Objective 5: This past field season (2003), we attempted a mark recapture of trout. We used trap nets, gill nets, trammel nets, and hook and line. Hook and line yielded the most captures, but none of the capture methods were overly successful. We used visible implant tags to mark the trout. We have marked 91 trout and recaptured four. We have removed 36 stomachs (natural deaths and killed) and pumped 8 stomachs for diet analysis, which is still being processed.

Budget Status:

Funds Provided:

Category	2003
Salaries	$32,000
Isotope analysis	$4,500
Travel	$3,500
Supplies, Equipment	$3,500
Indirect costs	$6,450
Total	**$49,450**

Funds Expended: $49,450
Remaining Balance: $0

Project Number: V.03.06 **Development of Macrophytes in Utah Lake: Large-Scale Macrophyte Additions and Carp Exclusions**

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Project Summary:

The purpose of this study was to determine if macrophyte communities in Utah Lake could be reestablished and maintained through reintroduction and carp exclusion in order to restore and increase habitat complexity. The contents of this report represent results from our experiments conducted on Utah Lake during the 2003 field season. We report the results from our seven carp enclosure experiments including: 1) the effect of carp on aquatic macrophyte species found in Utah Lake. 2) carp effects on the species composition and number of aquatic invertebrate species associated with aquatic macrophytes. Results from our Millville Experimental Ponds including: 1) the direct and indirect effects of carp on aquatic macrophyte species abundance and composition 2) water quality including turbidity. Results are also reported from laboratory experiments including: 1) analysis of nutritional content and chemical composition of aquatic macrophytes 2) structural analysis 3) consumption or non-consumption of aquatic macrophytes by carp.

By understanding how each macrophyte is able to withstand the direct and indirect effects of carp and reduced water quality, we can better ascertain which macrophytes have the best probability for survival through reestablishment in order to increase habitat complexity.

Project Status:

This project is currently in the stage of data analysis and write-up of the final report including full determination of restoration potential for each species will be completed by May 2004.

Accomplishments:

Several experiments were performed in multiple locations, for simplicity each will be separated reported and then recommendation will be made based on all information.

Exclosures
The fenced exclosures excluding carp from Potomogeton beds were very successful. In the closed sides of each exclosure, Potomogeton increased in most cases. Open sides, which allowed for carp activity, decreased in every exclosure. In the case of the Provo Bay side exclosures, no plants were left in the open side of the exclosures at the end of the experiment. Statistical analysis using a two-way ANOVA showed a significant effect ($P < 0.001$) of treatments grouping all closed and all open final stem lengths of both bays which indicates that the increased macrophyte abundance in the open exclosures accounted for by the treatments and is not caused by random chance.

Millville Ponds
The average stem length of Potomogeton plants decreased in both the direct and indirect effect pond treatments, while the control pond increased in stem length dramatically. Carp negatively affect both, directly and indirectly, the average stem length of Potomogeton plants in experimental ponds. The average total cover of Chara sp. decreased in both the direct and indirect effect pond treatments, however, the control ponds slightly increased. Carp also, both directly and indirectly, negatively affect the average total cover of Chara sp. in experimental ponds. The average total stem length of Typha sp. increased in all treatments. It seems that Carp do not affect the average total stem length of Typha sp. in experimental ponds, in fact, Typha increased in all ponds. Limnological measurements were taken in all treatments over the course of the experiment.

Cattle Tanks
The results from the cattle tank experiment were inconclusive. Almost no difference in the dry weight between the control and treatment tanks was observed. In the no screen treatment, which allowed for natural uprooting of all plants, we observed more uprooting of plants but again there was no difference in these controls. Plants without protection were uprooted more frequently than that without protection but this was not dependent on whether carp were present or not. These results may be the result of wind factors affecting uprooting of plants rather than carp presence.

Tests for Nutritional Differences
Carbon content varied little between most of the species except Chara, which was had about 15-20 percent less than all others. Nitrogen content varied little between plants but was slightly higher in Ceratophyllum. Soluble Protein levels were highest in the most palatable food source “Broccolet”. Among the five macrophyte species Potomogeton was highest while Ceratophyllum had the

lowest content. Total Phenolic Content levels were highest in “Brocolett”. Among the five macrophyte species Typha and Scirpus were highest, while all other were approximately the same. Phenolic content is a crude measure of one main type of chemical deterrent.

Tests for Structural Differences

Toughness of each plant of measured by using a penetrometer to measure the grams needed to puncture through a specific part of each plant. Both Scirpus and Typha were the toughest of each plant species taking over 500 g to puncture both the stem and leaf portions of the plant. Ceratophyllum and Potomogeton were about equally less tough, while Chara took almost no force to puncture.

Tests for Consumption and Non-Consumption by Species

The whole plant assay showed that Chara is readily consumed as a live plant and Potomogeton is somewhat consumed, while Ceratophyllum, Scirpus and Typha are barely eaten. However, when carp are feed pellet form of the plants an opposite effect was seen. Scirpus and Typha were the most consumed in pellet form with Ceratophyllum slightly less; Both Chara and Potomogeton consumption declined. Scirpus, Ceratophyllum, and Chara do not seem to have water-soluble extracts that deter carp feeding behavior, but a reduction was seen in Typha and Potomogeton. Potomogeton was the only plant that showed evidence of a non-water soluble feeding deterrent. In general, Chara was the most consumed plant, but it also had the lowest toughness, and the most reduced nutritional content.

Restoration Potential for Each Macrophyte Species

The results from the Utah Lake exclosures show that exclusion of carp can dramatically increase the abundance of Potomogeton plants within the lake. No other plant species could be included in these large scale exclosures since those present at Utah Lake are emergent near shore plants (Typha and Scirpus) and would not be covered by water by the end of the experiment.

The experimental ponds do not as clearly show the same effect as the Utah Lake exclosures but this could be due in large part to the plants not being in the same density as those in the lake. Carp negatively affect, both directly and indirectly, the abundance of Chara and Potomogeton in experimental ponds but do not have any affect on Typha. It is probable that the reason for the decline in Chara is due to consumption by carp and by light limitation due to increased turbidity.

When offered as whole plants, carp consume Chara at levels much higher than all other plants offered even though this plant was also the least nutritious. Through further analysis, overall structure of Ceratophyllum, Typha and Scirpus seem to alleviate most of the consumption. The lack of consumption on Potomogeton seems to be caused by the presence of both water-soluble and non-water soluble extracts found within the plant.

From the above experiments, large-scale exclusion of carp from existing macrophyte beds such as Potomogeton has the largest affect on plant survival in Utah Lake. Plants such as Typha and Scirpus can better withstand direct affects caused by carp consumption. Therefore, increasing their abundance through physically increasing the numbers of these plants in closer proximity to the water will increase habitat complexity. Through observation, Scirpus and Typha seem to better withstand dry conditions and increased salinity levels caused by the lake level drop, which happens over the course of the summer. Salinity levels in excess of 25 ppt does not cause death in Potomogeton plants, however, these plants do require water at all times where as Typha and Scirpus can live extended periods of time without submersion of their roots. However, Typha and Scirpus would both need to be increased in numbers over the shoreline in order to have any affect on structural refugium for the June Sucker. Neither Ceratophyllum nor Chara are appropriate plants to consider for restoration based on the above results.

Budget Status:

Funds Provided: $51,750

Project Number: V.03.07 **Use of Luteinizing Hormone with Dopamine Blocker to Induce Increased Maturation of Gametes in June Suckers**

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Project Summary:

The June sucker (*Chasmistes liorus*) is an endangered fish endemic to Utah Lake, Utah. To aid in recovery efforts, a warm water sport fish and native aquatic species hatchery is scheduled to be built. Broodstock will be held at the new facility and they will be used to produce eggs to be hatched for future production fish to be stocked into Utah Lake, Utah.

The use of Ovaprim, an analogue of salmon Gonadotropin Releasing Hormone (sGnRHa) to induce spawning of the June sucker needs to be evaluated. Ovaprim is a product of Syndel International Incorporated. Some species of fish will not produce mature gametes when held in captivity (Mittelmark). The required environmental conditions such as temperature, substrate, flow rates, diet and light may not be present. Stress may be the result and this could prevent the necessary responses to complete the maturation of gametes. From past experiences at the FES, very few captive brood stock females have ovulated without the use of HCG. During the summer of 2002 we injected the males with 500 IU/kg of body weight and the females were injected at 1500, 1000, 750, 500 and 250 IU/kg of body weight. All of the males had increased milt production and none of the females gave eggs. We do not know why none of the females gave eggs, but it might be due to holding the fish in warmer water. Our facility is now on 66 F water where in the past we were using 60 F water. Other alternatives must be evaluated. We evaluated placing some of the females into 56 F water four months prior to spawning. We also used Ovaprim in combination with HCG to see if this has an added benefit. This combination has shown positive results on other species of fish that are difficult to spawn in captivity.

The goal of this study was to determine the best stage of gamete maturation for injecting females with HCG and to determine the proper dose and number of days to inject the HCG in the males and females. We also wanted to evaluate

placing some females in 56 F water for four months prior to spawning to see if this would help in the maturation of gametes. The objective is to induce spawning of the June sucker so that maximum fecundity, egg survival and hatch rates can be achieved in a hatchery environment.

Project Status: The study ran from June – July 2003 and it is completed.

Accomplishments:

A total of 30 females were injected with complete ovulation occurring in six fish and partial ovulation occurring in three fish (Table 1). The four fish with complete ovulation and the three fish with partial ovulation had been on coldwater since February. Complete ovulation occurred in two fish held in warm water. Partial and complete ovulation occurred at three of the dosage levels (Table 2). At 0.5 mls Ovaprim/kg BW two fish experienced partial ovulation. Complete ovulation occurred in one fish at the 1.0 mls Ovaprim/kg BW, one fish at the 0.5 mls Ovaprim+1000 IU's HCG/kg BW, and two fish at the 1.0 mls Ovaprim+1000 IU's HCG/kg BW. One out of three fish re-injected experience partial ovulation again. The vents on the females held at 56° F for four months appeared to be swollen and distended to a greater extent than the females on the other temperature regimes.

Table 1. Percent occurrence of partial and complete ovulation in injected fish by temperature regime.

		Partial Ovulation		Complete Ovulation	
Temperature	# Injected	#	%	#	%
56° F 4 months	10	3	30.00%	4	40.00%
56° F 1 week	3	0	0.00%	0	0.00%
64° F	17	0	0.00%	2	11.76%
Total	30	3	10.00%	6	20.00%

Table 2. Percent occurrence of partial and complete ovulation in injected fish by dosage level.

		Partial Ovulation		Complete Ovulation	
Dosage	# Injected	#	%	#	%
0.5 mls/kg	4	2	50.00%	0	0.00%
1.0 mls/kg	4	0	0.00%	1	25.00%
0.5 mls+1000 IU's/kg	3	0	0.00%	1	33.33%
1.0 mls+1000 IU's/kg	19	1	5.26%	4	21.05%

A total of fifteen males were injected in all three protocols. Protocol 1 injected six males, three were intraperitoneal and three were intramuscular. Three fish had increased milt levels on day 2 and only received two injections, two were intraperitoneal injections and one was intramuscular. On day 3 the remaining three fish had an increase in the amount of milt stripped. Protocol 2 used four fish for injections, two extruded a small amount of milt and two had a high number of tubercles on the anal fin at sorting. Injected one fish of each selection description

with 1.0 mls Ovaprim/kg BW and the opposite selections with 750 IU's HCG/kg BW. An increased amount of milt was stripped on the fourth and fifth day after injections. Protocol 3 used five fish for injections, all five fish were selected by a high number of tubercles were found on the anal fin. Three fish were injected with 1.0 mls Ovaprim/kg BW and two with 750 IU's HCG/kg BW, alternating intramuscular and intraperitoneal sites for each type of hormone. None of the fish injected with Ovaprim gave milt, but both HCG injected fish released milt. One fish gave milt the first day after injections and the other fish gave a limited amount on the second day and an increased amount on the third day. Males injected intramuscularly with Ovaprim developed blackened areas at injection sites.

Three crosses were made from the injected males and females. Cross 1 used 1.0 mls Ovaprim+1000 IU's HCG/kg BW injected female with a male injected two times at 500 IU' HCG/kg BW producing 6875 eggs with a 56.07% survival to swim up. Cross 2 used 0.5 mls Ovaprim+1000 IU's HCG/kg BW injected female with a male injected two times at 500 IU' HCG/kg BW producing 7497 eggs with a 29.60% survival to swim up. Cross 3 used 1.0 mls Ovaprim/kg BW injected female with a male injected three times at 500 IU' HCG/kg BW producing 8162 eggs with a 64.70% survival to swim up (Table 3).

Table 3. Comparison of percent survival to swim up of crosses 1-3 versus the sum percent survival to swim up of three lots of eggs received from wild stock in 2003.

Cross Number	Number of Eggs	Number of fish on Feed (swim up)	Percent survival to swim up
Cross 1	6875	3855	56.07%
Cross 2	7497	2219	29.60%
Cross 3	8162	5281	64.70%
Sum of 3 lots received	87766	28594	32.58%

Budget Status:

Funds Provided: $944.00 (OY2003)
Funds Expended: $665.00
Remaining Balance: $279.00

Literature Cited:

Mittelmark, J., and A. Kapuscinski. Induced Reproduction in Fish. Minnesota Sea Grant.

Hansen, E. 2003. Evaluation of Induced Spawning Techniques and Requirements in Captive June Sucker. Utah Division of Wildlife Resources: FES. Logan, Utah.

Project Number: V.03.08 **Fish Experiment Station Technical Services for June Sucker Fish Health Program**

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Project Summary:

To provide fish health services statewide including 1) performing fish health inspections prior to fish transfers according to Utah Regulation, 2) providing diagnostic services in response to reports of fish morbidity and/or mortality in captive and wild populations of June Sucker.

Project Status: Ongoing project

Accomplishments:

Fish Health Inspections - With the objective of recovering June Sucker populations throughout the State of Utah, it will be necessary to transfer fish from one body of water to another. Thus, in accordance to Utah Regulation, these populations must be inspected prior to transfer in order to prevent the spread of prohibitive pathogens into new sites. One of the responsibilities of the Technical Services at the FES is the determination of the presence or absence of pathogens in June Sucker populations from the FES June Sucker Facility and various refugia where fish are located.

Gross examination was performed for obvious external lesions/parasites and for the presence/absence of Asian Tapeworm (*Bothriocephalus aceilognathi*) in the gastrointestinal tract; furthermore, kidney/spleen samples were collected for analysis of filterable agents (virus) on EPC, CHSE-214, and BF-2 cell lines. The following sites were inspected in 2003:

1. FES June Sucker Facility – Logan
Fish Health Approval number: DWR03-051
Expiration: 08/07/04
Along with the research and culture of Rainbow and Cutthroat Trout at FES, June Sucker are being held and reared an adjacent facility. A lethal sample of sixty fry

(approximately two months old) from six lots (three originating from the Provo River, and three from FES broodstock) were collected on August 7, 2003 and inspected for virology. Gross examination for prohibitive parasites (AT) was not performed, as these fish were too small. No pathogens were detected in the lots of suckers sampled, and continued success at the FES facility will be a major factor in the recovery of the endangered species.

2. Red Butte Reservoir
Fish Health Approval number: DWR03-025
Expiration: 09/18/04
This reservoir is located in the canyon above the University of Utah in Salt Lake City. In addition to providing culinary water for the City, this reservoir also serves as a refuge site for Native Cutthroat and June Sucker. A full lethal sample of 60 fish were obtained from the reservoir in September of 2003. No evidence of filterable agents was found. Likewise, no intestinal cestodes (AT) were found, and these fish were granted fish health approval. It was determined by the June Sucker Recovery Team not to transfer fish from Red Butte in 2003, however, if and when fish are to be transported in the future, it will be necessary to recertify the population according to Utah Regulations.

Diagnostic Services
The other responsibility of the Technical Service Team at FES is to provide diagnostic services in response to reports of June Sucker morbidity and/ or mortality. The laboratory is equipped and staffed to perform diagnostic testing including bacteriology, virology and/or parasitology. Presently, the Service does not have a technician trained in tissue preparation, so the Utah State Diagnostic Laboratory is currently providing histopathology and toxicology services.

During the last year, several incidences of concern were brought to the attention of the stations fish pathologist and fish health specialist. In June of 2003, culturists at the FES reported an increase in mortalities of adult June Suckers. A sample of moribund fish was sacrificed, and a chronic bacteremia was diagnosed in the population. Several treatments were initiated, including a 1000ppm salt treatment and a series of treatments with nitrofurazone. The fish responded fairly well to the treatments, however an exact etiology was never determined.

Soon after the outbreak in the adult population, a group of fingerlings started to show an unusual increase in mortalities. Microscopic examination of this group revealed numerous bacterial organisms (rods and cocci) on the external body surface, and the gills were covered with mucus as well as bacteria. Cultures were taken and sensitivity tests determined that the bacteria (presumed *Shwanella* sp.) were sensitive to several antibiotics (resistant to Penicillin) and this outbreak was successfully controlled with a single chemotherapeutant treatment using a drip system. Biosecurity measures were instituted to prevent the spread of the disease.

Finally, throughout the year and in past years, culturist have noticed that an increasing number of June Sucker fry/fingerling are developing spinal deformities. Affected fishes progressively exhibited scoliosis and kyphosis along with bilateral pigmentation changes consistently half way down the spine. Fishes have been sampled throughout the past year. Bacteriology and virology were performed with no significant findings. Histopathology has been performed, and the findings were normal. Samples of liver were analyzed for MS-ICP mineral analysis, and several possible deficiencies were identified. However, since there is little reference data on this species, interpretation is difficult. Therefore, to gain more insight as to the 'normal' values of the elements in June Sucker raised under natural conditions, samples of fish were taken from Red Butte Reservoir and Camp Creek Reservoir. Preliminary analysis indicates that there may be an iron deficiency in some of the captive fish; however further sampling, and statistical analysis are necessary before and conclusions can be made. It is possible that some of the health problems with the cultured population are related to nutrition and this mineral analysis work will continue.

It is anticipated that in the OY2004 an increasing need for fish health activities will occur and that future diagnostic cases are probable. Additional fish health inspections may be required if fish transfers will occur from other locations.

Budget Status:

Funds Provided: $11,395

Personnel Services	$9,471.32
Supplies (collection, laboratory)	$1,000.00
Travel	$1,000.00
Indirect Costs	$1,420.70
Total Annual Budget	$12,892.02

Funds Expended: $11,395
Remaining Balance: ($1,497)

Project Number: V.03.09 **Heritability Study for Morphometric Characters of Utah Lake Suckers**

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Project Summary:

Suckers in Utah Lake are morphologically diverse. Individual suckers that match the historic characterization of June sucker, those that match the Utah sucker form, and those with intermediate morphologies are all presently found in Utah Lake populations of suckers. To help effectively characterize the genetic diversity of Utah Lake suckers and develop protocols to protect genetic integrity, we must know if there are genetically-based differences among different morphological types of suckers in Utah Lake, or if observed variation is environmentally induced. The current draft of the genetics conservation management plan emphasizes the importance of morphological information regarding which individuals are chosen as parents for the captive brood stock.

A first step toward understanding the genetic basis of morphological variation is to determine its level of heritability. Almost all traits will be heritable at some level, so just showing heritability is not sufficient. Rather, we propose to quantify and compare levels of heritability among various morphological traits. In addition we have the opportunity to assess performance of various morphotypes in the lake environment. By linking observed morphologies to estimates of heritability and performance, we will provide a valuable tool for making informed decisions regarding brood stock development and artificial propagation.

Project Status:

In 2003, crosses were made among 4 June sucker females, 7 June sucker males, 3 Utah sucker females, and 7 Utah sucker males according to a full sib/half sib design. Resulting offspring were used to estimate heritability of morphometric traits. These crosses represent the first half of the full design, which will require 2-3 years to complete. Larval suckers were hatched at FES and at about 6-8 weeks of age they were transferred to experimental enclosures. Half were allocated to enclosures in Utah Lake, and half to tanks on the BYU campus. Low water and poor lake conditions resulted in near complete mortality

of suckers in enclosures in Utah Lake. Currently, we are collecting data from suckers held in tanks at BYU. An interim report will be provided by the end of March 2004, and a final report will be provided after the second half of the experiment is completed (estimated April 2005).

Accomplishments:

This project will be difficult to complete unless the lake level is higher than in 2003. Larval survival in the main body of the lake is poor. Hopefully, water levels will be such that we will be able to complete this experiment in a more benign area of the lake such as Provo Bay. Poor survival noted in the main body of the lake suggests a need for a study to evaluate larval survival at various locations throughout the lake.

Budget Status:

Funds Provided: $34, 650
Funds Expended: $34,650
Remaining Balance: $0

Project Number: V.03.10 **Investigation of Ecological Differences of Utah Lake Suckers**

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Project Summary:

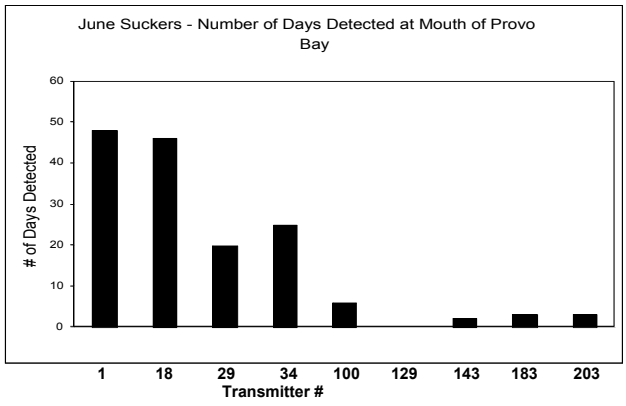
A recent study demonstrates that morphometric and meristic characteristics can be used to distinguish between June sucker (Chasmistes liorus), Utah sucker (Catostomus ardens), and their hybrids (Cole and Crowl, 2003 Annual Report). Examination of the results of a recent genetic analysis (Mock, in progress) of Utah Lake and other regional suckers in light of these morphometric findings reveals a slight genetic differentiation between June sucker and Utah sucker. Fully distinguishing between Utah Lake suckers requires investigation of their ecologies. We need to understand dietary differences and correlate them to mouth morphology; determine movement patterns, including lake habitat requirements and spawning movements; and determine differences in growth rates and development patterns. To meet these objectives, our approach includes a field component involving radio and acoustic telemetry of Utah sucker and June sucker in combination with targeted trapnetting of suckers and sampling a variety of environmental factors (limnological and habitat variables) in Utah Lake. We are using a stable isotope analysis of Utah Lake suckers (and June and Utah sucker morphotypes in Red Butte Reservoir) and potential food items to determine feeding preferences. We are also conducting a laboratory experiment comparing feeding behavior and growth of larval and juvenile June sucker and Utah sucker. Results of this study will further differentiate between June sucker and Utah sucker and perhaps provide managers with information relevant to the persistence of two distinct suckers in Utah Lake.

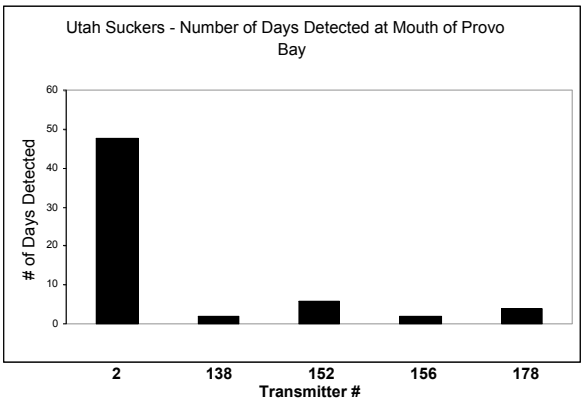
Project Status:

All of the described components of this study are currently ongoing**.** Samples and data previously collected are being analyzed. Telemetry investigations will resume in Spring 2004, when the acoustic receiver buoys are placed at the mouth of the Provo River. Collection of limnological and stable isotope samples continues. The laboratory experiment will run until April 2004, (and perhaps beyond). The anticipated date of completion and the due date are Spring 2004.

Accomplishments:

Delays in obtaining transmitters prevented us from implanting the proposed numbers of suckers; we plan to implant more transmitters in the early spring prior to the spawning run (staging fish at the mouth of the Provo River will be captured via trapnets). Combination radio/acoustic transmitters (CARTs) were surgically implanted into a total of seven Utah suckers and 12 June suckers in the spring of 2003; four transmitters, two from June suckers and two from Utah suckers, have since been recovered (mortality or expelled transmitter). Despite the limited number of implanted fish, preliminary analysis of telemetry data documents post-surgery downstream migration and later detection of both June and Utah suckers via acoustic receiver buoys at the mouth of Provo Bay. Nearly all of the implanted June suckers and all of the implanted Utah suckers were detected at the mouth of the bay on at least one day in the summer of 2003. However, four June suckers were detected on more than 20 different days at the mouth of Provo Bay whereas only one Utah sucker was detected as often at that location.





Limnological samples have been collected along a transect extending from within Provo Bay to about two km outside its mouth; the analysis is ongoing. Collection of samples continues and will be intensified once more fish have been implanted with CARTs. Also, we will add several more sampling sites when the acoustic receiver buoys are moved to the mouth of the Provo River in Spring 2004. Trapnetting will be employed to capture suckers for transmitter implantation prior to next spring's spawning run; also, once more tagged fish are in the lake, trapnetting (and habitat sampling) will be intensified.

Stable isotope samples from representative June sucker and Utah sucker morphotypes (photographs obtained also) have been collected from Red Butte fish (during disease certification) and await analysis for determining diet preferences. Additional samples (muscle plugs) will be collected from Red Butte morphotypes and from Utah suckers and June suckers in Utah Lake, as will samples of potential food items (zooplankton, seston, aquatic macrophytes, and

benthic and littoral invertebrates). Sampling (via targeted trapnetting) will be intensified when additional tagged suckers are present in Utah Lake.

A laboratory experiment employing two treatments, diet and species composition, and utilizing two replicates of the design below was recently initiated.

Diet – Zooplankton June sucker	Diet – Benthic larvae June sucker	Diet – Zooplankton and Benthic larvae June sucker
Diet – Zooplankton Utah sucker	Diet – Benthic larvae Utah sucker	Diet – Zooplankton and Benthic larvae Utah sucker
Diet – Zooplankton June and Utah sucker	Diet – Benthic larvae June and Utah sucker	Diet – Zooplankton and Benthic larvae June and Utah sucker

Growth and diet preference (using stable isotope analysis where necessary) of larval/juvenile Utah Lake suckers will be compared among the treatment groups via ANOVA. The experiment will run until April 2004 (and beyond).

Budget Status:

Funds Provided: $56,743
Funds Expended: $56,743 (Total anticipated expenditures by the end of the fiscal year)
Remaining Balance: $0

Project Number: V.03.11 **Movement Patterns and Habitat Preferences of the Endangered June Sucker in Utah Lake**

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Project Summary:

Study 1: Development and implementation of a research plan designed to evaluate the movement patterns and identify preference areas for the June sucker in Utah Lake.

To investigate June sucker movements in Utah Lake we are using radio and acoustic telemetry. We will tag approximately 18 Wild and naturalized adult June suckers captured during the spawning run with combined acoustic and radio tags (CART). The capture and tagging of all fish will be done in coordination with the Utah Department of Wildlife Resources. The advantage of using CARTs is that they allow all fish to be detectable by the acoustic hydrophone system in the mouth of Provo Bay. CARTs are digitally encoded and programmed to transmit intermittently from March 15, 2003 through March 15, 2005. The transmitters have a life expectancy of 661-1000 transmittable days, and their dimensions are approximately 16 mm x 60 - 68 mm with a weight of 25.3g in air. For tracking tagged fish, we used the SRX_400 receiver system and a four-element Yagi antenna produced by Lotek Wireless Corporation. The SRX_400 is capable of tracking and data logging digitally encoded transmitters.

Surgical techniques were similar to the modification of Ross and Kleiner's shielded-needle technique (1982) described in Isaak and Bjornn (1996). In addition, fish were given an injection of oxytetracycline at a dosage of 50 mg/kg body weight. The incision was closed with two to three individual sutures. Fish were held from one to three hours post-surgery to visually monitor their condition. In 2003, we were able to maintain that tags were less than two percent of the total weight of the fish.

Tracking efforts were largely directed and concentrated on areas of the lake where fish were most abundant. The lake was divided into five sections and a combination of systematic and random tracking protocols were used. Also,

individual tracking was conducted on individual fish to observe more specific short-term movement patterns.

Due to the increased ability of the WHS_1100 wireless hydrophones to monitor presents/absence of tagged fish under various conditions, we propose incorporating two additional WHS_1100s into the lake wide tracking effort. These hydrophones could be positioned in the lake relaying capture information back to a shore based SRX 400 receiver. Hydrophones could be deployed randomly to search areas that need increased effort, or systematically to create a search pattern aiding in finding particular individuals. This system could be deployed in areas that are suspected to hold fish or in deeper areas of the lake that are difficult to survey with radio telemetry. In addition, these hydrophones will allow deployment in the mouth of the Provo River during the spawning run, while allowing us to continue monitoring the mouth of Provo Bay simultaneously.

Boat tracking surveys were conducted during all hours to detect potential diurnal behavioral patterns that may exist (e.g. distribution, distance to shore, rate of movement, and feeding). Collecting behavioral information around the clock may detect information about movement patterns or habitat use that would otherwise be missed with daytime only studies.

Study 2: Evaluate the movement and migratory patterns of nonnative fish species (primarily common carp, white bass, and walleye) with an emphasis on movement between Provo Bay and Utah Lake.

To track the timing and extent of nonnative fish movement in Provo Bay we used a remote acoustic receiver (SRX_400 receiver system), in combination with two remote hydrophones (WHS_1000 series). Due to the late start of this project and the early drawdown of the lake, only four common carp were implanted with coded acoustic transmitters in 2003. By July 15, water levels in Provo Bay were no longer high enough to support adult fish, and by August 8, the bay was less than three inches deep. These four fish were implanted to test the efficiency of the hydrophone system. When water levels rise during the spring of 2004, the remaining 36 tags will be deployed. Preliminary tests of this system showed that we can monitor the movement and directionality of individual fish in the mouth of Provo Bay. In addition, this system has monitored the movement of tagged June and Utah suckers in the vicinity of the bay. This system can be moved to the mouth of the Provo River during the spring of 2004 to aid in determining spawn timing for June suckers if a second system is not available.

We used trap nets to capture and tag nonnative fish within the inlet to Provo Bay. In the spring of 2004 we will batch mark target species within Provo Bay in order to better understand migrational timing. This method will provide data on the mass-movement of fish into and out of Provo Bay. In conjunction with the trap netting, we will continue a mark recapture study to determine population abundances in Provo Bay. We set 6 trap nets with 100 ft. leads and 50 ft. wings

in three pairs with one net in each pair facing into the bay and the other facing out of the bay on a weekly basis. One pair will be placed on each side of the inlet to the bay, and one pair in the channel. Nets will continue to be set one half hour before dark and pulled one hour after sun up. Setting nets overnight has two advantages: to reduce conflict with recreational boaters and to reduce gear avoidance by the targeted species.

Using continuous acoustic tracking and netting methodology, we will able to: 1) document seasonal movements of nonnative fish; 2) determine environmental cues associated with seasonal movements, 3) get population estimates. Between netting and the acoustic system in the mouth of Provo Bay we will be able to determine the extent at which June suckers utilize the Provo Bay. All suckers captured during netting surveys will be measured and scanned for pit tags. All suckers tagged with CART tags will be detected by the remote acoustic receivers positioned in the mouth of Provo Bay. Data from this system will greatly reinforce data collected from net surveys.

Project Status:

Studies 1, 2, will continue for an additional field season. Results from these studies will be presented in May of 2005.

Accomplishments:

Study 1: Development and implementation of a research plan designed to evaluate the movement patterns and identify preference areas for the June sucker in Utah Lake.

In the spring of 2003 we tagged 12 June suckers captured by DWR during the spawn. Two known mortalities occurred one being in the Provo River and the second being in Utah Lake. One tag was recovered and will be reused in the spring in of 2004. The number of fish tagged in 2003 was limited due to the late arrival of funding and the length of time to produce tags. By the time tags were received the majority of the spawning June suckers had returned to the lake.

During the spring, summer and fall of 2003 we used radio telemetry to track the movements of June suckers from the release point in the Provo River, into Utah Lake. Some success was realized while using boat based tracking methods, allowing the collection of weekly, daily and hourly movement data on some individuals. The use of aircraft to locate fish in the lake proved to be difficult and only provided the locations of two individuals on one occasion. The poor efficiency associated with aerial surveys many be lessened by the addition of tagged fish in the spring of 2004. More fish in the lake may increase the chance of detection.

Detection of June and Utah suckers by the remote hydrophones in the mouth of Provo Bay proved promising and provided information on fish movement through the area. Many of the June suckers tagged in the Provo River were detected by the hydrophones in the mouth of the bay. It is believed that placing a second pair of hydrophones in the main body of the lake would offer long-term presence absence data that cannot be collected by other methods.

Study 2: Evaluate the movement and migratory patterns of nonnative fish species (primarily common carp, white bass, and walleye) with an emphasis on movement between Provo Bay and Utah Lake.

The use of acoustic telemetry to track the movement of non-native fish into and out of Provo Bay looks to be promising, provided Provo Bay has water in it this spring. Due to the extremely low water conditions present by the mid summer of 2003 we implanted only four carp caught in the innermost reaches of the inlet to the bay to test if they would be detected by the hydrophone array. Detections of these four fish were made by both hydrophones over a several week period. The detected exhibited behavior that suggested they were at least temporary residents to the mouth of the bay and not moving in or out. It was decided that due to the low water conditions in the bay, tagging the remaining fish would not meet the intended goals of the experiment. In the spring of 2004 we will tag fish within the bay and monitor their movements, we will select fish randomly from within the bay to reduce the chance of obtaining family groups or residents to the bay.

In additions to the hydrophone system we set nets weekly throughout the summer and into the fall. Due to extremely low water conditions our netting was cut short by reduced net efficiency. Results of trap netting in the mouth of the bay show the inlet of the bay to be important to walleye, carp and white bass. Due to the low water conditions in the bay during the summer of 2003 it is not our opinion that these fish were entering the bay or leaving the bay. It is hypothesized that the bay inlet is important to these fish in some manner though it is not understood how. More fish were caught in outbound nets when compared to inward movement.

Additional Findings:
1. Walleyes populations in the area of Provo Bay may be larger than initially thought.
2. June suckers utilize the inlet of Provo Bay during the summer and fall, even under low water conditions.
3. Channel catfish were not susceptible to capture in trap nets, however they were susceptible to trammel nets set at the same time.

Budget Status:

Funds Provided: $97,214
Funds Expended: $97,214 (by end of fiscal year invoices)
Remaining Balance: $0

Project Number: V.03.12 **Database Review – Technical Committee Demonstration and Workshop**

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Project Summary:

This project is designed to update and maintain all relevant fisheries, limnological and ecological data of interest to the JSRIP.

Project Status:

We have completed the first round of data acquisition, entry and database development. To date, all data pertaining to June Suckers, nonnative fish and other related fisheries information have been entered and programmed. This phase is completed. There will be a continual need to update the database.

Accomplishments:

A completed manual and disc have been prepared for the Recovery Team. This should suffice for this year's products and effort.

The next phase of this project is to collate remaining water quality, limnology and ecology data. We will also put the existing program on a university web site for participants to access.

Budget Status:

Funds Provided: $6,325
Funds Expended: $6,325
Remaining Balance: $0

Project Number: V.03.13 **Monitor June Sucker Refuge Populations and Use as Source for Transfers**

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Project Summary:

The objective of this project was to monitor the June sucker in Red Butte and Camp Creek Reservoirs, and Arrowhead Pond through the use of trapnets, trammel nets, and gill nets.

Project Status:

This project consists of ongoing-revised monitoring of the June sucker population in Red Butte Reservoir, Camp Creek Reservoir, and Arrowhead Pond.

Accomplishments:

Red Butte Reservoir - The population of June sucker (*Chasmistes liorus*) was estimated to be 16,649 (95 percent CI: 10,975 < N < 28,277) in 2002. Based on these estimates, we proposed to capture and transport up to 4,000 June sucker to Utah Lake during 2003. However, due to elevated water levels in the reservoir we were unable to perform this task. The area in which we had anticipated pulling the nets was under approximately two meters of water and surrounded by inundated willows making it impossible to cull fish.

Nevertheless, we anticipate that through cooperation with the CUWCD, USFWS and others the water levels can be manipulated to facilitate accomplishment of this project. We anticipate completing this by July 1, 2004.

Camp Creek Reservoir - The one-trammel net and two-gill net sets resulted in the capture of 124 June sucker. Multiple age classes were captured including age classes, which were likely 10+ years old. Gill net #1 caught 27 June sucker (13.0/net hour), gill net #2 caught 43 June sucker (21.5/net hour), and the trammel net caught 54 June sucker (15.4/net hour) of the larger size groups. Three wild June sucker were recaptures; no hatchery fish were recaptured during 2003. All recaptured fish were adults >300 mm. One individual was initially tagged in 1999 and recaptured in 2000 and 2003; this fish had not grown during the past four years. One individual was initially tagged in 2000 and had grown four mm during the past three years. The third individual was initially tagged in August of 2001 and had grown six mm in two years. All three recaptures were not encountered during the 2001 transfer efforts to Utah Lake. All untagged June sucker ∃150 mm TL were PIT tagged and released; a total of 107 June sucker were PIT tagged.

The number of June sucker sampled in 2003 at Camp Creek Reservoir (n=124) was similar to the catch observed during monitoring efforts and the catch rebounded quickly following the 2001 transfer effort to Utah Lake (Figure 1). With the number of June sucker present in Camp Creek Reservoir and many of the fish exhibiting poor condition, another transfer of June sucker to Utah Lake during 2004 should be completed.

Arrowhead Pond - Monitoring of Arrowhead Pond produced only two wild June sucker; no hatchery fish were recaptured during 2003. One June sucker was a recapture from March of 2002; this sucker had grown from 372 mm to 388 mm in a year and a half. The current drought has reduced this population due to low water levels resulting in water quality problems within the pond. Twenty-two dead June sucker were observed and pulled from Arrowhead Pond during the spring of 2002 indicating a partial winterkill during the winter of 2001/2002. In spite of the water quality problems in Arrowhead Pond, a small population of primarily wild June sucker appears to persist.

Budget Status:

Funds Provided: $12,233
Funds Expended: $4,548
Remaining Balance: $7,685

Project Number: V.02.10 **Development of a Life/Stage Model for June Sucker**

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Project Summary:

All organisms progress through definable life stages as they develop from birth to adulthood. Life stages can be determined by age, size, or development (e.g., sexual maturity). Because characteristics of organisms differ depending on their current stage, their vital rates, such as probability of mortality, fecundity, future reproductive value, etc., will also differ (Caswell, 2001). Understanding how each stage contributes to growth of a population is critical for successful management or recovery of a population.

An important part of recovering the June sucker will be to understanding how factors that may limit recruitment affect sucker population dynamics. In particular, understanding which life-stages are most vulnerable to mortality and which contribute most to population growth, will be critical to determine appropriate and effective recovery efforts (e.g., Belk et al, 2001). June sucker are long-lived organisms that annually produce large numbers of young (Belk 1998). Suckers exhibit distinct life stages based on size and development. However, how each of these stages contributes to growth of the population is not known. As such, it is difficult to judge which recovery efforts might be most effective for June sucker. We propose to develop a stage-based matrix population model for June sucker, and to test the importance of each stage to population growth using sensitivity analysis.

Project Status:

This project is nearly complete. We have built the matrix model and the corresponding sensitivity matrix. We are currently finishing some simulations of various stocking strategies. We anticipate submission of the final report by March 30, 2004.

Accomplishments:

It is clear from the sensitivity matrix that enhancement of survival for small June sucker is the most effective way to increase the population growth rate. However, the sensitivity analysis pertains to a population in stable age distribution and clearly this population is not. Simulations of various stocking strategies suggests that stocking large numbers of large (old) individuals will lead to more rapid population increases than stocking smaller individuals. However, economic and developmental concerns about keeping individuals in captivity for long periods of time suggests that the best strategy might be to concentrate on stocking large numbers of relatively small individuals and to concurrently work to change habitat such that survival of small June sucker would improve.

Budget Status:

Funds Provided: $11,300
Funds Expended: $13,500
Remaining Balance: ($2,200)

VI. INFORMATION AND EDUCATION

Project Number: VI.03.01 **Implementation Public Outreach and Media Relations Plan**

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Project Summary:

The purpose of this project was to conduct communications research (stakeholder working group meetings, one-on-one stakeholder meetings and a statewide public opinion survey), prepare a communications research report and based on those findings develop a strategic communications outreach plan for the JSRIP. Our goal was to develop an effective and strategic communications plan that would promote stakeholder awareness and understanding of the JSRIP, and ultimately have the recovery efforts supported and accepted. Our objectives were to be able to have a clear overall picture of the project, key stakeholders and the “climate” in which the project would operate, understand perceptions and attitudes, and to use the research to provide a benchmark for measuring future performance.

Project Status:

The research was conducted during the summer of 2002 and a research report was summarizing and analyzing the findings was prepared in December 2002. Based upon the research report a strategic communications plan was prepared and approved by the JSRIP on June 2003.

Accomplishments:

The project was executed in six phases: 1) fact-finding; 2) one-on-one interviews; 3) stakeholder working group meetings; 4) public opinion survey; 5) research analysis and report; 6) strategic communications plan development.

Fact-Finding: Vanguard Media Group (VMG) analyzed newspaper articles, reviewed information on the Internet, obtained work plan studies and contacted other recovery programs.

One-On-One Interviews: VMG conducted 28 one-on-one interviews with stakeholders. Each interview lasted approximately one hour and consisted of 16 base questions similar to the public opinion survey. The questions asked were both open- and closed-ended so that we could obtain both qualitative and quantitative information. The interviews were conducted in person and by phone. These stakeholders were categorized into four groups: recreation users, residents, environmental groups, business owners and land developers, water officials and decision-makers.

Stakeholder Working Groups: VMG conducted six stakeholder working group meetings in public libraries to obtain qualitative information about perceptions regarding the June sucker, the Recovery Program and Utah Lake. A group meeting lasted approximately two hours and included an over of the project and a facilitated discussion. In all 38 people attended the stakeholder working groups.

Public Opinion Survey: A random sample survey was conducted to gather qualitative, statistically valid data that would be representative of the state. A total of 500 adults were interviewed giving us a ± 4.5 percent margin of error. The sample was drawn to accurately reflect the population distribution of Utah's counties. Both structured and unstructured questions were used to measure the intensity of opinions and assess perceptions of respondents. Demographic questions were asked to provide opinions and subgroups. The survey had 58 questions and lasted approximately 12 minutes.

Research Analysis & Report: Research findings from four mechanisms were then analyzed to identify key findings and their implications. A formal research report was drafted and presented to the JSRIP.

Strategic Communications Plan: Based on the research findings, VMG created the strategic Communications Plan. The research findings helped formulate the situation analysis, identify the core elements of the plan, and define the strategies and tactics.

The research process proved to invaluable for the JSRIP, the communications planning process and driving work plan elements. Particularly of interest was the amount of support there was for the Endangered Species Act (ESA); how undervalued Utah Lake was and people's perceptions about it; and how much knowledge and attitudes regarding the June sucker differed from among stakeholders and the general public. Key findings included:

1. How Utah Lake is utilized.
2. How Utah Lake is perceived.

3. What people know and think about the June sucker.
4. How people feel about the Recovery Program.
5. Who is likely to oppose the Recovery Program.

Upon completion of the research, the strategic communications plan was developed and is currently being implemented. The plan and the employed activities have successfully increased awareness about the JSRIP, shifted attitudes of stakeholders to support the Recovery Program, and has caused other stakeholders to at least understand where there is common ground for support. When plan strategies were implemented, media coverage began to teeter to include stories that were more positive and illustrated the efforts and the benefits of the JSRIP. Currently, not only now are stories positive in nature, and relationships with key stakeholders improving, key media representatives use JSRIP staff as experts on issues facing Utah Lake and its ecosystem. The plan has assisted us in creating an effective media relations campaign to help mold perceptions of key stakeholders. The results that have come from implementing the strategies outlined in the plan have been so successful that other endangered species programs are beginning to look at JSRIP as a model. The JSRIP research report and planning document was also recognized by the Public Relations Society of America for being outstanding work in the field of communications.

Budget Status:

Funds Provided: $75,000
Funds Expended: $75,000
Remaining Balance: $0

Project Number: VI.03.02 **Operation and Maintenance of JSRIP Web Page**

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Project Summary:

Construct and operate a web page that will inform a variety of interested parties about the June Sucker, Utah Lake Ecosystem and the JSRIP. The Web Page will run off the USFWS Utah Field Office Web site.

Project Status:

The Project was supposed to be designed and up and running by June of 2003. Difficulties in getting approvals for building a web site through the Federal Government and its associated guidelines led the USFWS to conclude that perhaps working through Vanguard Media was the best way to get the project designed and annually operated.

Accomplishments:

Development of the Web Site was postponed until 2004 when Vanguard Media would be able to assist with development and be able to find a sponsoring site for the web page.

Budget Summary:

Funds Provided: $8,000 (USFWS was contributing the funds in-kind)
Funds Expended: No funds were expended for this effort.

Project Number: VI.03.03 **Distribution of JSRIP Book – Historic Accounts of Utah Lake With Emphasis on Native Fish Community (Extension of Project VI.02.03)**

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Project Summary:

Develop Utah's first history book on Utah Lake entitled *Utah Lake: Legacy* to highlight the rich history of Utah Lake and the important role it, the native fish community (specifically the June sucker) and the entire ecosystem have played historically and today. The book also talked about the JSRIP's mission and vision, and stressed the importance of stewardship. The book's target audiences were JSRIP stakeholders: decision-makers; landowners and developers; special interest groups; and recreational users. The purpose of the project was to ultimately promote awareness and understanding of the JSRIP; initiate proactive communications with stakeholders; and to establish and maintain a relationship with stakeholders.

Project Status:

In July of 2002 Vanguard Media Group (VMG) began working with local historian Robert Carter to collect historical information about Utah Lake and specifically its fish community, collect images, and to draft the copy. The book was printed in September 2003.

Accomplishments:

Robert Carter took his 85,000 hours that he has spent collecting information from journals, libraries, historical societies, newspapers, interviews and from other pertinent scholars to help us develop a comprehensive history of Utah Lake and it fish community. Robert Carter also donated hundreds of historical images he had collected from various sources to go towards the project. In addition, VMG conducted more than 25 interviews with local seniors to obtain personal accounts and additional photographs. Working with Chris Keleher from the JSRIP and Robert Carter, VMG created an overall theme for the book, collected additional

images, developed the copy for the Utah Lake: Legacy book, designed the 168 pages, and had 2,000 copies of the book printed.

The book has served as a primary tool for communicating information about Utah Lake, the Utah Lake Drainage Basin's ecosystem, the June sucker and the JSRIP. It was instrumental in securing positive media coverage about the program, which turned overall media coverage around. The media was quick to respond to the book and the stories about Utah Lake and the JSRIP became more positive in nature and included our key messaging. The book has had rave reviews by all stakeholder groups who have received copies of it. In fact many stakeholders have called the JSRIP for additional copies. And some stakeholders from the water community were so impressed that they are pursuing similar projects about their organizations. Stakeholder groups are also scheduling Robert Carter and members of the JSRIP to make presentations to their organizations based on information contained in the book, such as the Utah Historical Society, Daughters of Utah's Pioneers, Utah Lake Study Committee and the Utah Water Users Association. VMG is now in the process of creating a documentary based on Utah Lake: Legacy that will air on public television and will be used as a study guide by area schools. The Utah Lake: Legacy book was also recognized by the Public Relations Society of America as being an outstanding example of work in the public relations field.

Budget Status:

The budget for the book on Utah Lake was included in the $75,000 for Project VI.03.01, Implementation of the Communication Plan, no additional funds were expended.

VII. PROGRAM MANAGEMENT

Project Number: VII.03.01 Program Director's Office Management

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Project Summary:

The Program Director's Office (PDO) provides management and oversight for the JSRIP. The Program Director, Utah Department of Natural Resources and the Local Coordinator (CUWCD) share responsibility for Program planning, accomplishment, budgeting, and reporting.

Accomplishments:

The following narratives summarize, by recovery element, accomplishments in the CY 2003 JSRIP:

Non-native and Sportfish Management Actions completed in 2003 include the development of a draft concept plan, which discusses alternatives for controlling non-natives, primarily carp, establishing a spawning and nursery refuge area in Provo Bay, and developing nursery areas and/or predator free environments at the mouths of the Provo River and Hobble Creek. Initiating any pilot project would require more detailed design, NEPA compliance and public outreach. Several aspects of continued planning and research to support the concept plan are underway including investigation of movement patterns of June sucker in Utah Lake (V.04.10), monitoring and movement of non-native fishes in Utah Lake

(V.04.10) and investigation of ecological differences of Utah Lake suckers (V.04.09). These studies should be completed in 2004. Additionally, research into assessing carp numbers, controlling carp in the Provo River and surrounding Utah lake wetlands was initiated in 2003 and will continue in 2004 (I.04.03).

Habitat Development and Maintenance This Recovery effort continues to focus on providing spawning and grow out habitats in the Lower Provo, Hobble Creek and Powell Slough. Funds have been made available for the acquisition or purchase of easements at selected properties, and willing sellers identified (II.04.01). The PDO has coordinated these purchases with local city and county officials to insure compatible environmental uses and planning with local community needs. NEPA compliance and public outreach would be completed before specific plans are implemented.

Although the DEQ did not begin stakeholder meetings until 2004, the PDO coordinated its needs with DEQ (DWQ) personnel as required in II.03.06. Although delayed for several months DWQ now has hired a consultant (SWCA) to assist them in public outreach and in developing a plan to determine important Total Maximum Daily Load (TMDL) issues and how to correct the 'impaired waterway" designation now carried by Utah Lake. The PDO will continue to participate in the TMDL process as it, in concert with JSRIP activities, should lead to a cleaner and more ecologically receptive lake habitat that will allow for a more balanced fish community that includes June sucker in the future.

Water Management and Protection to Benefit June Suckers Water Management and Protection is an on-going Program effort with committees and agencies analyzing and recommending annual flow requirements in the Provo River, providing funding and operational control to acquire and release specified flows throughout the year, and continuing cooperation among parties to identify and acquire long term water storage or identify other acquisition opportunities. The committees and staff also monitor gages (III.03.07) and participate in the ULS planning system (III.03.06) in order to insure continuing environmental benefits from on-going water development projects.

The PDO followed the development and issuance of a draft Environmental Impact Statement for the ULS through 2003 and into 2004. Comments on the EIS were submitted to CUWCD and a final EIS should be issued in the latter part of 2004. O&M costs associated with Provo River gage has been assumed by the CUWCD.

Genetic Integrity and Augmentation A *Genetics Management Plan* has been prepared (IV.03.02) and is being used to insure quality of wild and hatchery-reared stocks. Refugia continue to produce stocks suitable for reintroduction into

Utah Lake. Hatchery space is being constructed and an interim hatchery planned for future improvement of genetic stocks, fish condition and numbers of fish.

Research, Monitoring and Data Management This element provides the basic understanding of the life requirements of June sucker, helps biologists understand the fishes' life history and needs, and monitors our progress toward recovering the species (V.03.03). In 2003 we learned more about the fishes' genetics and relationship with other similar species, how to grow and reproduce the fish in hatcheries, and gained a better understanding of June sucker behavior in the lake and refuge systems. We are getting larger numbers of June suckers into the lake, they are surviving and in many cases returning to spawn with wild fish (V.03.13). Projects in 2004 will continue to build upon these efforts to increase our understanding of this unique species.

Information and Education (I&E) Primary efforts in the I&E element include continuing outreach to the public and media with an increased emphasis on informing the public of what we are doing and what we are trying to accomplish (VI.03.01). Utah Lake: Legacy was produced and distributed to legislators, city officials, schools and other interested publics (VI.03.03). The book chronicles the lake's history, the wonderful resources that were once there and talks about how we need to try and get the biological and recreational resources back. With the understanding of the public that the goal is not just to protect fish and wildlife resources, but to protect the lake ecosystem, including existing and future water uses, the public has been very receptive of the efforts of the program.

Project Status:

Program Management is the responsibility of the PDO. The program has focused on achieving both program goals including continuing water development and use while increasing the likelihood of June sucker recovery. Progress is being made on both fronts and program participants are continuing their support of efforts into 2004.

Budget Status:

Funds Provided: $160,000.00
Funds Expended: $160,000.00
Remaining Balance: $0

Project Number: VII.03.02 **Participation in Program Committee Meetings**

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Project Summary:

This recovery element acknowledges "in-kind" contributions from agencies participating in the JSRIP. Costs for attendance at all AC and TC meetings, work assignments related to the JSRIP and all other costs associated with agency's involvement in organizing and implementation program goals and objectives.

Project Status:

This project is an ongoing effort.

Budget Status:

Funds Provided: Inkind
Funds Expended: Inkind
Remaining Balance: Inkind