JUNE SUCKER RECOVERY IMPLEMENTATION PROGRAM

PROGRAM ACCOMPLISHMENTS CALENDAR 2002

July 23, 2003

Program Director's Office

June Sucker Recovery Implementation Program
Program Accomplishments

July 23, 2003

The following work plan summary includes all the scopes of work for recovery elements funded by the June Sucker Recovery Implementation Program (JSRIP) in operational year (OY) 2001. Although some nine million dollars was shown to be available for June sucker recovery efforts much of that funding was to fulfill multiple purposes such as *Red Butte Dam Repair* ($6,000,000) and *Acquiring Flows in the Lower Provo* ($1,400,000). Those projects are ongoing through the next calendar year.

Likewise many research projects began in 2001 were extended into 2002, because of a late Program start and the need to review and finalize project reports. Nonetheless, much of the annual monitoring effort, feasibility of controlling nonnative fish in Utah Lake, and habitat development opportunities were completed in 2001 and established a foundation for pilot projects to be planned in 2002 and implemented in 2003.

Hatchery expansion was largely completed in 2001 and June sucker of several age classes are now held at the Fisheries Experiment Station (FES) in Logan. June sucker were also captured from Red Butte Reservoir and Camp Creek Reservoir and stocked into Utah Lake. All June sucker transfers in 2001 were reviewed and approved by the Fish Health Board as required.

Program participants provided countless hours of in-kind support through meeting attendance, participation in Recovery Team efforts and workshops, as well as participating on the Flow Workgroup which monitors flows in the Provo River during the pre- post- and runoff period and makes recommendations to operators to protect and enhance native fish spawning and movement.

Budget Summary for June Sucker Recovery Implementation Program for Operational Year 2002

(July 23, 2003)

Project Number	Project Title (Task)	OY 2002 Total	JSRIP Account	Direct Transfer*	In-Kind Services	Comments
I. Nonnative and Sportfish Management						
I.02.01a	Nonnative Fish Control Pilot Study Preparation					Cost Covered (PDO)
I.02.01b	Nonnative Fish Control Pilot Study	100,000.00				Placeholder
II. Habitat Development and Maintenance						
II.02.01a	Habitat Enhancement Alternatives Provo River Flood Plain Pilot Study Preparation					Cost Covered (PDO)
II.02.01b	Habitat Enhancement Alternatives Provo River Flood Plain Pilot Study	100,000.00				Placeholder
II.02.02	Utah Lake Water Quality Coordination with Utah DEQ, DWQ					Cost Covered (PDO)
III. Water Management and Protection to Benefit June Sucker						
III.02.01a	Preparation for Pilot Study to Establish an Additional Spawning Location					Cost Covered (PDO)
III.02.01b	Pilot Study to Establish an Additional Spawning Location	100,000.00				Placeholder
III.02.02	Refine Flow Requirements to Maintain and Enhance June Sucker Spawning...				Flow Work Group	Agency Funded
III.02.03	Acquire and Protect Flows in the Provo River					DOI Lead Funded Outside JSRIP

Project Number	Project Title (Task)	OY 2002 Total	JSRIP Account	Direct Transfer*	In-Kind Services	Comments
IV. Genetic Integrity and Augmentation						
IV.02.01	Brood Stock Development through Collection of June Sucker Eggs and Larvae from the Provo River	54,300.00		54,300.00 (URMCC)		
IV.02.02	Genetic Management Plan for June Sucker in Captivity	21,172.76		13,559.72 (DNR)	7,613.04 (UDWR)	
IV.02.03	Secure Red Butte Reservoir as a Refuge Site					CUWCD Non-JS Funds
IV. 01.04	Investigation and Development of Mona Reservoir as a JS Refuge	40,250.00	40,250.00			
IV.02.05	Conduct NEPA Analysis for Warm Water Fish Hatchery				URMCC/DWR	275,000.00 Funded Outside JSRIP
IV.02.06	Fish Experiment Station Operation and Maintenance for June Sucker	63,717.00		63,717.00 (URMCC)		
IV.02.08	Interim Hatchery Development - Goshen Growout					50,000.00 (URMCC) Funded Outside JSRIP
IV.02.09	June Sucker Transfer from Refuge Sites to Utah Lake					SOW Developed if Needed
IV.02.10	June Sucker Transfer from Wahweap Hatchery to Utah Lake	48,900.00		24,900.00 (DNR) 24,000.00 (BOR)Tags	JSRIP Participants	

Project Number	Project Title (Task)	OY 2002 Total	JSRIP Account	Direct Transfer*	In-Kind Services	Comments
V. Research, Monitoring, and Data Management						
V.02.01	June Sucker Selenium Uptake Study Completion; Goshen Warm Springs, Utah County					Cost Covered in OY2001
V.02.02	June Sucker Recovery Team Recovery Definition					10,000.00 In-kind contribution covered by participants
V.02.03	Development of JS Standardized Monitoring Program and Electronic Database	27,500.00		27,500.00 (BOR)		
V.02.04a	Morphometric Assessment of June Sucker	35,650.00	35,650.00			
V.02.04b	Genetic Analysis of Spawning June Sucker	12,650.00		12,650.00 (DNR)		
V.02.05	June Sucker Feed Study	6,904.00		6,904.00 (URMCC)		
V.02.06	Monitoring Trends in Adult June and Utah Sucker Populations in Utah Lake and Tributaries in 2002	70,029.00		5,029.00 (DNR)		65,000.00 (USFWS) Section 6
V.02.07	Effects of Density and Location on Growth and Survival of Young June Sucker in Utah Lake	66,900.00		66,900.00 (DNR)		
V.02.08	Investigation of Feeding and Spawning Behavior of Adult June Sucker in Red Butte Reservoir	32,200.00	32,200.00			
V.02.09	Development of Macrophytes in Utah Lake: Macrophyte Additions and Carp Exclusions	40,250.00	40,250.00			

Project Number	Project Title (Task)	OY 2002 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	11,300.00		11,300.00 (DNR)		
V.02.11	Development of Selection Criteria and Assessment of Primary and Secondary Refuge Sites for June Sucker	13,275.00				
V.02.12	Use of Human Chorionic Gonadotropin (HCG) to Induce Increased Maturation of Gamates in June Suckers	2,140.00		2,140.00 (URMCC)		
V.02.13	Fisheries Experiment Station Technical Services for June Sucker Fish Health Program	11,680.35		11,630.35 (DNR)		
V.02.14	Monitor and Maintain June Sucker Refuge Populations in Red Butte and Camp Creek Reservoirs, and Arrowhead Point Reservoir	16,105.00		16,105.00 (DNR)		
VII. Information and Education						
VI.02.01	Developing a Media Relations and Public Outreach Program for the JSRIP	75,000.00	75,000.00			
VI.02.02	Development and O&M of JSRIP Web Page	3,430.00			$3,430.00 (USFWS)	
VI.02.03	Recording Historic Accounts of Utah Lake with Emphasis on the Native Fish Community	50,000.00	50,000.00			
VII. Program Management						
VII.02.01	Program Director's Office Management	$160,000.00		$160,000.00 (DNR/CUWCD)		
VII.02.02	Participation in Program Committee Meetings					
Totals		**$1,163,353.11**				

*** Funds transferred directly from participating agency to implementing entity.**

NONNATIVE AND SPORTFISH MANAGEMENT

Project Number: I.02.01a Nonnative Fish Control Pilot Study Preparation
Project Number: I.02.01b Nonnative Fish Control Pilot Study

Contact Person:

Chris Keleher
Program Director's Office
Central Utah Water Conservancy District
355 West University Parkway
Orem, Utah 84058
(801) 226-7147
Fax: (801) 437-3168
ckeleher@cuwcd.com

Project Summary:

Although initially planned as a component for 2002 Annual Work Plan, these projects were not implemented. The feasibility study to control nonnative fish in the Utah Lake was funded as part of the 2001 Annual Work Plan and finalizing the report of the feasibility study took longer than originally anticipated. The report was finalized in July of 2002 (SWCA, Environmental Consultants 2002). The remainder of the 2002 operational year provided time for the Technical Committee (TC) to digest the report and its recommendations. Based on the report findings, the TC decided not to implement a "pilot study" immediately, but to recommend additional research for the 2003 Annual Work Plan geared towards gaining a better understanding of habitat use and movement patterns of nonnative fish as well as native fish in Utah Lake. Based on similar nonnative control efforts that have been implemented in other areas, the TC was interested in investigating whether natural migratory patterns of nonnative fish in Utah Lake could be used as a means of control.

Project Status:

A multi-disciplinary subcommittee was formed and began working on developing specific concepts for potential implementation on Utah Lake. The results of research being conducted in OY 2003 will be important to fully develop the concepts into alternatives for National Environmental Policy Act (NEPA) compliance. A draft report outlining specific concepts will be distributed to the TC in August of 2003.

Accomplishments:

Based on information provided in the nonnative fish control feasibility study (SWCA, Environmental Consultants, 2002), the TC recommended that the following projects be conducted in OY 2003 to provide specific information to be used in developing a range of concepts for potential implementation on Utah Lake:

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

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

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

V.03.10. Investigation of Ecological Differences of Utah Lake Suckers

V.03.11. Investigation of Movement Patterns of Utah Lake Fish

(Highlight important findings of the project and summarize important results. If project report or findings result in recommendations for future work or direction of recovery efforts include a summary.)

Budget:

Funds Provided: $100,000 was identified as a placeholder in OY 2002 for implementing a pilot study to control nonnative fish.

Funds Expended: No direct expenses were incurred for activities conducted in OY 2002.

Remaining Balance: $100,000

HABITAT DEVELOPMENT AND MAINTENANCE

Project Number: II.02.01a **Habitat Enhancement Alternatives Provo River Flood Plain Pilot Study Preparation**

Project Number: II.02.01b **Habitat Enhancement Alternatives Provo River Flood Plain Pilot Study**

Contact Person:

Chris Keleher
Program Director's Office
Central Utah Water Conservancy District
355 West University Parkway
Orem, Utah 84058
(801) 226-7147
Fax: (801) 437-3168
ckeleher@cuwcd.com

Project Summary:

In OY 2001 the JSRIP funded a study to develop concepts for habitat enhancement on the lower Provo River. A report of the studies findings was finalized in June of 2002 that included recommendations for a pilot study (BIO-WEST, Inc. 2002). The findings of the report have been shared with local interests including Utah County, Provo City, Mountainland Association of Governments, local landowners and others. Issues have been raised during meetings with local interests, but none of them are considered to be irresolvable at this time.

Paralleling our efforts, Ducks Unlimited and others were awarded a grant under the North American Wetlands Conservation Act (NAWCA) for funds to acquire lands north of the mouth of the Provo River (Skipper Bay). Additional funds for land acquisition have been acquired through Section 6 of the Endangered Species Act (ESA). Ducks Unlimited and the JSRIP will collaborate on the effort to acquire lands and enhance habitat in the lower Provo River historic flood plain and Skipper Bay. In addition to lands targeted for acquisition by Ducks Unlimited and the JSRIP, Provo City entered into an easement with a local landowner on about 400 acres in the Skipper Bay area. It is uncertain to what extent the existing easement between Provo City and the landowner may limit habitat enhancement opportunities.

Project Status:

Implementing habitat enhancement activities, even a pilot study, on the lower Provo River will require landowner participation either through a willingness to sell their property or to provide easement that would allow for habitat enhancement. The Nature Conservancy has agreed to contact and negotiate with landowners in the lower Provo

River/Skipper Bay area and will be doing so during the summer of 2003. NEPA compliance for habitat enhancement could begin as soon as the fall of 2003. Final design for the habitat enhancement will depend on lands that can be acquired from willing sellers.

Accomplishments:

As a result of JSRIP efforts to develop concepts for enhancing habitat in the lower Provo River historic flood plain, the JSRIP has been able to partner with Ducks Unlimited in a collaborative effort. This effort provides the opportunity to combine funding and resources to achieve mutual goals for the lower Provo River/Skipper Bay area. A considerable amount of outreach to local interests has been accomplished which provided the opportunity to understand issues that may be associated with habitat enhancement. Local interests recommended pursuing one concept as preferred above the others (northern concept), and the same concept is preferred by the TC based on the needs of the June sucker.

The recommendation is to acquire lands necessary for habitat enhancement from willing sellers and initiate NEPA compliance and final design based on lands that can be acquired.

Budget:

Funds Provided: $100,000 was identified as a placeholder in OY 2002 for implementing a habitat enhancement pilot study on the lower Provo River.
Funds Expended: No direct expenses were incurred for activities conducted in OY 2002.
Remaining Balance: $100,000

Project Number: II.02.02 **Utah Lake Water Quality Coordination with Utah DEQ, DWQ**

Contact Person:

Chris Keleher
Program Director's Office
Central Utah Water Conservancy District
355 West University Parkway
Orem, Utah 84058
(801) 226-7147
Fax: (801) 437-3168
ckeleher@cuwcd.com

Project Summary:

The Utah Department of Environmental Quality (DEQ), Division of Water Quality (DWQ) has authority over water quality issues for the state. Utah Lake is water quality is impaired for Phosphorus and Total Dissolved Solids (TDS). The DWQ is required to draft a TMDL (Total Maximum Daily Load) for those constituents that are responsible for impairing water quality. Maintaining water quality of Utah Lake and its tributaries will continue to be an important factor as June sucker recovery progresses. Since the DWQ is not a formal participant to the JSRIP, the Program Director's Office (PDO) coordinates regularly with DWQ regarding Utah Lake water quality issues.

Project Status:

The DWQ has elevated developing a TMDL for Utah Lake to a high priority. In the summer of 2003 a request for proposals was advertised to initiate the first phase of the TMDL process. Since there is a large quantity of historic information and data from various sources on the water quality of Utah Lake, the first phase of the TMDL will be to gather and synthesize all existing information. Once all available information has been synthesized, another request for proposals will be advertised to analyze data, identify information gaps and prepare the TMDL. The PDO will continue to coordinate with DWQ as the TMDL progresses.

Accomplishments:

As of mid-June 2003, DWQ has contracted a consulting company for the first phase of the TMDL and the process has been initiated.

Budget:

Funds Provided: Funds provided through PDO management
Funds Expended: N/A
Remaining Balance: N/A

WATER MANAGEMENT AND PROTECTION TO BENEFIT JUNE SUCKER

Project Number: III.02.01a **Preparation for Pilot Study to Establish an Additional Spawning Location**

Project Number: III.02.01b **Pilot Study to Establish an Additional Spawning Location**

Contact Person:

Chris Keleher
Program Director's Office
Central Utah Water Conservancy District
355 West University Parkway
Orem, Utah 84058
(801) 226-7147
Fax: (801) 437-3168
ckeleher@cuwcd.com

Project Summary:

In OY 2001 the JSRIP contracted BIO-WEST, Inc. to conduct a feasibility analysis of establishing an additional spawning location in Utah Lake to benefit June sucker. The report was finalized in July 2002 (BIO-WEST, Inc. 2002) and provided a review of American Fork Creek, Hobble Creek, and the Spanish Fork River. In a cost-benefit comparison of tributaries evaluated, BIO-WEST found that Hobble Creek and American Fork Creek were the top candidates for establishment of an additional spawning location. Because Hobble Creek is larger in terms of channel width and potential spawning reach length; and its inflow area contains more high quality wetland vegetation for rearing habitat; and flow depths and velocities over potential spawning beds are closer to those observed in the Provo River; and opportunities for enhancing flows are considerably better, JSRIP participants agreed to fund additional research geared toward establishing an additional spawning run on Hobble Creek.

Project Status:

A request for proposals for developing and evaluating habitat enhancement concepts in Lower Hobble Creek and its interface with Utah Lake for the purpose of establishing June sucker spawning and nursery habitat was advertised by the JSRIP in September 2002. Based on the technical merit of their proposal and their qualifications and background, BIO-WEST, Inc. was awarded the contract to perform this study. Mild weather in the fall of 2002 allowed BIO-WEST to accomplish a considerable amount of the field work associated with the project, including surveying and mapping the steam and its interface with Utah Lake (Provo Bay), and initiating wetland inventories and delineation. A draft report is anticipated by late summer 2003.

Accomplishments:

Based on information gathered in the fall of 2002, BIO-WEST developed some preliminary concepts for habitat enhancement opportunities. Additional data will be gathered in the summer of 2003 to refine and further develop these concepts. Recommendations and results are pending additional data collection and analyses.

Budget:

Funds Provided: $106,356.38 ($100,000.00 identified for pilot study in OY 2002)
Funds Expended: $51,569.16 (as of March 31, 2003)
Remaining Balance: $54,787.22 (as of March 31, 2003)

Project Number: III.02.02 **Refine Flow Requirements to Maintain and Enhance June Sucker Spawning**

Contact Person:

W. Russ Findlay
Bureau of Reclamation
302 East 1860 South
Provo, Utah 84606-7317
(801) 379-1084
Fax: (801) 379-1159
rfindlay@uc.usbr.gov

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 Utah Lake system 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. It was cooperatively implemented by the Workgroup during the 1999, 2000, 2001, and 2002 runoff period. These efforts have been deemed a success by the Workgroup. The attached graph shows the 2002 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 2002 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 ramping up period beginning on May 6th to a peak flow of approximately 850 cubic feet per second (cfs) on May 11th. This was followed by a decline to a minimum flow near 75 cfs by May 17th. This hydrograph was followed to provide for a flushing flow and to accommodate a high flow study.

The 2002 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:

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

Project Number: III.02.03 Acquire and Protect Flows in the Provo River

Contact Person:

Ralph G. Swanson
CUPCA Office
Department of Interior
302 East 1860 South
Provo, Utah 84606-6154
(801) 379-1254
Fax: (801) 379-1209
rswanson@uc.usbr.gov

Project Summary:

The purpose of the project is to acquire or otherwise secure a sufficient volume of water (through water shares, water rights or other) to ensure an adequate flow regime in the Provo River (magnitude and timing) to assist recovery of the June sucker. (*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) adult fish 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 Utah Water Conservancy District's (CUWCD) 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 CUWCD, Utah Reclamation Mitigation Conservation Commission (URMCC), and Department of Interior (DOI) remain committed and active in pursuing water acquisitions from willing parties in the Provo River basin. The June Sucker Flow Workgroup is beginning a review of issues necessary to determine a sufficient 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 Program will be able to secure sufficient permanent water to achieve June sucker recovery under *Recovery Plan* Task 3.1.3.

Accomplishments:

A total of 17,139 AF of acquired water was available under the Program for June sucker in 2002. Of this**,** 9,672 AF was secured for 2002 (much of it in prior years. See below for acquisitions in 2002). A substantial portion of this water was released into the Provo River and managed to meet the flow regime developed by the June Sucker Flow Workgroup in accordance with the *Recovery Plan* goals. (See Annual Report for project III.02.02 for information on the 2002 flow regime).

The CUWCD continued pursuit of open market purchase of water, using funds provided through Section 302(a) of CUPCA in 2002. However, no additional acquisitions were completed this year. 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 OY 2002, two additional blocks of CUP water, totaling 1,500 AF, were secured for future use under the CUWCD's Water Conservation Credit program (CUPCA Section 207). Each block will be available for a period of five years, in an overlapping manner, resulting in six years of flow benefits.

Results of the water acquisition program to date, exclusive of open market water acquisitions funded through Section 302(a) of CUPCA, are depicted in Table 1. This table identifies the source of all water acquired for the Program (temporary and permanent). These data are displayed in Figure 1 and projected through 2010, with new 2002 acquisitions highlighted.

No water was acquired directly from federal water project sources during 2002.[1]

A substantial portion of the total water supply acquired to date for the June sucker is only available on a temporary basis. Figure 2 distinguishes between permanent and temporary water. The expiration of temporary acquisition arrangements will result in considerably less water available beyond 2004 than is presently available. This may substantially impair Program abilities to provide adequate flow conditions in the future, particularly in dry years. Efforts will continue to secure additional water for June sucker recovery. Based on past history, there is good reason to believe that water will continue to become available for use by the Program to improve the Provo River flow scenario in 2005 and beyond.

[1] It is important to note that water secured under authority of CUPCA Section 207 is relinquished by federal project petitioners and typically comes from a federal project water supply, usually the CUP.

Budget:

Funds Provided: No JSRIP funds were expended. (All funds were from Federal appropriations under Sections 207 and 302(a) of the CUPCA (P.L. 102-575.)

Funds Expended: $1,734,518 was expended in 2002 for the 9,672 AF of water available in 2002 for the June sucker. ("Banked" water was paid for in prior years.) These funds were expended as credits against the CUP repayment obligation of the CUWCD. These credits represent CUP project costs the district would otherwise have repaid the federal government. (A portion of this water was purchased outright—not in the form of credits--in prior years, those costs being stated in the year of purchase and not amortized for this report.)

An additional $51,092 was paid for operation and maintenance expenses of water delivery. These funds reimburse expenses incurred for the storage and delivery of water provided for June sucker recovery actions in 2002.

A grand total of $1,785,610 was expended to accomplish this project in 2002.

Remaining Balance: N/A

GENETIC INTEGRITY AND AUGMENTATION

Project Number: IV.02.01 **Brood Stock Development Through Collection of June Sucker Eggs and Larvae from the Provo River**

Contact Person:

Krissy Wilson, and Josh Rasmussen
Utah Division of Wildlife Resources
Central Region
1115 North Main Street
Springville, Utah 84663
(801) 491-5678
Fax: (801) 491-5646
krissywilson@utah.gov

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 15 and June 7, 2002. Suckers were observed and captured on the first night of spotlighting. A total of 270 suckers were captured: 116 June suckers (41 wild and 75 stocked from hatcheries, Red Butte or Camp Creek), 129 hybrid suckers (Utah x June), and 24 Utah suckers. A population estimate of adult wild June sucker that were captured in the river during spawning spawn was calculated using the modified running Schnabel Program (Version 3.0) and estimates the population size at 446 (95% CI: 322<N<729).

Streamside spawning produced eight family lots and one sib lot (June sucker female crossed with two June sucker males). Approximately 191,000 eggs were fertilized and transported to the FES for incubation.

Active light trapping was conducted from May 23 to June 14, 2002, and approximately 11,000 larval suckers were captured. A total of 7,856 larval suckers were transported to

the FES, where they will be used to supplement the brood stock. An additional 3,591 larval suckers were held in cages in Provo Bay.

Four thousand seven hundred and seventy-nine larval suckers were captured in light traps (passive) at the standardized monitoring sites. These suckers were all preserved in formalin for later identification.

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. We also recommend collection of larval suckers to augment fish produced by artificial spawning methods.

Budget:

Funds Provided: $54,300
Funds Expended: $54,300
Remaining Balance: 0

Project Number: IV.02.02 **Genetic Management Plan for June Sucker in Captivity**

Contact Person:

Matthew E. Andersen
Utah Division of Wildlife Resources
1594 West North Temple, Suite 2110
Salt Lake City, Utah 84114-6301
(801) 538-4756
Fax: (801) 538-4745
matthewandersen@utah.gov

Project Summary:

The goals of this project are to develop a document that describes the June sucker held in captivity, the existing and planned facilities to hold these fish, and future management of these captive stocks. The development of a *Genetics Management Plan for June Sucker in Captivity* (Plan) is called for in the *June Sucker Recovery Plan*. The *Recovery Plan* calls for a Plan to protect the genetic integrity of the captive stock. A related element in the *Recovery Plan*, also addressed in the subject Plan, is contributing to guidelines for the production and release of captive reared June sucker into Utah Lake.

At the time of formalization of the Program, June sucker were held in four locations outside of Utah Lake. These animals are an important element in recovery because of their potential to be brood stock, producing additional young fish that can be released into Utah Lake. Using the captive animals wisely, in a manner that maintains available

genetic diversity and maximizes the return of June sucker to Utah Lake, is the subject of the Plan.

The Plan incorporates available knowledge of June sucker genetic diversity and the hybridization of June sucker and Utah sucker, a sympatric native fish. Additional information regarding the genetic structuring of the population is being developed, and will be incorporated in future iterations as it becomes available. The Plan describes how, using existing and planned facilities, the existing stocking goals for June sucker will be met.

Project Status:

The second draft of the Plan was delivered to the Program in July 2002. Following review and comment by Program TC members, it was determined that another iteration is desired to improve clarity, simplify the discussion of hybridization, and to allow for the incorporation of newly available information. A scope of work (SOW) for a third draft to be completed in calendar year 2003 was submitted.

Accomplishments:

The second draft of the Plan has provided a more complete summary of the existing June sucker in captivity and the facilities where they are held than was available from the first draft. It summarizes historical information, genetic considerations, management goals, and management protocols. It describes the approach for meeting the current goal for releasing captive-raised June sucker into Utah Lake at a size that will help them avoid predation by nonnative fish, including the use of existing and planned facilities. The current Plan includes four appendices: one describes the morphologic characters used to identify June sucker captured in the wild; one describing the protocol for conducting streamside matings, and two that bring together all of the hatchery records regarding June sucker held at the UDWR FES. The appendices will be maintained in the third draft.

The next iteration of the Plan is expected to focus on those actions that are currently indicated by the available information regarding the genetic structuring of the population, with less mention of the potential for uncertainty in this area. Additional discussion of the water regime in the Provo River, and how that is determined and controlled, especially as it relates to the annual spawning run, will be included. The author has been developing figures to help illustrate the text, especially those sections that describe the movement of eggs, larvae, and more mature fish among available and planned facilities. The third iteration will direct investigation of the potential to rear young fish in protected areas to accelerate release of June sucker into Utah Lake.

Budget:

Funds Provided: $13,559.72
Funds Expended: $13,559.72
Remaining Balance: $0

Project Number: IV.02.03 Secure Red Butte Reservoir as a Refuge Site

Contact Person:

Chris Keleher
Program Director's Office
Central Utah Water Conservancy District
355 West University Parkway
Orem, Utah 84058
(801) 226-7147
Fax: (801) 437-3168
ckeleher@cuwcd.com

Project Summary:

In 1992, approximately 3200 June sucker were introduced into Red Butte Reservoir. Monitoring efforts in 1996 confirmed that spawning and recruitment had occurred in the reservoir. Subsequent monitoring efforts confirmed that in addition to the 1995-year class, at least three additional year classes have recruited in Red Butte Reservoir.

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 the the CUWCD was authorized.

In 2001, $400,000.00 was provided to the CUWCD, 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) was prepared and used as a basis for an EA.

NEPA compliance is required as the conveyance and repair of Red Butte Dam and Reservoir are federal actions. Once the NEPA documentation is completed, it along with *the Draft Preliminary Design and Cost Estimate for Rehabilitation of Red Butte Dam and Appurtenances* (September 2001) will be used by the CUWCD's Board of Trustees to further consider accepting title to the facility and completing the necessary rehabilitation.

If the CUWCD's Board of Trustees accepts title to the facility with the responsibility for completing the necessary rehabilitation, final design would be initiated followed by construction. If secured, the reservoir will be considered for formal designation as a refuge for June sucker. If the CUWCD's Board of Trustees decides not to accept title to Red Butte Dam and Reservoir, the facility will remain in federal ownership.

Project Status:

A final EA has been delayed because of the need to develop a mitigation plan and memorandum of understanding between the CUWCD and The U.S. Army Corps of Engineers (COE) for cultural resources that occur on the land that is proposed for transfer. It is anticipated that the final EA) will be released in late summer 2003 and that the CUWCD Board of Trustees will make a decision on whether or not to accept title to Red Butte Dam and Reservoir shortly thereafter.

Accomplishments:

The EA for the *Property Transfer and Improvements of Red Butte Dam and Reservoir* was initiated with a public meeting at Red Butte Gardens in January 2002. Comments received and issues identified were considered in the development of and administrative draft EA that was distributed to cooperating agencies in June 2002. The EA was revised based on agency comments and released as a public draft in July 2002. Written comments on the public draft were received from two organizations and one individual. Responses have been prepared and incorporated into a final draft. The final draft will be released upon completion of a formal memorandum of understanding between the COE and the CUWCD regarding mitigation for cultural resources that are present on the site.

Budget:

Funds Provided: Outside funding source
Funds Expended: N/A
Remaining Balance: N/A

Project Number: IV.02.04 **Investigation and Development of Mona Reservoir as a June Sucker Refuge**

Contact Person:

Dr. Todd A. Crowl
Ecology Center
Utah State University
5205 Old Main Hill
Logan, Utah 84322-5205
(435) 797-2498

Fax: (435) 797-1871
facrowl@cc.usu.edu

Project Summary:

The June sucker was federally classified as endangered with critical habitat, effective March 31, 1986 (51 FR 10857), because of the severe population declines. The species had a documented wild population of fewer than 1,000 individuals at the time of its listing (51 FR 10857). The June sucker was federally listed as endangered due to: a) their localized distribution; b) failure to recruit new adult fish; and c) threats to their continued survival. Decline in abundance of June suckers can be attributed to habitat alteration through de-watering stream channels and degrading water quality, competition and predation by nonnative fish species, commercial fishing, and killing of adults during the spawning run. The USFWS has given the species a recovery priority of 5C. A 5C designation applies to a species that are highly susceptible to extinction, a low recovery potential, and presence of conflict. Water development and sport fishery management are the primary conflicts to June sucker recovery.

Because of the difficulties associated with lake size, non-native species predation, and habitat degradation (Crowl et al. 1995, Crowl et al. 1998, and Petersen 1996), long-term recovery success of June sucker within Utah Lake does not appear obtainable at this time. However, short-term alternatives do exist, and are essential if we are to successfully prevent the extinction of this species. In establishing refugia populations within another body of water that does not have the existing problems associated with Utah Lake, we can attempt to keep the species persisting, while providing opportunities to learn more about its life history. Ultimately, we may be able to generate self-sustaining populations if we can find habitats that provide as many of the necessary habitat features as possible. This will most likely be achieved by finding refugium sites within the historical, geographical range of June sucker.

The purpose of this study is to determine if a refugium population of June sucker can be established within Mona Reservoir based on physical, biological, and chemical constraints. These include basic physiological drivers such as oxygen availability and maximum temperatures, as well as food-web based variables such as predation pressure and food availability. Because Mona Reservoir is managed as a water storage and delivery system, basic biotic and chemico-physico drivers can show large fluctuations, potentially decreasing or eliminating long-term survivorship of a refuge population. Establishing a conservation pool of water that will optimize water needs water users while still providing minimum conditions for June sucker is necessary for long-term planning and conservation strategies (see recovery plan). Once minimum flow constraints have been determined, we will provide a range of biomass and numbers of June sucker that can successfully be maintained within the reservoir. The specifics of the management scenarios are provided in the proposal summary.

The North Juab Valley watershed is located approximately 64 kilometers due south of Utah Lake, and is located within the same watershed as Utah Lake. Mona Reservoir

has been constructed at the terminus of the valley, which captures and stores surplus water and irrigation return flows for Goshen Valley of southern Utah County located downstream or delivered to Utah Lake. The reservoir receives inflow from upper Currant Creek, a number of surrounding springs, and canals from the Spanish Fork Canyon-Nephi Irrigation System. Flows from Currant Creek are largely derived from discharges from springs and irrigation return flows, although the creek also receives tributary flows from West Creek and Burraston Ponds, and in years with very high flows, water originates from Salt Creek. Mona Reservoir has a dam height of 10 meters, a maximum capacity of 18,658 acre-feet, and a surface area of 715 hectares (CUWCD 1998). The location of Mona Reservoir within the natural Utah Lake watershed provides unique opportunities specific to the recovery of June sucker. An essential goal of endangered species recovery efforts is to restore the ecological conditions that will allow evolutionary processes of the species to continue. Yet, Utah Lake, because of its altered environment and extremely large size does not offer, at present, the necessary components leading to the recovery of the species. Meanwhile, Mona Reservoir offers a unique opportunity as a temporary refuge and study site for the endangered species. Considerably less effort will be required to manage fish populations and mimic historic ecological conditions for June sucker in Mona Reservoir than in their historic habitat of Utah Lake, because of Mona's relatively small size of 526 ha.

Project Status: No information provided.

Accomplishments:

Objective 1 - Evaluate chemic-physico components required to support June sucker

Dissolved oxygen and temperature profiles, water chemistry samples, and secchi measurements have been collected from the 2000, 2001 and 2002 field seasons on a bi-monthly basis. During the 2001 and 2002 field seasons, conductivity, turbidity, and pH measures were added to the sampling regime. All chemic-physico components have been evaluated in regards to differing habitats found within the reservoir as well as evaluating trends throughout the sampling periods. During the summers of 2000 and 2001, all physico-chemical properties were well within the physiological tolerance limits of all age groups of June suckers. However, during the summer of 2002, the reservoir reached a critical level of less than 1 m maximum depth, prior to drying up completely. During the July sampling period, corresponding to the drop in depth to 1 meter, the dissolved oxygen level dropped to 1.6 mg/l during the early morning (0500). Surface temperatures reached 31 C during this same period. These data suggest that at a minimum, Mona Reservoir will need to be managed to have a depth of at least 1 m (at the north end of the reservoir) in order to maintain a June sucker refugia population.

Objective 2 - Evaluate the biological components of the reservoir foodweb
Zooplankton and chlorophyll a samples were collected on a bi-monthly basis during the 2000, 2001 and 2002 field seasons. Zooplankton samples have been analyzed in the lab and evaluated for numbers per liter as well as total biomass found within the reservoir's different habitats. Trends in zooplankton densities were also evaluated

throughout the sampling periods. Chlorophyll a samples have been analyzed using flurometery and resulting in standing stock algal biomass measurements. Standing stock algal biomass was then compared to net primary production measurements taken during both field seasons using incubated BOD bottles. In all cases, both primary productivity (phytoplankton) and zooplankton densities are more than adequate to support a substantial June sucker refugia population. Our data suggest that zooplankton densities are actually higher in Mona reservoir than in Utah Lake. Species composition is also sufficiently diverse to provide all size fractions of prey of all age classes of suckers.

Objective 3 - Evaluate essential physical habitat components
Reservoir water elevation measurements were recorded every other week during the 2000 - 2002 field seasons. Data were used in conjunction with data obtained from the state engineers office to determine the volume of water within the reservoir during both field seasons, and to determine areas of habitat available to fishes throughout the summer. Physical habitat data collected also include mapping of macrophyte stands during the 2001 field season. This information has been used to determine the percentage of reservoir that could potentially provide habitat for introduced June sucker. The 2002 summer resulted in the loss of all macrophyte habitat. The upper end of the reservoir dried up early in the summer and most macrophytes disappeared. Macrophyte data also support our contention that the required conservation pool for this reservoir is at or above a 1 m depth at the northern sampling station.

Objective 4 - Validate projected June sucker biomass
June sucker growth experiments were conducted during the 2002 field season in fine-mesh cage enclosures. Larval fish were obtained from the FES. However, because the reservoir dried up within three weeks of the initiation of the experiment, all fish perished and no data were obtained.

Recommendations:
Maintain the reservoir at a minimum depth of one meter to provide physico-chemico, habitat and food resources that our required to sustain a healthy June sucker refugium population.

Continue to monitor the plankton and fish community. Because of the complete drying of the reservoir during the 2002-year, we were able to almost completely eradicate the existing carp population. We now have an opportunity to watch the rate of carp reinvasion as well as quantifying the rate of the rest of the foodweb recovering.

We are now in a position to introduce June sucker into Mona reservoir to establish our second needed refugium population. To most quickly reach our goal of a self-reproducing, sustainable population, I suggest we add the following:

60,000 YOY obtained from natural spawn and initially raised at FES
5,000 juveniles obtained from Red Butte reservoir and surplus fish from FES

300 adults from Red Butte, the Ogden nature ponds and other adults from appropriate refugia populations (based on the genetics plan).

The numbers listed above are based on our calculations of mortality (60 percent for YOY; 10 percent for juveniles and two percent for adults. In addition, we used our efficacy of sampling juveniles from the Red Butte study to provide a sample size big enough to make it feasible to capture them with a reasonable number of traps.

Budget:

Funds Provided: $40,250
Funds Expended: $40,250
Funds Available: $0

Project Number: IV.02.05 Conduct NEPA Analysis for Warm Water Fish Hatchery

Contact Person:

Maureen Wilson
Utah Reclamation Mitigation and Conservation Commission
102 West 500 South, Suite 315
Salt Lake City, Utah 84101
(801) 524-3146, Ext. 107
Fax: (801) 524-3148
mwilson@uc.usbr.gov

Project Summary:

This project is conducted by the Utah Reclamation Mitigation Conservation Commission (URMCC) and cooperating agencies, UDWR, U.S. Fish and Wildlife Service (USFWS), Bureau of Land Management (BLM), 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 County, or at Goshen Warm Springs in Utah County, Utah.

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 EIS for the production facility is 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: August 2003
Public meeting: September 2003
Final EIS: January 2004
Decision: March 2004

For the June sucker interim facility EA:
Draft EA: February 2003
Final EA: April 2003

Accomplishments:

Site-specific technical studies are substantially complete for the Gandy Warm Springs site. Additional monitoring, for example, neotropical migratory bird nesting study may be conducted through the remainder of the NEPA schedule. Scoping was initiated for the Goshen Warm Springs alternative for the production facility and the Interim hatchery.

DEQ conducted an initial site investigation on the Goshen Warm Springs site to determine the presence of heavy metal contaminants and volatile organic compounds in association with the Tintic Standard Reduction Mill. This study results indicated the presence of contamination, particularly arsenic and lead. Further site sampling will be conducted to evaluate the use of the site for the hatchery alternatives and design considerations later in the process.

Budget:

Funds Provided: $275,000
Funds Expended: $45,000; as of September 30, 2002
Remaining Balance: $230,000

Project Number: IV.02.06 **Fish Experiment Station Operation and Maintenance for June Sucker**

Contact Person:

Doug Routledge
Utah Division of Wildlife Resources
Fisheries Experiment Station
1465 West 200 North
Logan, Utah 84321
(435) 752-1066 Ext. 16
Fax: (435) 752-6977
dougroutledge@utah.gov

Project Summary:

The June sucker responsibilities at the FES are increasing significantly. Proposals were made for OY 2002 and beyond that required more facilities and staff to meet the goals of the JSRIP. Funding became available and these needs were met. 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 will also be used for research studies, such as evaluating feed types and the use of HCG to induce spawn. We also needed to prepare the new facility with the proper plumbing and tanks to allow us to raise fish and do studies. We also needed to operate and maintain both June sucker facilities and the grounds related to the June sucker at FES.

Project Status:

The operation and maintenance of this facility is ongoing. The goals have been completed or are still in process as outlined in our 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 and dismantled the degassing columns in the old facility.

This year we received nine separate lots from the Provo River egg take from 4/30 – 6/5/02 and 1 lot from the larval light trap program on the Provo River. We received the larval fish on 6/4/02.

A total of 191,607 eggs were received and we only had 37,443 larval fish go on feed. This is a 19.54 percent survival rate. As of 11/30/02 we have had a 68.10 percent survival rate on all lots combined once the larval fish went on feed. This includes the 4,000 fish transferred for research projects.

Survival as of 11/30/02:

Lot Number	Number of Eggs Received	Number on Hand	% Survival to Date	Iodine Used	Fish/lb	Daily Growth
020430SKJNPR01	3130	48	1.53%	Yes	463.72	.008”
020501SKJNPR02	6942	16	.23%	Yes	346.85	.009”
020506SKJNPR03	35,100	243	.69%	Yes	996.97	.006”
*1) 020520SKJNPR04	31,663	9605	30.33%	No	1087.21	.006”
020521SKJNPR05	5980	0	0.00%	No		
020521SKJNPR06	10,108	4387	43.40%	No	683.92	.008”
020521SKJNPR07	41,522	4814	*2) 21.23%	No	1018.10	.006”
020528SKJNPR08	6494	762	11.73%	No	847.54	.007”
020605SKJNPR09	50,668	0	0.00%	No		
020604SKJNPR10 Larval fish from light trap	5770	1625	28.16%	NA	1009.93	.008”
Summary	**197,377**	**21500**	***2) 12.92%**			

Notes:
- These are being used for the feed study.
- Percent survival includes the 4,000 fish used for BYU and USU research projects.
- Lot # 020521SKJNPR05: Due to a bacterial problem, we had extremely high mortalities on these four days after initial feeding. We only had three fish remaining 11 days after initial feeding.
- Lot # 020605SKJNPR09: These eggs were extremely adhesive and we had some fungus problems. The eggs hatched prematurely on the 6th day. There was no sign of a larval fish after hatching, just broken eggshells.

Several lots hatched prematurely, within four to six days in 64 F water. Some eggs were treated with iodine and some were not. Once the eggs began to hatch, the larval fish disintegrated with just the eggshells remaining. Eyes had not developed yet on the few larval fish that did survive. After about the 8th day eyes began to appear.

I am not sure what is causing the eggs to hatch prematurely. At first I was convinced it was due to treating the eggs with iodine, but we had other lots that were not treated with iodine and they hatched prematurely also. On the few lots where we had good hatch rates, we were able to see the eye-up in the egg after eight days and the eggs hatched on the 9th day.

The following is the inventory of the other June sucker that were raised at FES during 2002.

Lot number			number on hand	f/lb	Length "
89SKJNUSU		~	48	0.89	14.5
91SKJNBYU		~	53	0.89	14.5
91SKJNUSU		~	51	0.89	14.5
92SKJN		~	20	0.89	14.5
93SKJNlot2		~	61	0.89	14.5
Totals			**233**		
94SKJNLot-4	Family lot	~	136	1.06	13.45
94SKJNLot-11	Family lot	~	122	1.16	13.24
94SKJNLot-6	Family lot		127	0.92	14.11
95SKJNlot4	Family lot	~	58	1.06	13.55
94SKJNlot8	Family lot	~	36	1.06	13.55
Totals			**385**		
990618SKJNPR01	Family lot larval fish from Provo River 1999		**65**	2.21	11.25
000509SKJNPR01	Family lot		1,418	23.63	4.91
000523SKJNPR02	Family lot larval fish from Provo R. 2000		2	6.06	7.63
000525SKJNPR04	Family lot		352	13.38	5.81
000525SKJNPR05	Family lot		1,919	56.28	3.63
000601SKJNPR06	Family lot		3	17.84	5.48
000601SKJNPR07	Half Sib Hatchery Male		579	27.56	4.74
000602SKJNPR08	Family lot		2	9.79	6.69
000527SKJNFE01	89SKJNUSU female 91SKJNUSU Male		29	4.16	8.9
Totals			**4,304**		
010424SKJNPR01	Family lot		211	48.90	4.08
010426SKJNPR02	Family lot		152	69.03	3.64
010502SKJNPR03	Family lot		3132	140.41	2.96
010515SKJNPR04	Family lot		60	73.89	3.56
010516SKJNPR05	Family lot		1016	56.29	3.9
010516SKJNPR06	Family lot		623	43.57	4.25
010518SKJNPR07	Sib lot hatchery male		44	48.03	4.11
010518SKJNP08	Sib lot hatchery female		1	76.17	3.52
Totals			**5,239**		

To meet the goals the following activities were done:
Mortalities were collected daily, tanks were cleaned as needed, fish were fed, equipment was disinfected after each use, flows were monitored, water quality such as oxygen, gas saturation levels, pH, total and un-ionized ammonia, CO_2 and temperature

were taken. The end of the month sample counts were taken. The Lot Production Histories were kept on each lot. Accurate records were kept on a daily basis. Chemical treatments were administered on eggs and fish as needed. We stock and transferred fish as needed. Preparation of future study proposals, station program review, research papers related to June suckers were done. We attended meetings as needed.

Ronney Arndt evaluated sperm motility using various salt diluents and he also evaluated a sperm extender. It was determined that continued use of rock salt diluent at .75 percent is still the best for hatchery and field fertilization. Milt samples that were stored in an extender for 1-2 days still retained viable sperm. More research is needed to develop a good extender. (Arndt, 2002)

To meet the goals we will need to continue with annual operation and maintenance 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 $500.

Arndt, R. 2002. June Sucker Milt Research – Spring 2002. The Ichthyogram, Volume,13, Issue 2, July 2002.

Budget:

Funds Provided: OY 2002 = $63,552.00
Funds Expended: $52,419.00 (Jan 1, 2002 – Dec. 31, 2002)
Remaining Balance: $11,133.00 (As of Dec 31, 2002)

Project Number: IV.02.08 Interim Hatchery Development – Goshen Growout

See Project Number IV.02.05.

Project Number: IV.02.09 June Sucker Transfer from Refuge Sites to Utah Lake

A new SOW was not submitted. There was no plan or approval to transfer fish from refuge sites to Utah Lake.

Project Number: IV.02.10 **June Sucker Transfer from Wahweap Hatchery to Utah Lake**

Contact Person:

Matthew Andersen
Utah Division of Wildlife Resources
Native Aquatic Species Section
1594 West North Temple
Salt Lake City, Utah 84115
(801) 538-4756
Fax: (801) 538-4745
matthewandersen@utah.gov

David W. Speas
Utah Division of Wildlife Resources
Native Aquatic Species Section
1594 West North Temple
Salt Lake City, Utah 84115
(801) 538-4762
Fax: (801) 538-4745
davidspeas@utah.gov

Project Summary:

The objective of this study was to augment the existing population of June Sucker in Utah Lake with marked fish from Wahweap State Fish Hatchery (Wahweap) near Big Water, Utah. This project is related to the following recovery elements of the *June Sucker Recovery Plan* (USFWS 1999):

4.1.1 Refine and continue to implement procedures augmenting existing June sucker population in Utah Lake.
4.1.2 Propagate and stock June sucker into Utah Lake

Project Status:

On April 1, 2001 approximately 8,364 June sucker fry were transported from the UDWR FES, Logan, Utah to Wahweap. These fry (lot 000601SKJNPR07) originally were collected as larvae from the Provo River during spring 2000. Fish were held at Wahweap until August 2002, at which time they were implanted with passive internal transponders (PIT tags) and transported to Utah Lake. For comparative purposes, a subset of the same June sucker lot was held at FES throughout the study period

Accomplishments:

June sucker grew at an average rate of 0.2 mm/day at Wahweap and 0.12 mm/day at FES. Survival rates during the study period were 35 percent at Wahweap and 73 percent at FES. Biologists implanted 2,474 June sucker with PIT tags at Wahweap; of these, 200 (7 percent) expired during tagging, and of these 140 (70 percent) were noticeably deformed. No mortalities were incurred during transport from Wahweap to Utah Lake.

Biologists anticipated comparatively rapid growth rates at rearing facilities in Wahweap. June sucker reared at Wahweap grew at nearly double the rate observed at FES, but survived at half the rate observed at FES. Inverse relationships between survival and growth are common within stocks of fish (Cushing 1981), so it is difficult to ascertain whether one rearing environment (i.e., Wahweap or FES) is necessarily “better” than the other. Managers should nevertheless recognize growth and survival trade-offs and base their choices of rearing locations on other logistical factors, such as stocking schedules, proximity of the facility to Utah Lake, cost of transport, and baseline facility operation and maintenance requirements.

Because the experimental transfer from Wahweap had never before been attempted, the costs were overestimated in the initial SOW. As a result, only a small fraction of the budget was expended.

Budget:

Funds Provided: $24,900
Funds Expended: $3,385
Remaining Balance: $21,515

RESEARCH, MONITORING, AND DATA MANAGEMENT

Project Number: V.02.01 **June Sucker Selenium Uptake Study Completion: Goshen Warm Springs, Utah County, Utah**

Contact Person:

Maureen Wilson
Utah Reclamation Mitigation and Conservation Commission
102 West 500 South, Suite #315
Salt Lake City, Utah 84101
(801) 524-3146 Ext. 107
Fax: (801) 524-3148
mwilson@uc.usbr.gov

Project Summary:

Goshen Warm Springs, Utah County, Utah has been identified as a warm-water hatchery site on an interim basis (approximately five years). An interim hatchery would aid the recovery of June sucker. Selenium levels in the Goshen Warm Springs water supply approach levels of toxicological concern for June sucker rearing.

A selenium uptake study using June sucker age one-year class was conducted at Goshen Warm Springs in 2001 to determine the usefulness of the water source for augmentation of June sucker. A control site located in Provo Bay, Utah Lake was used for comparison. If the water supply is found adequate, it could be used to help enhance the June sucker population in Utah Lake and its tributaries.

Growth data was also taken, providing a comparison in June sucker growth rates between Goshen Warm Springs and Utah Lake.

Project Status:

The study has been completed. The draft report is currently undergoing review and revision. A final report is anticipated by December 31, 2002.

Accomplishments:

Taken from the Draft Report Executive Summary by A. L. Allert, J.F. Fairchild, T.W. May, L.C. Sappington, L.E. Johnson and C.C. Witte, U.S. Geological Survey, Columbia Environmental Research Center, 4200 New Haven Road, Columbia, Missouri 65201: Details will be provided in the final report.

Selenium uptake in June sucker was statistically significant in two ponds at the Goshen Warm Springs. The two ponds in the south-flowing system at Goshen Warm Springs

were named North Pond and Lily Pond for purposes of this study. Spring flow to these ponds are planned to be used as the water supply for the interim hatchery and the Goshen alternative for the production facility. Statistically significant uptake was not observed in June sucker at the Utah Lake, Provo Bay site.

Fish growth was significantly greater at Utah Lake and North Pond compared to Lily Pond. Statistically significant selenium depuration occurred after the transfer of June sucker to clean water at the Columbia Environmental Research Center.

The selenium concentrations in the June sucker are considered by the USGS not likely to be of concern as they are not at acute toxicity levels. The depuration experiments conducted at the research center indicate that juvenile June sucker would eliminate selenium in Utah Lake within three months of stocking. If fish are stocked into Utah Lake at age one, and recruited to reproductive age, they should not be impacted by selenium.

Fish were fed at all sites with BioKyowa® feed. Fish appeared to grow most rapidly in Utah Lake due to an abundance of natural food sources. Based on growth rates, the study indicated that the commercial diet used may not meet the nutritional needs of June sucker.

Recommendations for additional work or future direction for recovery were for: additional research in feed formations, consideration and further evaluation of cage culture in Utah Lake for propagation, including various stocking densities, and an examination of historic, current and future water quality conditions in Utah Lake to ensure recovery success.

Budget:

Funds Provided: $82,000 through a URMCC agreement with USFWS
Funds Expended: $16,689 reimbursed as of June 30, 2002, $82,000 anticipated by the end of the fiscal year
Remaining Balance: $0

Project Number: V.02.02 June Sucker Recovery Team Recovery Definition

Contact Person:

Maureen Wilson
Utah Reclamation Mitigation and Conservation Commission
102 West 500 South #315
Salt Lake City, Utah 84101
(801) 524-3146
Fax: (801) 524-3148
mwislon@uc.usbr.gov

Project Summary:

This is an ongoing project**.** The USFWS reconvened the June Sucker Recovery Team in 2000. The team's objective is to revise the *June Sucker Recovery Plan* (USFWS 1999) with quantifiable population objectives.

This project provides information to address the following *June Sucker Recovery Plan* tasks:

7.0 Further define criteria necessary for the recovery of June sucker, and
7.1 Conduct an analysis to refine quantified objectives for June sucker recovery including a definition of a self-sustaining June sucker population.

These definitions and analysis will provide guidance to the JSRIP for meeting the recovery objective.

Project Status:

In 2001, the Recovery Team developed action-response criteria, in the absence of adequate June sucker information. The recovery definition has been refined in 2002 to consider biologically-defensible criteria, or criteria considerations at the genetic, population and ecosystem level. Discussions were led by team members on each of these levels at meetings throughout the year. A summary of the discussions, with the criteria developed to date will be provided to the USFWS and the June Sucker Recovery Implementation Program by the Annual Assessment meeting in March 2003.

Recovery Team activities are ongoing.

Accomplishments:

The June Sucker Recovery Team met in April, May, July, September and December of 2002. Following the 2002 Program Annual Assessment meeting, program guidance input on project direction and/or future research needs was provided to the PDO. These are listed below by Program recovery element:

Recovery element: habitat development and maintenance

Recovery team recommendation: The lower Provo River habitat development alternatives as presented at the Annual Assessment meeting were ranked: 1. North alternative; 2. South alternative; 3. Middle alternative. Rankings were based mainly on the amount of habitat provided.

The Recovery Team also recommends that the Program move ahead with the removal of the Fort Fields diversion structure and the remaining diversion structures on the Provo River with the identification of what the future habitat will look like, e.g.,

vegetation types, river and/or riparian contours and how nonnative impacts will be dealt with.

Alternative spawning site: The Recovery Team recommends that the Program evaluates present spawning use and considers experimental stocking in Hobble Creek with removal of beaver dams, if fish are available.

Recovery element: nonnative and sport fish management

Recovery team recommendation: Not enough was known about all of the options. It was decided to not make a recommendation until the JSRIP TC review is completed.

Recovery element: water management and protection to benefit June sucker

Recovery team recommendation: The Recovery Team recommends that the Program continues to search for and secure flows with the acknowledgement of lake elevation and its impact on flows and habitat. The Program should evaluate years of high June sucker recruitment as their numbers increase and relate to flow conditions during spawning. Also recommended is the development of non-lethal techniques to age June sucker.

Recovery element: research, monitoring, and data management

Recovery team recommendation: The Recovery Team recommends that the Program conduct a Utah Lake water quality data review for water quality protection designation and total maximum daily load (TMDL) development. We further recommend additional testing of tagging of adult June sucker in Utah Lake (to include both sonic tags and telemetry). An overall data review, or analysis, after the database is developed is also recommended.

Recovery element: genetic integrity and augmentation

Recovery team recommendation: The Recovery Team recommends that the Program sponsor a workshop on native fish augmentation and culture techniques. We also recommend that the success of stocking various sizes of June sucker in Utah Lake be evaluated.

Recovery element: information and education

Recovery team recommendation: The Recovery Team recommends that public relations for recovery efforts be developed, particularly in light of the planning efforts for the Utah Lake System of the Central Utah Project (CUP). The Program should further participate in all Utah Lake planning efforts.

Budget:

All funds are provided by Recovery Team members. A nominal figure of $18,000 has been identified to cover team member's participation. These costs are for meeting attendance and time for material development, review and comment.
Funds Expended: $18,000.
Remaining Balance: 0

Project Number: V.02.03 **Development of June Sucker Standardized Monitoring Program and Electronic Database**

Contact Person:

Thomas Chart
Bureau of Reclamation
125 South State Street Rm 6107
Salt Lake City, Utah 84138 - 1147
(801) 425-3863
Fax: (801) 524-5499
tchart@uc.usbr.gov

Dr. Todd Crowl
Utah State University
5205 Old Main Hill
Logan, Utah 84322-5205
(435) 797-2498
Fax: (435) 797-1871
facrowl@cc.usu.edu

Matthew Andersen
Utah Division of Wildlife Resources
1594 West North Temple
Suite 2110/Box 146301
Salt Lake City, UT 84114-6301
(801) 538-4756
Fax: (801) 538-4745
nrdwr.manderse@state.ut.us

Project Summary:

The goal of this project is to develop a standardized monitoring program and database for use by the 2002 field season. Specific monitoring program goals and objectives and structure of the database will be a collaborative effort between the principal investigators and the TC.

A *Standardized Monitoring Handbook* will be produced, which explicitly describes field sampling protocols (physical data collection / protocol, sampling gears, spatial and temporal sampling design criteria, specimen preservation protocol), includes sample data forms, and a minimum of data analysis to be compiled on an annual basis and provided to the Program in annual report form. In addition, we will provide specific field offices with hardware and software that will make data entry and processing almost immediate. These 'field computers' will be downloaded to the main computer data base (maintained at Utah State University (USU) in collaboration with the UDWR statewide data base project).

Our goal is to have the database developed to accept standardized monitoring data collected during the 2002 field season. However, the design of the database will be an iterative process and will not likely be complete until the spring of 2003. Incorporation of historical data into the database may continue past 2003.

With this in mind, for the June sucker monitoring program to be effective there must be a clear understanding amongst program participants what the goal and objectives of monitoring will be. It must also identify the appropriate population indicators (species, life stages) and the necessary level of detection (presence / absence, distribution, abundance, demographic rates). Once these decisions have been made, power analysis can be used to determine the level of sampling necessary to meet the needs of the monitoring program. Sampling protocols (including data collection formats) must then be clearly defined to ensure a consistent approach to data gathering in the long term. To the maximum extent possible this monitoring program will build on past June sucker monitoring efforts conducted by the state of Utah, the USFWS, and others, however, the parallel development of QPOs by the JSRT will ultimately provide the framework for this monitoring program.

Database

Recovery Programs in other systems have taken various approaches to: 1) storing data collected from program-sponsored activities and 2) standardization of the data collected. The JSRIP has recognized a need to develop a database to: 1. serve as a repository for data collected in the future, not limited to the monitoring data, and 2. incorporate as much of the existing information collected on Utah Lake and it's tributaries (by UDWR, USFWS, USU, private consultants) that could be of use to the program. The collection of June sucker information began in 1878 when Jordan first collected this species. Anecdotal information about June sucker distributions and abundance has been reported by various sources since that time through the first part of the 1900's; all of which is unfortunately beyond the scope of this proposed effort. Beginning in the 1950's the UDWR began gill-netting surveys at Utah lake which constitutes the earliest data set which will be considered for inclusion in the JSRIP database. Retro-fitting data from past collections to a newly created database will require time.

It is important to note that the principal investigators intend to collaborate with the JSRIP TC to develop the standardized monitoring program and the structure of the JSRIP database.

Accomplishments:

These data have served as the basis for the development of the database structure and data entry tools. We will continue to coordinate with all agencies that have been involved in June sucker monitoring/research to accumulate a complete June sucker database.

The June Sucker 1998 data were used to create a Microsoft Access database, which includes the following tables:

Prototype data sheets for future data collection have been designed and will be discussed with the June Sucker TC and UDWR biologists in late January.

Data entry for all additional years is continuing. We have identified the need for one technician (working on an 80 percent schedule) for a full year to enter the remaining data.

We need to clarify questions that invariably arise when reviewing long-term data sets and strive to develop a process that facilitates the collection of data in as consistent a manner as is possible.

Monitoring Program-

This activity was designed to track closely with the activities of the June Sucker Recovery Team. The June Sucker Recovery Team remained active in 2002, focusing on defining recovery from a genetic, population and landscape perspective. Based on discussions in 2001 and 2002, the Recovery Team realized that it may be premature to develop quantifiable population objectives at this time and that some phased approach to recovery, and monitoring toward recovery was needed. The principals for this study adapted their efforts accordingly. In June 2002, a report entitled, *June Sucker Standardized Monitoring Program: Rationale and Proposed Sampling Protocols* was drafted and circulated amongst the project principals and the PDO. Comments were received later in the year and have yet to be incorporated. In that report, monitoring efforts of other JSRIP are reviewed and considered in the process of developing a rationale to monitor the June sucker. Historical sampling and sampling techniques for June sucker and other species in Utah Lake and it's tributaries are summarized and discussed. Finally, a monitoring plan and sampling protocols are proposed. Whereas many of the components of the proposed monitoring program built on recent monitoring activities, several new components (snorkel counts of spawning Utah Lake suckers in the Provo River and other tributaries, revision of the pre- and post-spawning trap netting, incorporation of a lake beach seining) were incorporated. Some of those new components are being implemented on an experimental basis.

Recommendations:

The budget needs to be increased to incorporate historical data sets in the database (see revised SOW for OY 2002). Continue with development of both the database and the monitoring program according to the originally proposed schedule.

Project Status:

This is an ongoing effort. The report will be revised and distributed to the TC for their review by mid-April, 2003

Budget:

Funds Provided: $27,500
Funds Expended: $27,500
Remaining Balance: $0

Project Number: V.02.04a Morphometric Assessment of June Sucker

Contact Person:

Dr. Todd A. Crowl and David Cole
Ecology Center
Utah State University
5202 Old Main Hill
Logan, Utah 84322-5205
(435) 797-2498
Fax: (435) 797-1871
facrowl@cc.usu.edu

Project Summary:

The June sucker has a complex nomenclatural history (reviewed in Evans, 1997). Miller and Smith (1981) concluded June suckers of today are different from specimens collected in the 1880's because of hybridization with Utah suckers (*Catostomus ardens*) during the drought years of the 1930's. Despite morphological differences, recent genetic studies have not differentiated between June, 19th century and recent specimens, and Utah suckers from Utah Lake (Evans, 1997; Mock, personal communication). These studies suggest more ancient hybridization, and Evans (1997) concludes that the current assemblage of suckers in Utah Lake has likely resulted from repeated drought induced hybridization events between June and Utah suckers. Although the suckers from Utah Lake appear, by current techniques, to be a hybrid swarm, they are genetically distinct from all other Bonneville Basin populations of Utah

sucker (Mock, personal communication). Considerable morphological differences exist between June suckers and Utah suckers, especially in the mouth and head regions. Based on mouth morphology (and anecdotal descriptions of behavior), June suckers are presumed to be planktivorous and Utah suckers are presumed to be (and are in other systems) benthic/epi-benthic feeders (Sigler and Sigler, 1987).

The results of this morphometric analysis will be compared with those obtained in the related genetic project (V.02.04b - Genetic Analysis of Spawning June Sucker; Mock, in progress). Of interest is whether the morphological extremes ('good' June sucker verses 'good' Utah sucker) are correlated with opposite 'ends' of the hybrid swarm generated by principal components analysis of the genetic data. This morphometric analysis will also aid in consistently identifying June suckers for egg and sperm collection in the spring spawning run. It is unknown if a change from year to year in the number of spawning June suckers is a real phenomenon or a sampling artifact resulting from a change in the personnel identifying the fish. One year a sucker may be identified as a June sucker and spawned, while the next year it may be labeled a hybrid and not spawned.

In addition, this morphometric analysis will provide relevant information for the following related future projects:

V.03.09 – Heritability Study for Morphometric Characters of Utah Lake Suckers
V.03.10 – Investigation of Ecological Differences of Utah Lake Suckers
V.03.11 – Investigation of Movement Patterns of June Sucker in Utah Lake.

Project Status:

Presently, morphometric data has been collected from all target populations except those at: the FES hatchery in Logan (images will be obtained by 1/10/03); Camp Creek Reservoir (sampling to be arranged with UDWR); and the Ogden Nature Center (sampling to be arranged with UDWR). Additional images will also be obtained from suckers captured during the 2003 Provo River spawning run. Analysis of data is ongoing. The project's due date (Final Report) is May 2003, and this is the anticipated date of completion.

Accomplishments:

A preliminary 'relative warp analysis' using ten morphological landmarks (anatomical homologies located from the head to the caudal fin) failed to completely differentiate between 13 June suckers (actually 12 fish; images from both 2001 and 2002 were used for one fish) and 13 Utah suckers (results not included). This was most likely because of the variability of the images in the posterior regions of the fish. Even with a plexi-glass divider in the imaging live well, it was impossible to ensure that each specimen was in the same position; thus, the caudal fins of specimens sometimes angled towards, sometimes away from, the photographer.

Thus a second preliminary analysis (principal components analysis) was conducted using data collected from the anterior portions of the same fish images (from the tip of the snout to the origin of the dorsal fin). The following ratios were used as variables in the analysis: snout-eye distance/snout-dorsal fin distance; snout-head distance/snout-dorsal fin distance; head depth/ snout-dorsal fin distance; eye diameter/ snout-dorsal fin distance; lower lip gap width/mouth width; and lower lip lobe length/mouth width.

Results of this preliminary PCA appear in the tables and figures below. From the graphs, it is apparent that plots of Principle Component 1 verses Principle Component 2 and Principle Component 2 verses Principle Component 3 differentiate June and Utah suckers fairly well. Most of the separation of June and Utah suckers is due to Principal Component 2, which is highly correlated with mouth features; Principle Component 1 is correlated with the head characters and Principal Component 3 is correlated with eye diameter. It will be interesting to see how the addition of other variables (e.g. jaw angle or presence/absence of lip papillae) will affect future analyses.

Finally, there are several things to keep in mind regarding this preliminary and future morphometric analyses:
1) The suckers used in this preliminary study represented the morphological extremes (as interpreted by the investigators, D.D. Cole and Todd A. Crowl with input from Chris Keleher); analyses using all of the data from several hundred fish, many of which are morphologically intermediate, will likely result in a morphological ‘swarm’.
2) Utah suckers may be under-represented in the genetic analysis presently completed (Cole, personal observation). Therefore, emphasis will be placed on obtaining more genetic samples and images of Utah suckers early in the spring spawning run in 2003 (Utah suckers still tend to spawn slightly earlier than June suckers, although there is considerable overlap).
3) Statistical techniques other than PCA may better differentiate June and Utah suckers.
4) The data regarding the sucker (pit tag # 224044191F) for which there were two images (2001 and 2002) resulted in a fairly large degree of separation via the PCA. This is perhaps due to the quality of the images, as some measurements are difficult to obtain (it’s often difficult to discern the edges of the eye socket).

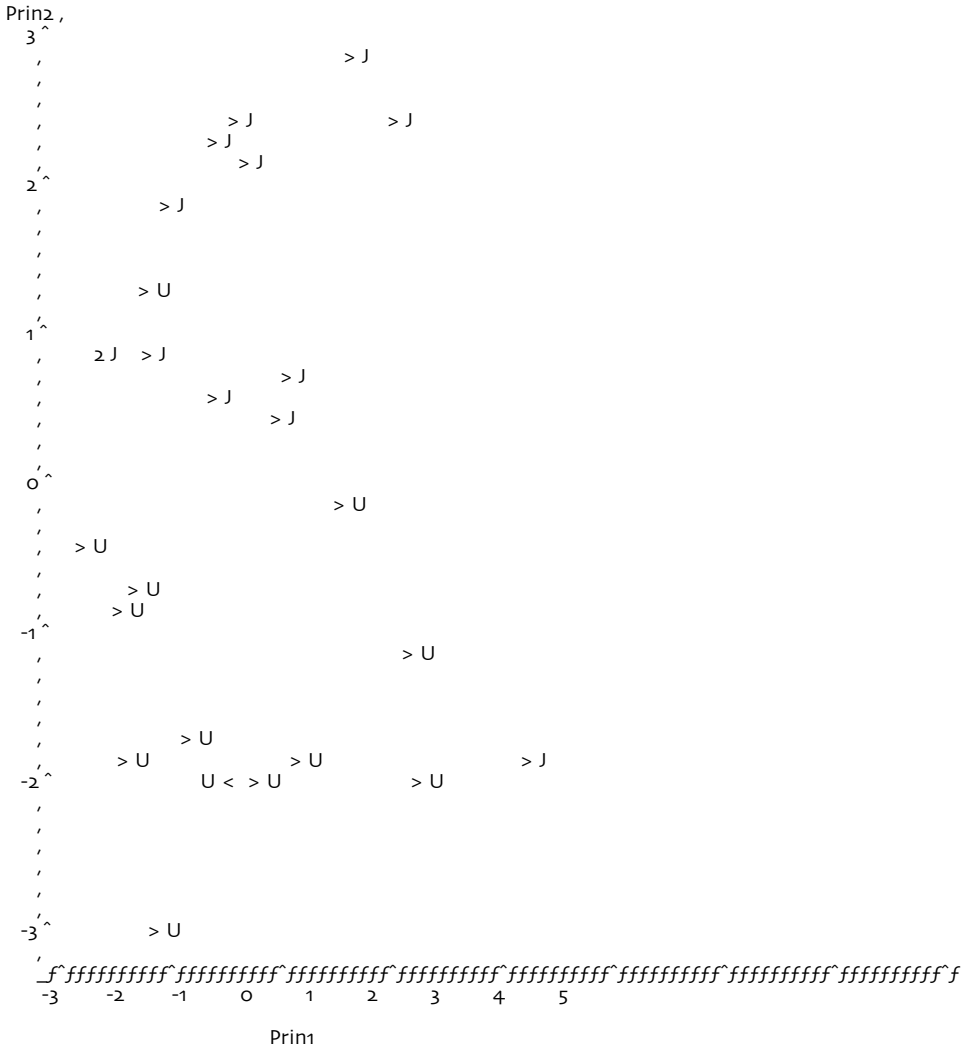
Correlation Matrix

	eyedorsal_ ratio	eyediam_ ratio	headdorsal_ ratio	headdepth_ ratio	gap_ratio	lobe_ratio
eyedorsal_ratio	1.0000	0.3015	0.6999	0.4491	0.2782	-.3139
eyediam_ratio	0.3015	1.0000	0.3684	0.3912	0.0038	0.1957
headdorsal_ratio	0.6999	0.3684	1.0000	0.6510	-.2203	0.1498
headdepth_ratio	0.4491	0.3912	0.6510	1.0000	0.0142	0.0830
gap_ratio	0.2782	0.0038	-.2203	0.0142	1.0000	-.8260
lobe_ratio	-.3139	0.1957	0.1498	0.0830	-.8260	1.0000
Prin1	0.7912	0.6121	0.8981	0.8086	-.0052	0.0529
Prin2	0.3950	-.1385	-.1532	-.0429	0.9375	-.9568
Prin3	-.2320	0.7544	-.3038	-.0097	0.2299	0.0693
Prin4	-.3303	-.1762	-.1110	0.5805	0.1226	0.0011
Prin5	0.2098	-.0698	-.1836	0.0362	0.1252	0.2472
Prin6	-.1054	-.0323	0.1778	-.0769	0.1935	0.1257

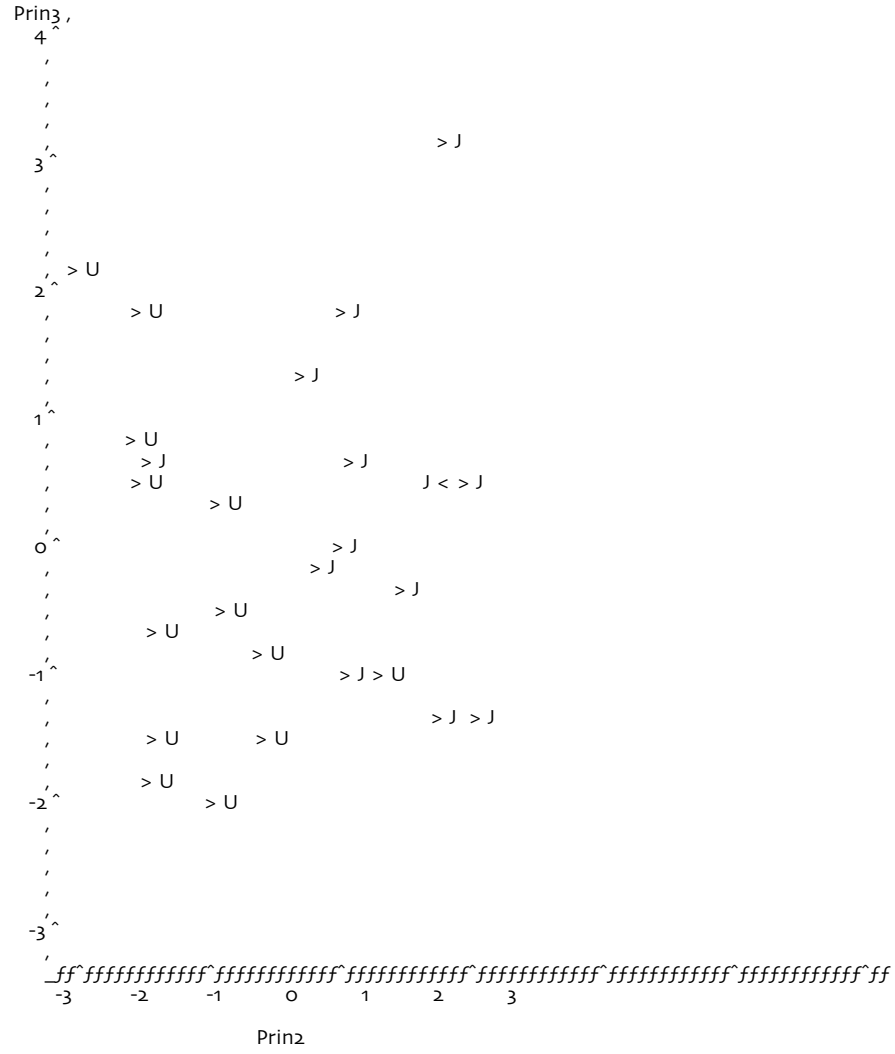
Eigenvalues of the Correlation Matrix

	Eigenvalue	Difference	Proportion	Cumulative
1	3.46397792	0.46900749	0.2887	0.2887
2	2.99497043	1.22195843	0.2496	0.5382
3	1.77301200	0.26858753	0.1478	0.6860
4	1.50442447	0.34373266	0.1254	0.8114
5	1.16069181	0.05776845	0.0967	0.9081
6	1.10292336	1.10292336	0.0919	1.0000

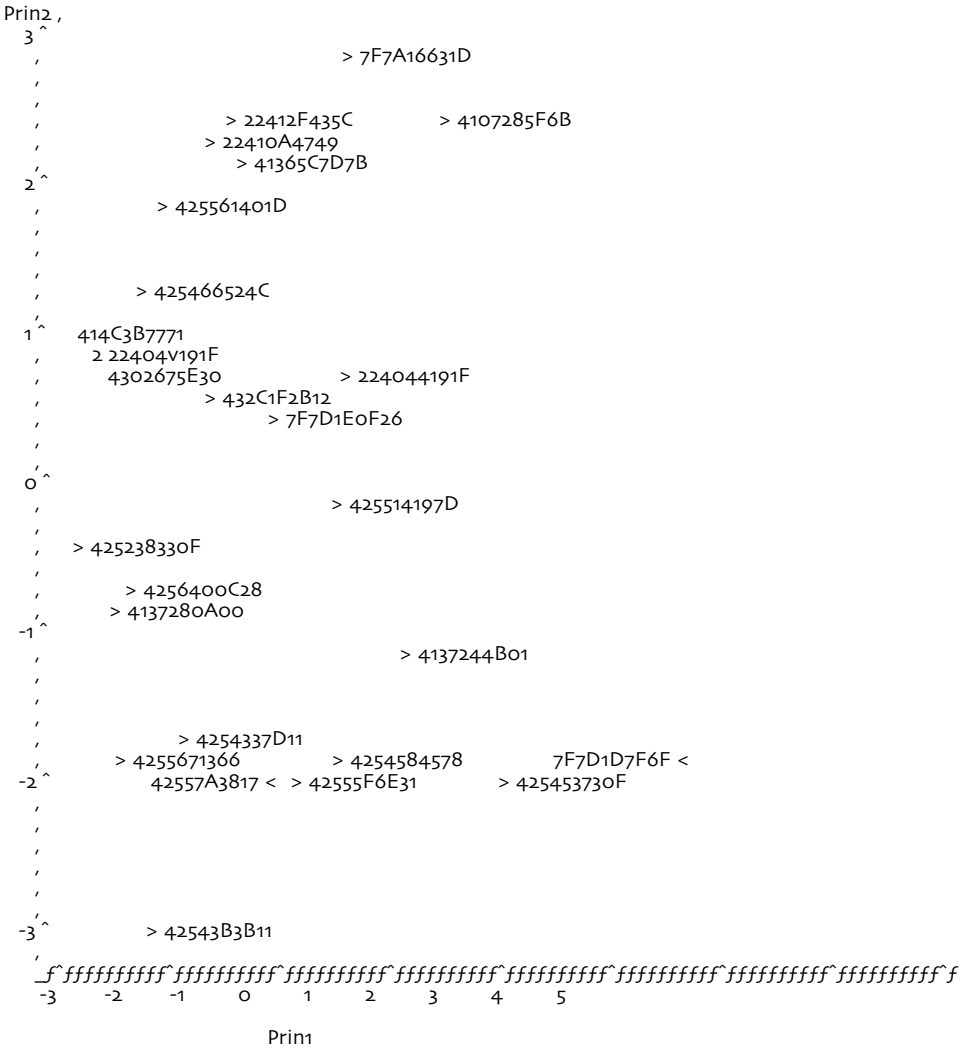
Plot of Principal Component 2 and Principal Component 1. Symbol points to label.



Plot of Principal Component 3 and Principal Component 2. Symbol points to label.

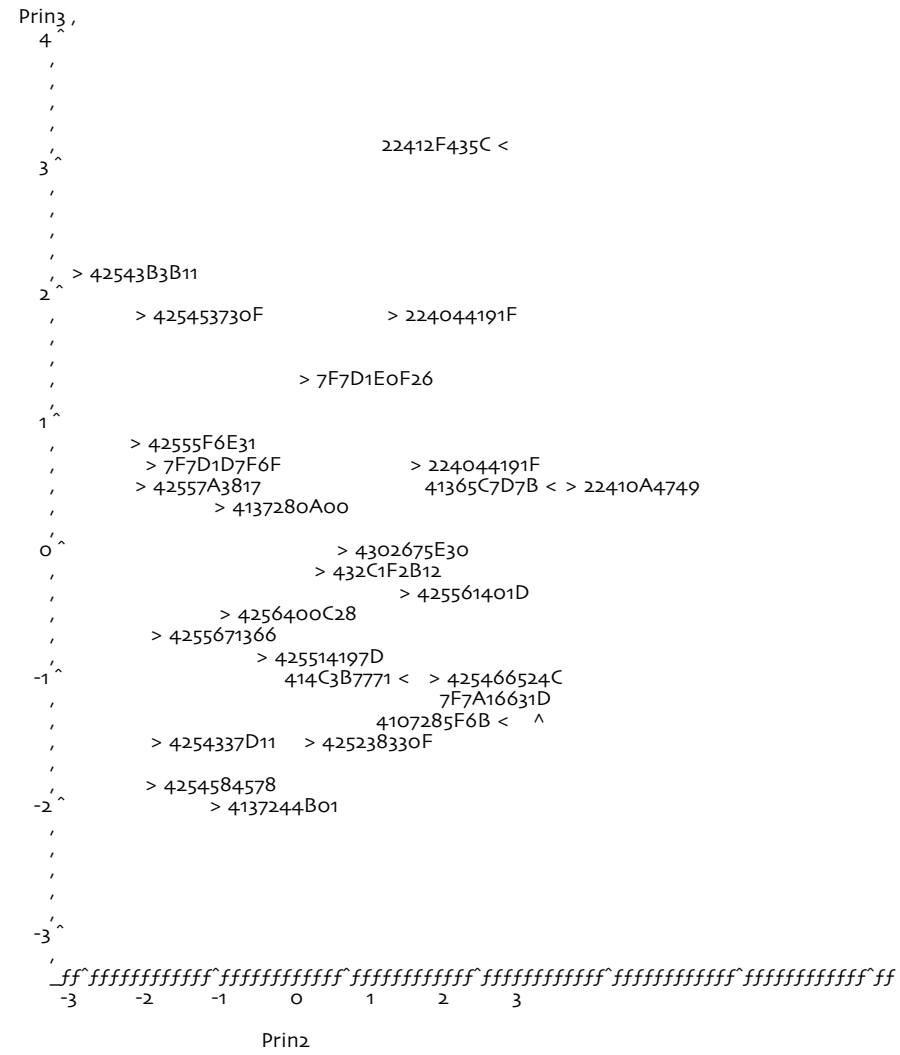


Plot of Principal Component 2 and Principal Component 1. Symbol points to label.



NOTE: 1 label characters hidden.

Plot of Principal Component 3 and Principal Component 2. Symbol points to label.



Budget:

Funds Provided: $35,650
Funds Expended: $36,462.36
Remaining Balance: $187.64

Project Number: V.02.04b Genetic Analysis of Spawning June Sucker

Contact Person:

Karen Mock
Utah State University
Department of Fisheries and Wildlife
Logan, Utah 84322-5210

(435) 797-7870
Fax: (435) 79701871
karen@cnr.usu.edu

Project Summary:

The suckers in Utah Lake display a wide range of morphologies, ranging froma “Utah sucker” morphology to “June sucker” morphology. This is suggestive of extensive hybridization. To date, the target of recovery actions for the June Sucker has been defined morphologically, assuming that such fish possess more of the original June Sucker genes than other suckers in Utah Lake. It is possible, however, that morphology is not an adequate surrogate for broader underlying genetic differentiation. The goal of this project is to establish whether spawning suckers in the Provo River having a morphology thought to be more representative of June Suckers are genetically more similar to each other than to other suckers spawning at the same place and time. The samples used for this project were obtained from Provo River spawning suckers in May/June 2001.

Project Status:

The funding for this project was not available until late October 2002. Despite this delay, we have successfully extracted DNA from 70 Provo River spawners (2001), and performed AFLP analysis on these samples. Preliminary results have been compiled and presented at the TC meeting. We have recommended that this project be extended to include another year of data (summer 2002 spawners) because the 2002 fish seemed to represent a wider diversity of morphologies. This proposal has been submitted. Presuming that this additional work is funded, we plan to submit a combined final report before December 2003.

Accomplishments:

Our results from the 2001 spawners suggest that there are not genetically distinct groupings of suckers in Utah Lake. Morphologically “June-sucker-like” fish did not turn out to be more closely related to each other than to fish with other morphologies. However, the fish sampled in 2001 may not include an adequate number morphological “extremes”. We suggest that this work be extended to include the Provo spawners from 2002, which appear to capture a greater diversity of morphologies.

Budget:

Funds Provided: $ 12,650
Funds Expended: $ 12,650 (projected)
Remaining Balance: $ 0

Project Number: V.02.05 June Sucker Feed Study

Contact Person:

Doug Routledge
Utah Division of Wildlife Resources
Fisheries Experiment Station
1465 West 200 North
Logan, Utah 84321
(435) 752-1066 Ext. 16
(435) 752-6977 (fax)
dougroutledge@utah.gov

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.

The objective of the following studies was to determine the proper diet needed to provide the required nutrients for good growth and health. The goal of the following studies was to improve intensive culture methods to increase production and improve fish health.

Project Status:

Feed Study 1: This study began in January 2002 and was completed in May 2002.
Feed Study 2: This study began in May 2002 and will end in February 2003.

Accomplishments:

Feed Study 1: 1/17/02 – 5/8/02
The feed study began on 1/17/02 using a total of 4355 fish from lot number 010502SKJNPR03. These fish were being fed Bio Kyowa before the study began. This lot was divided equally into five treatment types with three replicates/treatment. A total of 290 fish were placed into each of the 15 troughs used. Initial length was 1.588" and the fish/lb was 871.42 with a condition factor of .0002867. The treatments used were Bio Kyowa, Silver Cup trout, Razorback (formulated by the Bozeman Fish Technology Center), Bio-Vita and Bio-Flake (from Bio-Oregon).

Results:

Diet	Number at End	Fish/lb	Length	% Mortality	Feed Conversion	Condition Factor
Bio Kyowa	368	571.68	1.92"	57.75	4.08	.0002468
Silver Cup	451	578.55	1.92"	48.28	2.92	.0002448
Razorback	796	444.13	2.01"	8.61	1.56	.0002792
Bio-Vita	799	409.05	2.02"	8.37	1.44	.0002955
Bio-Flake	847	553.47	1.88"	2.87	2.48	.0002709

Notes:
Bio Kyowa and Silver Cup have been the diets we have used in the past. In the past, we have had fairly high mortalities, chronic disease problems from the bacterial hemorrhagic septicemia and at times severe crippling rates. From this study, it is clear those diets are not acceptable for the overall health and condition of the June sucker. We had extremely high mortalities and poor feed conversions on these two diets.
A second feed study needed to be done. We needed to evaluate the Razorback, Bio-Vita and Bio-Flake more and we also needed to try other diets. The use of live feeds at initial feeding, such as artemia and rotifer's also needed to be evaluated.

Feed Study 2: 5/31/02 – Present (The study will probably end in February 2003)
This feed study began on 5/31/02 at initial feeding using 19,710 larval fish at an estimated 78,000 fish/lb. We are evaluating five different feeding regimes each with three replicates having 1,314 fish. In the past, larval fish were fed an artificial diet from BioKyowa, we needed to evaluate the use of live feeds at initial feeding. Four of the treatments, Razorback, Bio-Vita, Bio-Flake and Willow Beach were fed artemia for the first two weeks, and then we began feeding the different diet types along with the artemia for another two weeks. Four weeks after initial feeding, we began feeding 100 percent of the dry commercial diet types. One treatment was fed rotifers for the first two weeks. We then began feeding a Zeigler larval diet along with the rotifers. After 48 days of initial feeding we began feeding 100 percent Zeigler larval diet due to a crash in our rotifer population. We had hoped to feed the rotifers as part of their diet till the fish reached 1".

Results as of 11/30/02

Diet	Number to Date	Fish/lb	Length	Percent Mortality	Feed Conversion	Condition Factor
Artemia, Bio-Flake	3354	907.07	1.50"	14.92	1.46	.0003303
Artemia, Willow Beach, Bio-Diet	475	2272.35	1.21"	87.95	2.26	.0002502
Artemia, Bio-Vita	19	7834.74	.81"	99.52	3.19	.0002340
Artemia, Razorback	2822	903.68	1.55"	28.41	1.31	.0003063
Rotifers, Zeigler Larval Diet	2935	1628.12	1.21"	25.54	1.76	.0003546

It appears from this study that the Bio-Vita is by far the worst diet to use at initial feeding. This contradicts the results from our first study. In study #1, the Bio-Vita had the best-feed conversion, growth rate and condition factor, with fairly low mortalities. Comparing the two studies, the Bio-Flake and Razorback appeared to be the two best diet types. The Bio-Flake has had the lowest percent mortality of all treatments and the Razorback had the best growth rates, feed conversions and condition factors of the two, but 4.5 months into the second study the June sucker on the Bio-Flake began showing signs of severe crippling. Since mid October, the Bio-Flake crippling rates have increased significantly with very few cripples in the other diets, but the Zeigler diet is also beginning to have increased crippling rates.

Summary:
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 will use this as our control and vary the number of days we are feeding the brine shrimp. We also need to evaluate the Bio-Flake more extensively. We were having some very positive results with the Bio-Flake. Two months after initial feeding the fish being fed the Bio-Flake had the better growth rates and the lowest mortality rate, but 4.5 months after initial feeding, we began seeing increased crippling rates. We will begin feeding the Razorback and Bio-Diet two months after initial feeding of the Bio-Flake. We hope this will help reduce the crippling rates. We will also evaluate Zeigler's finfish diet.

Budget:

Funds Provided: OY 2002 = $6904.00
Funds Expended: $2,579.73 (Jan. 1, 2002 – Dec. 31, 2002)
Remaining Balance: $4,324.27 (As of Dec. 31, 2002)

Project Number: V.02.06 **Monitoring Trends in Adult June and Utah Sucker Populations in Utah Lake and Tributaries in 2002 (Provo, Spanish Fork, and American Fork Rivers, and Hobble Creek in 2002)**

Contact Person:

Krissy Wilson, Richard Hepworth, and Josh Rasmussen
Utah Division of Wildlife Resources
Central Region
1115 North Main Street
Springville, Utah 84663
(801) 491-5678
Fax: (801) 491-5646
krissywilson@utah.gov

Project Summary:

The goal of this project was to monitor trends of adult June 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 2002. 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 2002. June suckers were also sampled for using electrofishing equipment in the Spanish Fork River from mid-April through June 2002.

June sucker eggs and larval suckers were collected with light traps and drift nets in May, June and July 2002.

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

Task 1: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

Task 2: Monitor trends in the adult populations of June and Utah suckers in Utah Lake:
Trapnet sampling at the mouth of Provo River
Trapnet sampling throughout Utah Lake

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:

Funds Provided: $65, 029
Funds Expended: $65, 029
Remaining Balance: 0

Project Number: V.02.07 **Effects of Density and Location on Growth and Survival of Young Jun Sucker in Utah Lake**

Contact Person:

Dr. Mark C. Belk
Brigham Young University
Department of Zoology
175 WIDH
Provo, Utah 84602
(801 422-4154
Fax: (801) 422-7423
mark_belk@byu.edu

Project Summary:

This project has three objectives. 1) Quantify effects of density, and location (habitat) on growth rate and survival of June sucker in Utah Lake over their first summer. 2) Measure physical and biotic characteristics of habitats, and quantify change in food resources as a consequence of density treatments in different habitats. 3) Measure diet selectivity by young June sucker in different habitats and densities.

This project addresses two main tasks in the *June Sucker Recovery Plan*. First, results of this project will help determine what types of habitats favor growth and survival of young June suckers (Task 3.0). This information is critical for understanding consequences of proposed habitat enhancement or restoration alternatives. Second, results of this project will help determine the feasibility of growing-out large numbers of young June suckers in Utah Lake (Task 4.0). This information will be useful to understand effects of density and grow-out procedures in Utah Lake, and for

comparison to results from hatchery propagation or other alternatives. This SOW specifically addresses the tasks from the recovery plan listed below:

3.0 Evaluate and minimize factors limiting recruitment of June sucker
3.2 Restore or provide habitat limiting recruitment of June sucker in Provo River
3.4 Restore or provide habitat-limiting recruitment of June sucker in Utah Lake
3.7 Evaluate food availability for June sucker in Utah Lake
4.0 Enhance June sucker population in Utah Lake and its tributaries
4.1 Refine and continue to implement procedures augmenting existing June sucker population in Utah Lake.

Project Status:

Field work for this project was completed during summer 2002. Enclosures in three of the four locations were damaged by severe storms and falling water levels. Treatments in the Provo Bay location were not compromised, and we have evaluated growth and survival of young June suckers in response to density for this location. We are currently evaluating diet selectivity of June sucker and composition of invertebrate prey from enclosures. We anticipate completion of these tasks by early summer and submission of a final report by fall 2003.

Accomplishments:

Both survival and growth were affected by density. Surprisingly, lowest growth and survival rates were observed in the lowest density treatment (12 suckers/enclosure). Highest growth and survival rates were observed in the medium density treatment (22 suckers/enclosure). There was some indication of decreased growth and survival in higher density treatments (42 and 82 suckers/enclosure). These results suggest that successful recruitment may depend on some minimum density of young suckers (e.g., Allee effect). We recommend additional experiments to more clearly understand the relationship between density and vegetation, and growth and survival of young June sucker. Additionally, the design of enclosures that allowed access to the substrate accounted for some of the problems that led to the failure of enclosures. We suggest evaluating the importance of access to the substrate for growth and survival of June sucker.

Budget:

Funds Provided: $66,900
Funds Expended: As of December, 31, 2002 about $35,000 has been spent. ($66,900 will be spent by the end of the fiscal-year.)
Remaining Balance: $31,900 to be used for the tasks remaining as detailed above.

Project Number: V.02.08 **Investigation of Feeding and Spawning Behavior of Adult June Sucker in Red Butte Reservoir**

Contact Person:

Dr. Todd A. Crowl and Eric Billman
Ecology Center
Utah State University
5205 Old Main Hill
Logan, Utah 84322-5205
(435) 797-2498
Fax: (435) 797-1871
facrowl@cc.usu.edu

Project Summary:

Study 1: Identify characteristics of spawning sites within Red Butte Reservoir
We will use a combination of direct observations using scuba as well as spawning baskets and temperature/substrate sampling to identify spawning behaviors and sites. Because Red Butte is typically clear, fish can easily be followed and observed using SCUBA apparatus. We will begin weekly sampling regimes in May to see if we can identify and observe spawning behaviors. If we are successful, we will use underwater videography to capture these activities. Also, if spawning is observed, we will quantify spawning sites using physical, biological, and chemical parameters to determine preferences of site choice. 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 (Sigler and Sigler 1987; Zorn et al 1998) Substrates will be quantified using a Wentworth substrata scoring method. We expect to find spawning groups over similar substrates as those utilized by river spawning June sucker.

In addition to direct observation, we will also set out spawning baskets in various locations and habitat types throughout the reservoir. Baskets will have different substrate sizes to determine if spawning June suckers have a preference for habitat types, substrate, both, or neither. Finally, we will quantify micro-temperature characteristics of the reservoir to determine if groundwater sources are present in the reservoir. If we locate any of these, we will set up observation sampling to determine if they are used as spawning grounds.

Study 2: Quantify feeding behaviors and diet composition of adult suckers.
We will use observation blinds similar to those use by ornithologists to observe 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 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 one percent 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 (Johnson et al 2002).

Study 3: Identify potential sampling protocols for juvenile and small adult suckers.
Virtually no data exist for juvenile or small adults from Utah Lake. Part of the problem is that we have never identified sampling procedures or protocols that target that segment of the population. In addition, we have never established what kinds of habitats that this size class of fishes utilizes. To that end, we will use various sampling methodologies across all available habitats to assess basic characteristics of small suckers. We will use benthic and buoyant trapping methods using baited and unbaited minnow traps, pop nets that are designed to sample heavily vegetated areas as well as various sizes of hoop and trammel nets. Sampling efforts will occur at night and during the day in shoreline, open water and macrophyte areas. If we identify habitats utilized by juvenile and small adult suckers and procedures for sampling them, we will quantify feeding behaviors and diet composition of this size group of fishes.

Project Status:

Studies 1 and 2 will continue for an additional field season. Results from these studies will be presented in a report of all Red Butte studies in May 2004. Study 3 was completed during this year and results from final analyses will be presented in a report in May 2003.

Accomplishments:

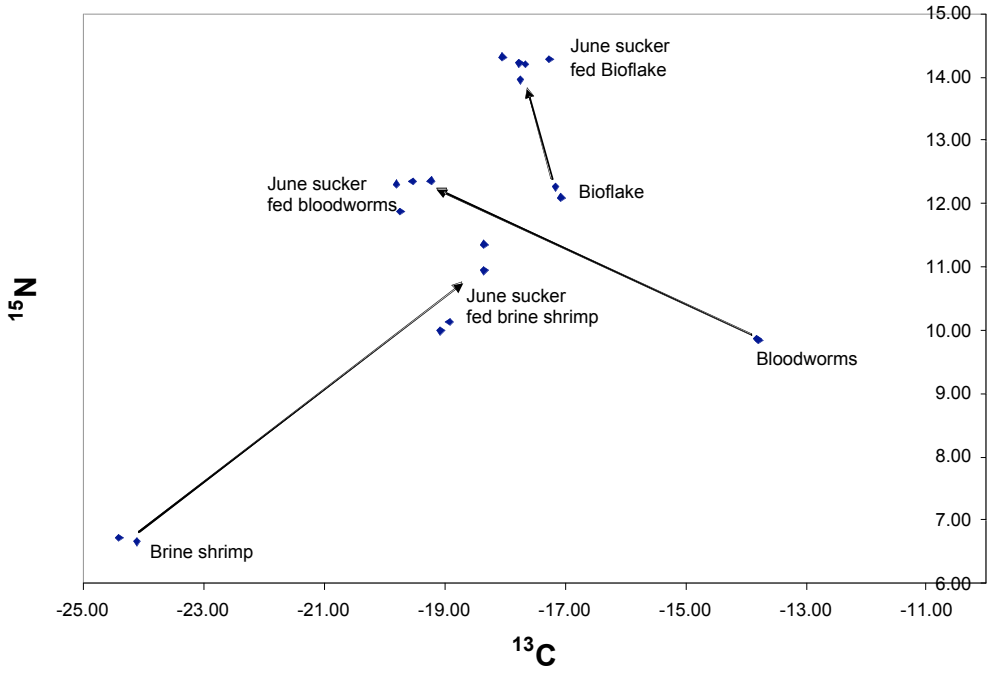
Study 1: Identify characteristics of spawning sites within Red Butte Reservoir
We had planned on determining spawning sites visually, using underwater videography and scuba diving observations. This was impossible because of algal blooms in the reservoir during May, June, and July (0.5 m secchi depth during these months) and more importantly, the extremely high levels of turbidity that we encountered, probably due to the crayfish invasion. We were able to estimate spawning duration for 2002 to be mid-May to the end of June using light trap data in Red Butte Reservoir and prior research on hatching periods and larval development (USFWS1999). Based on these findings, we are developing a study for Spring, 2003, to combine light trapping with egg

trapping to determine sites and duration of spawning (Schreiner et al 1995; Horn et al 1989).

Study 2: Quantify feeding behaviors and diet composition of adult suckers.
Muscle samples for stable isotope analysis were collected from 56 June sucker from all age classes between July 7-12. In addition, we collected phytoplankton, plants, zooplankton, insects, crayfish, cutthroat trout, and detritus samples to develop the food web of Red Butte Reservoir. This study will be continued in the summer of 2003.

In conjunction with the food web study, we are conducting a laboratory feeding study using larval June sucker and three food types (BioFlake, brine shrimp, and bloodworms). Results from this study should show the enrichment of stable isotopes in a predator compared to its prey (Figure). Results after 67 days showed good separation between tanks and food types but did not follow the three percent enrichment of ^{15}N and one percent enrichment of ^{13}C as expected (Figure). We suspect that deviations from these values occurred because larvae were feeding on either bacteria, fungal, or algal growing in the tanks; we observed larvae gleening sides of tanks on a few occasions.

Figure: Stable isotope graph of June sucker fed three different food types shows that the expected outcome (Figure 1) was not achieved. Deviations might be a result from June sucker gleening sides of tanks.



Study 3: Identify potential sampling protocols for juvenile and small adult suckers.
After finding we could capture juvenile June sucker in minnow traps, we began a trapping study around Red Butte Reservoir starting June 11 and ending September 7 (trapping was not continuous during this time period). Minnow traps were set at 32 sites in the littoral zone and six sites in the pelagic zone. At each site, we collected habitat

variables (substrate, vegetation, slope, depth of trap, temperature, and dissolved oxygen). No June sucker were captured in traps set at pelagic sites. At littoral sites, 44 June sucker were captured at 18 of the 32 littoral sites. Final analyses will potentially provide evidence for types of habitats that juvenile June sucker prefer.

Additional Findings -During habitat trapping for juvenile June sucker, we discovered high densities of crayfish, catching as many as 13 individuals in a single, unbaited minnow trap set overnight. Biomass of these crayfish is also high, large individuals weighing as much as 74 g wet weight. We believe that significant ecosystem level changes have occurred in the reservoir as a result of the crayfish: aquatic macrophytes have disappeared, turbidity levels have increased drastically since 1997 (1.5 NTU to 30.3 NTU), and secchi disk depths have decreased since 1997 (4.5 m to 0.75 m). Also, we discovered that the water column below six m went anoxic for a couple of weeks during August, presumably caused by the decomposition of algal blooms that occurred for the majority of the spring and summer months.

Budget:

Funds Provided: $32,200
Funds Expended: $26,745.02
Remaining Balance: $5,454.98

Project Number: V.02.09 **Development of Macrophytes in Utah Lake: Macrophyte Additions and Carp exclusions**

Contact Person:

Dr. Todd A. Crowl
Ecology Center
Utah State University
5205 Old Main Hill
Logan, Utah 84322-5205
(435) 797-2498
Fax: (435) 797-1871
facrowl@cc.usu.edu

Project Summary:

The decline of June Suckers in Utah Lake is undoubtedly a multi-faceted problem associated with habitat destruction and the introduction of non-native fish species. Our research over the past six to seven years suggest that in addition to the loss of spawning habitat in the Provo River (as well as other potential spawning tributaries), the loss of aquatic macrophytes has resulted in the loss of required habitat within the lake for YOY fish. This is especially true now given the introduction of all of the potential predatory fish such as white bass, catfish and walleye. The loss of macrophytes is

undoubtedly a combination of changes in lake level elevation that occur at a faster rate than historically possible due to water extraction and the introduction of carp. Carp have a two-fold effect on aquatic macrophytes through direct consumption, especially of fine roots and through increased turbidity levels because of their benthic feeding and swimming behavior. All of these factors taken to together have resulted in a much simpler structural environment within the lake environment itself. The few larval suckers that do make it from the river to the lake no longer have any structural refuge in which to avoid the much higher predation pressure that now exists.

The goal of this project is to understand how we can best re-establish extant macrophyte beds to provide the much needed structural habitat for young June suckers. We are using a combination of *in situ* field exclosure experiments coupled with artificial pond experiments to determine whether simply eliminating carp from localized areas is adequate to rejuvenate the macrophyte beds that do still exist in the lake. The alternative possibility is that even without direct carp grazing and perturbation, the lake now has too much turbidity and lake-level fluctuations to allow macrophyte re-establishment. In addition to determining the ultimate limiting factors to macrophyte maintenance, we are trying to determine which macrophyte species are most likely to be able to succeed within the existing confines of Utah Lake. There is anecdotal evidence that at least once species of *Potomageton* that is native to Utah Lake may be resistant to carp herbivory. We have identified a number of small patches of *P. pectinatus* that still exist in Utah Lake.

This project is comprised of three parts:
- Construct exclosures along the Utah Lake shoreline to manipulate carp, turbidity and water levels
- Introduce potted typha and a native floating macrophyte as our response organism
- Manipulate the fenced areas by adding carp, increasing turbidity and affecting water flux

Accomplishments:

Results:
Objective 1 - Construct exclosures along the Utah Lake shoreline to manipulate carp, turbidity and water levels

We constructed two types of enclosures as a test for macrophyte restoration. First, we built large cages with PVC frames that measured 3m x 3m x 3m in dimension. Cage frames were covered with 5 mm mesh netting. This was coarse enough to allow water movement through the cages, but fine enough to preclude fish from invading the cages. These cages were anchored into the sediments using 2 m fence posts. The cages are very versatile and are relatively easy to manipulate. However, because of the high winds and large wave action that periodically move through the lake, we found it necessary to add an addition fence around the windward side of the cages. By connecting all six cages together and anchoring all corners, and adding the wind/wave

break fence, we were able to keep these cages functioning in the mouth of Provo Bay throughout the summer and fall.

Because of the existence of some relatively large stands of macrophytes off the shoreline of the lake, we decided to try an additional 'fencing' approach. We constructed fences *in situ* around existing macrophyte beds by pounding 2.5 m, metal fence posts into the substrate and attaching heavy gauge plastic fencing material around the outside. The fencing material had a mesh size of approximately 5 cm. These fences held up very well through all types of storms and also proved effective at keeping carp out. We will use this type of enclosure for future work both in the lake and Provo Bay itself.

Objective 2 - Introduce potted typha and a native floating macrophyte as our response organism

We used a variety of macrophytes as potential restoration species. The literature has some interesting anecdotal reports that *Potemogeton pectinatus* is less prone to carp herbivory and destruction than other aquatic plant species. While we have not yet ascertained the accuracy of this report, we decided to include it in our experimental design. We were successful at being able to transplant *Potemogeton, Chara, Ceratophylum* and bulrush (*scirpus*) in our experiment. All four of these species proved relatively easy to transplant.

Objective 3 - Manipulate the fenced areas by adding carp, increasing turbidity and affecting water flux

We added carp to half (three) of our 3x3x3 cages. Unfortunately, because of the extreme wave action at the mouth of Provo Bay, we were unable to affect turbidity directly. However, by adding plastic sheeting to half of the cages, we were able to reduce turbidity by 80 percent. To simulate lake-level fluctuation, we periodically raised and lowered plants. In addition, because of the drought conditions, the lake naturally dropped by almost 1.6 meters.

Overall, carp and carp alone significantly affected macrophyte biomass and composition. Virtually all species of macrophytes were decreased in the carp addition treatments. Changes in turbidity or water level fluctuation had little effect on any of the macrophytes except *Chara*. This species was very sensitive to changes in water level change and virtually disappeared with either carp or water fluctuations alone.

In addition to changes in macrophytes, the benthic invertebrate communities were also significantly affected by the presence of carp. In Carp exclusions, the macroinvertebrates had higher species richness and diversity, but lower biomass. When carp were present, the benthic invertebrates were almost totally comprised of chironomids which attained very high densities (> 100 / m^2 . *Potemogeton* was the least affected of the plants as per previous suggestions. It appears that this species possesses some ability to withstand or avoid carp herbivory and bioturbation effects.

Recommendations:

Continue with the large scale fence exclosures within Utah lake and Provo Bay to see if we can enhance and re-establish large macrophyte beds that are suitable for June Sucker nursery and refugia.

Continue research on the physical and chemical properties of *Potemogeton pectinatus* to determine why it shows some resistance to carp herbivory.

Conduct a pond study to more carefully tease apart the effects of carp versus natural turbidity levels. This is especially important for *P. pectinatus* to see what the tolerance limits are for restoration potential.

Budget:

Funds Provided: $40,250
Funds Expended: $19,403.40
Remaining Balance: $20,287.30

Project Number: V.02.10 **Development of a Life-State Model for June Sucker**

Contact Person:

Mark C. Belk and Steven Peck
Department of Zoology
Brigham Young University
175 WIDH
Provo, Utah 84602
(801) 422-4154
Fax: (801) 422-7423
mark_belk@byu.edu

Project Summary:

The objective of this project is to produce and test a life stage matrix population model for June sucker to evaluate the relative importance of each life stage to population recovery. This research will help by evaluating if the most critical life history stages are being targeted in the management plan. It will also assist in identifying at what age protection from predators might be most effective. The model specifically addresses recovery goal 3.0 from the *Recovery Plan*.

3.0 Evaluate and minimize factors limiting recruitment of June sucker (USFWS, 1999)

Project Status:

This project has been slow in getting started. We have outlined the basic structure of the model and are currently in the process of building the model. We expect the model to be completed by April 2003, and a final report and working copy of the model to be provided by fall 2003.

Accomplishments: None yet.

Budget:

Funds Provided: $11,300
Funds Expended: As of Dec. 31, 2002 about $800 has been expended. We anticipate using $11,300 by the end of the fiscal year.
Remaining Balance: Currently $10,500

Project Number: V.02.11 **Development of Selection Criteria and Assessment of Primary and Secondary Refuge Sites for June Sucker**

Contact Person:

Ralph G. Swanson
Senior Biologist
CUPCA Office
Department of Interior
302 East 1860 South
Provo, Utah 84606-6154
(801) 379-1254
Fax: (801) 379-1209
rswanson@uc.usbr.gov

Project Summary:

Criteria are to be developed upon which selection of a primary, and at least one secondary, refuge can be based. Once criteria are established, all candidate refuges will be evaluated. One primary refuge will be recommended to hold naturally reproducing June sucker. In addition, one or more secondary refuge will be selected. Per the *Recovery Plan*, at least one secondary refuge should be within the historic Utah Lake drainage. Secondary refuges could be used to study June sucker life history, feeding, growth or conduct other important recovery studies. This population could also be used to augment Utah Lake populations.

Parameters for guidance in the development of criteria were included.

Project Status:

Project is being held in indefinite abeyance.

After consideration by the TC, it was apparent that many important issues relevant to current and potential candidate refugia for June sucker were pending. Proceeding with this project was considered pre-mature until these issues are resolved and a definite list of candidate refugia sites can be agreed upon. These issues were:

1. Future ownership and jurisdiction of Red Butte Reservoir (a current refugia site) could affect the opportunity to retain June sucker in that facility.
2. Status of decisions on repair to the dam at Red Butte is related to #1, and could impact future management of water in the reservoir.
3. Separate studies to assess feasibility of Mona Reservoir serving as a new candidate refugia in the Utah Lake basin have only begun. Thus information to fairly assess the feasibility of Mona will not be available until 2004 or later.
4. Decision by UDWR to continue to maintain and manage Ogden Nature Ponds Camp Creek Reservoir (current refugia) for the interim future as part of the Genetics Management plan render assessment of these facilities moot.
5. Preliminary discussions regarding the feasibility of securing local farm ponds as refugia did not proceed to exploration of possibilities with landowners. The potential for such ponds to be evaluated as candidate refugia was thus impossible.

Date of completion for this project is unknown.

Accomplishments:

No accomplishments. This project should remain in suspension until a consensus list of candidate refugia sites can be produced.

Budget:

Funds Provided: $13,275 approved by AC.
Funds Expended: $0.00 (No JSRIP funds were expended.)
Remaining Balance: None. All funds were reprogrammed and expended on other approved recovery tasks.

Project Number: V.02.12 **Use of Human Chorionic Gonadotropin (HCG) to Induce Increased Maturation of Gametes in June Suckers**

Contact Person:

Doug Routledge
Utah Division of Wildlife Resources

Fisheries Experiment Station
1465 West 200 North
Logan, Utah 84321
(435) 752-1066 Ext. 16
Fax: (435) 752-6977 dougroutledge@utah.gov

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. 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 human chorionic gonadotropin (HCG) to induce spawning of the June sucker needs to be evaluated. 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. The amount of HCG to use per kg of body weight needs to be evaluated as well as the number of consecutive days it should be administered to both the males and females. It also needs to be determined at what stage of ripeness the eggs should be before HCG is administered. If HCG is not injected at the appropriate time, ovulation will not be increased.

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. The objective was to induce spawning of the June sucker so that maximum fecundity, egg survival and hatch rates could be achieved in a hatchery environment.

Project Status:

The HCG study ran from May 6 – July 10, 2002 and it is completed.

Accomplishments:

All males and females were selected by external characteristics. The females were selected if the vent was swollen and protruding and if the abdominal area appeared somewhat soft. The males were selected if they gave a small amount of milt. In the past, we have had success selecting our males and females in this manner. We had hoped to take an egg sample from the female to observe the location of the germinal vesicle to help us determine the ripeness of the egg. We used several sizes of catheter tubing, but we were unable to collect eggs this way.

First series of injections:
On 5/6/02 we began our first series of injections on the females. A total of 17 females from the 1992 – 1995 lots were used. The females were injected for five straight days. None of the females gave eggs.

HCG IU/KG of Body Weight Used	Number of Females Used	Average Weight in Pounds
1500	4	1.37
1000	3	1.02
750	4	1.23
500	2	1.06
250	2	1.43
Saline	2	.94

On 5/8/02 we began a series of injections on the males. A total of 16 males from the 1992 – 1995 lots were used. All of the males were injected with HCG at 500 IU/kg of body weight. Due to increased milt production all but four males were injected for two straight days. The other four males were injected again on the third day. After the three injections, these four males had increased milt production.

Second series of injections:
On 6/7/02 we began our second series of injections on the females. A total of 16 females from the 1989 – 1994 lots were used and they were injected with HCG for five straight days. The females were checked for eggs on June 12,13, 14 and 15, but none of the females became ripe.

HCG IU/KG of Body Weight Used	Number of Females Used	Average Weight in Pounds
1500	4	1.45
1000	4	1.61
750	2	1.33
500	2	1.31
200	2	1.45
Saline	2	1.43

On 6/8/02 we began a series of injections on the males. A total of 17 males from the 1989 – 1994 lots were used. All of the males were injected with HCG at 500 IU/kg of body weight. Due to increased milt production all but three males were injected for two straight days. The other three males were injected again on the third day. After three injections, these three males had increased milt production. On 6/12/02, Ronney Arndt used three of the males to evaluate sperm extenders on the milt. On 6/20/02, we checked the males to see how many still had milt. Six out of the remaining 13 gave milt.

Third series of injections:
On 7/5/02 we began our third series of injections on the females. A total of eight females from the 1989 –1994 lots were used and they were injected for five straight days. None of the females gave eggs.

HCG IU/KG of Body Weight Used	Number of Females Used	Average Weight in Pounds
1500	2	1.53
1000	2	1.54
750	2	1.75
500	2	1.42

On 7/6/02 we began a series of injections on males. A total of ten males from the 1994 – 1995 lots were used. All of the males were injected with HCG at 500 IU/kg of body weight. Due to increased milt production five of the males were injected for only two straight days. The other five males were injected again on the third day. Four of the five males given three injections had really thick coagulated milt before the second injection. These fish were checked before the 3rd injection and the milt came out freely and was not coagulated or thick. These males must not have been ripe enough going into the second injection.

Summary:
It is very puzzling to us as to why the females in this study did not become ripe enough to ovulate. In the past, we have had success injecting our females with 1,000 IU/kg of body weight for four straight days. On May 26, 1999 we selected five females from the 1989 – 1992 lots for HCG injections. The females with a swollen vent and softness of the ventral region were selected. On the 3rd day of injections, two females gave eggs and on the 4th day the other three gave eggs. All of the females were spawned on the 5th day after the first injection with males that had been injected with HCG for two straight days at 500 IU/kg of body weight. A total of 19,250 eggs were taken and on 8/30/99 13,532 June sucker were stocked.

We are not sure what might be responsible for the negative results in our 2002 study. In the past, our June sucker, were on 60 F water. In January 2002, all of our fish were placed on 66 F water with the construction of our new June sucker facility. It might be that the additional increase of six degrees is not allowing the eggs to develop. The females used were also placed on a different diet and this might be causing a problem. In 1999 the females were being fed BioKyowa and in January 2002 our females were placed on the new Razorback diet.

We need to further evaluate the use of hormones to induce spawning on June sucker. We need to place some of our brood stock in water less than 60 F to see if this helps in gamete development. Along with that, we need to try using a Luteinizing hormone-releasing hormone analog (LHRHa) along with a dopamine blocker. We may also need to use the LHRHa in combination with HCG and a pituitary extract. We will also need to try these hormones on the brood stock being held in 66 F water.

Budget:

Funds Provided: $2,140.00 (OY2002)
Funds Expended: $67.77 (HCG had already been purchased from previous years.) budget
Remaining Balance: $2,072.23 (As of Dec. 31, 2002)

Project Number: V.02.13 **Fisheries Experiment Station Technical Services for June Sucker Fish Health Program**

Contact Person:

Patrick Goddard, DVM, MS
Utah Division of Wildlife Resources
Fisheries Experiment Station
1465 West 200 North
Logan, Utah 84321
(435) 752-1066 Ext. 11
Fax: (435) 752-6977
patrickgoddard@utah.gov

Project Summary:

This is an ongoing project designed 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.

Accomplishments:

Fish Health Inspections
In accordance to the sub-objective described in the SOW, 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. 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. 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 2002:

Fisheries Experiment Station June Sucker Facility – Logan
Fish Health Approval Number: DWR02012 Expiration: 08/13/03
Along with the research and culture of Rainbow and Cutthroat Trout at FES, June Sucker are being held and reared in a new Facility that was completed in January 2002. A lethal sample of sixty fry (two months) from four lots (all originating from the Provo River) were collected on August 13, 2002 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.

Wahweap State Fish Hatchery – Page, AZ
Fish Health Approval Number: DWR02009 Expiration: 05/21/03
This warm water hatchery is located just north of Page, AZ and contains numerous stocks of warm water fishes, including June Suckers. A full lethal sample of 60 fish were obtained from the hatchery in May of 2002. No evidence of filterable agents was found. Likewise, no intestinal cestodes (AT) were found, however it was still recommended to prophylactically treat any fish to be transported with praziquantel beforehand.

Red Butte and Camp Creek Reservoirs
It was decided that no June Suckers were to be transported from these reservoirs in 2002, so it was not necessary to sacrifice any fishes for inspection purposes. If and when fish are to be transported in the future, it will be necessary to recertify the populations 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 the spring of 2002, several June Suckers were exhibiting hemorrhaging and ulceration of the skin. A sample of moribund fish was sacrificed, and an outbreak of *Aeremonas* septicemia was diagnosed in the population of fingerling June Suckers. Husbandry improvements were made to decrease the possibility of an epizootic by these pathogens.

Later that fall, a group of fingerlings were found to be flashing, and mortalities increasing. Microscopic examination of this group revealed numerous ciliated protozoa on the external body surface, and the gills were covered with mucus as well as ciliated protozoa with horseshoe shaped nucleus' (presumed to be *Ichthyophthirius multifiliis*). This outbreak of "ich" was successfully controlled with repeated formalin treatments using a drip system. Adjacent tanks were prophylactically treated and biosecurity

measures were instituted to prevent the spread of the disease. During this same time period, numerous fish were found to be developing erosive lesions on their nares. The sites were swabbed, and various media were inoculated. The bacterial cultures were identified as gram positive cocci, and further identification is currently being pursued.

Finally, throughout the year and in past years, culturist had 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 was performed, and the findings were normal. Samples of liver were analyzed for the presence of heavy metal (Zn toxicity), and again, no significant findings were noted. It is possible that the condition is related to nutrition and/or a genetic abnormality. The group of fish will continue to be monitored, and hopefully the underlying problem(s) will be diagnosed and corrected.

Project Status:

This is an ongoing project. It is anticipated that in the OY 2003 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:

Funds Provided: $11,680
Funds Expended: $3,704
Remaining Balance: $7,904

Project Number: V.02.14 **Monitor and Maintain June Sucker Refuge Populations in Red Butte and Camp Creek Reservoirs, and Arrowhead Pond**

Contact Person:

Krissy Wilson, Richard Hepworth, Josh Rasmussen, and Paul Thompson
Utah Division of Wildlife Resources
Central Region
1115 North Main Street
Springville, Utah 84663
(801) 491-5678
Fax: (801) 491-5646
krissywilson@utah.gov

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
Eight hundred forty-one June suckers were captured at Red Butte Reservoir, using trap and trammel nets. Seventeen of the 841 suckers captured were recaptures ranging in size from 73 mm to 496 mm. Six mortalities occurred. All fish were released back into the reservoir.

The June sucker population in Red Butte Reservoir was estimated with the modified running Schnabel Program (Version 3.0) to be 16,648 (95 percent CI: 10,974 < N < 28,277).

The number of June sucker over 200 mm was estimated to be 9,868 individuals (95% CI: 6,505 < N < 16,761). This analysis was conducted to compare with population estimates in previous years. The population of suckers over 200 mm was estimated to be 4,536 in 1998 and approximately 6,287 in 1999 (95 percent CI: 4,305 < N < 9,478). This indicates the population of fish over 200 mm is increasing at a rate of about 28 percent per year since 1998.

The population size of June suckers in Red Butte Reservoir is on the increase but does not appear to be in poor health (R. Hepworth, *pers. observation*) and did not exhibit signs of starvation due to overcrowding. However, Bonneville cutthroat trout captures rates have declined from previous years. Therefore, we recommend culling additional June sucker from Red Butte Reservoir in 2003.

Camp Creek Reservoir
The one trammel net and two gill net sets resulted in the capture of 34 June sucker. Two distinctive size groups of June sucker were caught with multiple age groups likely present. Gill net #1 caught 11 June sucker (5.5/net hour) of both size groups. Gill net #2 caught eight June sucker (4.0/net hour) of both size groups. The trammel net caught 15 June sucker (6.43/net hour) of the larger size group. Only one June sucker was a recapture. This fish was a hatchery fish from the 1994 lot and had been caught during the 2001 sampling as well. It had grown from 208 mm TL to 236 mm TL in a year. The remaining 33 June sucker were PIT-tagged and released.

The number of June sucker sampled in 2002 at Camp Creek Reservoir (n=34) was the lowest number observed since standardized monitoring began with two gill nets and one trammel net in 1997. The lower numbers observed during 2002 likely were a function of 992 June sucker being removed from Camp Creek Reservoir in 2001 during the transplant effort to Utah Lake. The 992 June sucker include the number of fish moved, mortalities during sampling, and fish required for disease certification. Although the numbers of June sucker sampled during 2002 were lower, multiple age classes still remain in the reservoir and left untouched, this population should rebound quickly within a few years. Any efforts to move additional fish from Camp Creek Reservoir should not begin until 2004 at the earliest. Annual monitoring should be continued at Camp Creek Reservoir.

Arrowhead Pond
All sampling in Arrowhead Pond was with one trammel net. The sampling in March produced 17 June sucker (18.5/net hour). Four of the fish were recaptures and had grown (mm TL) the following:

2000	2001	2002
	370	374
392		422
380		414
375		395

In addition, 22 dead June sucker were observed and pulled from Arrowhead Pond. Of the 22 fish, 10 fish were PIT-tagged from pervious sampling events. These fish were initially tagged between 1997-1999.

The sampling in October produced no fish.

The sampling in November produced one June sucker (0.5/net hour), which had not been previously tagged.

The low number of June sucker sampled during the fall of 2002 (n=0 in October and n=1 in November) in Arrowhead Pond indicates probable water quality problems in this pond during the past year. Drought conditions during the last three years have likely resulted in the water quality problems. The March 2002 sampling indicated that a partial winterkill occurred during the winter of 2001/2002. The number of live fish observed (n=17) in March, however, indicated that a good proportion of the population still remained in the pond. Prior to the 2002 fall monitoring, the lowest number of June sucker sampled since standardized monitoring began in 1997 had been eight fish in 2001 with the highest number sampled being 36 fish in 1998. The Arrowhead Pond population of June sucker should be monitored more frequently during 2003 to determine the extent of the remaining population. If drought conditions persist during 2003, this population may be in jeopardy.

Budget:

Funds Provided: $16,105
Funds Expended: $16,105
Remaining Balance: 0

INFORMATION AND EDUCATION

Project Number: VI.01.01 **Develop Short-term Approach and Long-term Information and Education Strategy**

Project Summary:

This project was carried over to 2002 as a request for proposal (RFP).

Accomplishments: The RFP will be advertised in 2002.

Project Status: No report is required.

Budget:

Funds Provided: $25,000.00
Funds Expended: $0
Remaining Balance: $25,000.00

Project Number: VI.02.01 **Developing a Media Relations and Public Outreach Program for the June Sucker Recovery Implementation Program**

Contact Person:

Chris Keleher
Program Director's Office
Central Utah Water Conservancy District
355 West University Parkway
Orem, Utah 84058
(801) 226-7147
Fax: (801) 437-3168
ckeleher@cuwcd.com

Project Summary:

A request for proposals was advertised in February 2002 to assist the JSRIP in developing a media relation and public outreach plan for the JSRIP. The SOW included:

1) working with the JSRIP to develop a proactive media campaign which will nurture and instill a positive view of the JSRIP and the Utah Lake ecosystem in the public eye,

2) working with the JSRIP to develop and information and education plan for the local public,
3) working with the JSRIP to develop a community outreach plan for local municipalities and other entities,
4) reporting to JSIRP committees and preparing a final report.

Based on the merit of their proposal and the credentials of their team, Vanguard Media Group (Vanguard) was awarded the contract to develop a communications plan for the JSRIP. Their proposal included four phases: 1) research, 2) development, 3) testing, and 4) implementation. The JSRIP funded the first two phases of Vanguard's proposal, which included research and plan development.

The research phase consisted of conducting a public opinion survey of 500 adults drawn to accurately reflect the population distribution of Utah's counties. In addition, Vanguard conducted 28 one-on-one interviews with stakeholders; held working group meetings with six stakeholder groups; and conducted a fact-finding mission to determine the type of public information available about June sucker, Utah Lake, the JSRIP, and similar programs. A final report summarizing the results of their research findings was distributed to JSRIP participants.

Key research findings include: how Utah Lake is used, how Utah Lake is perceived, what people know and think of the June sucker, how people feel about the JSRIP, who is likely to oppose the JSRIP, what issues are likely to arouse opposition, and where stakeholders and the public get their information.

Project Status:

This project has been completed as of June 2003. A final version of the communications plan was distributed to program participants via electronic mail (e-mail) in June 2003. Hard copies are available to JSRIP participants upon request from the PDO. A request for proposals to implement the communications plan has been advertised. A three to five contract to implement the communications plan for the JSRIP will be awarded to the successful bidder.

Accomplishments:

The JSRIP has recently (June 2003) advertised a request for proposals to initiate implementation of the communications plan. Once a bidder is selected, a SOW for the first year of implementation will be drafted for JSRIP committee approval.

Budget:

Funds Provided:	$75,000.00
Funds Expended:	$75,000.00
Remaining Balance:	$0

Project Number: VI.02.02 **Development of a Web Page for the June Sucker Recovery Implementation Program**

Contact Person:

Yvette Converse
Utah Field Office – Ecological Services
U.S. Fish and Wildlife Service
2369 West Orton Circle
West Valley City, Utah 84138
(801) 975-3330 Ext. 144
Fax: (801) 975-3331
Yvette_converse@fws.gov

Project Status:

The website was not developed in CY 2002 and has been identified as a valuable program project for CY 2003. Funding will be carried over for CY 2003.

Budget:

Funds Provided: $2,500.00
Funds Expended: $0
Remaining Balance: $2,500.00

Project Number: VI.02.03 **Recording Historic Accounts of Utah Lake with Emphasis on the Native Fish Community**

Chris Keleher/ Vanguard Media Group
Program Director's Office
Central Utah Water Conservancy District
355 West University Parkway
Orem, Utah 84058
(801) 226-7147
Fax: (801) 437-3168
ckeleher@cuwcd.com

Project Summary:

In July 2002, the JSRIP released a request for proposals to research and prepare an historic account of Utah Lake with an emphasis on the native fish community. The intent of this project is to raise public awareness of the

importance and benefit of the Utah Lake ecosystem and to shift negative public attitudes towards Utah Lake and its native fishes through educating the public of the role Utah Lake and its native fishes played in the history of this area. Vanguard Media Group (Vanguard) partnered with local historian, Robert Carter, and was awarded the contract for this work in August 2002. Their proposal included two phases: 1) Research Gathering, which includes historic records and accounts, and personal interviews; and 2) Book Development. Disseminating the book to the public was not included in the 2002 Annual Work Plan, but was deferred until 2003.

Project Status:

Robert Carter has been compiling historic information on Utah Lake from journals, libraries, historical societies, newspapers, and interviews for a number of years. His collection includes images and information on the ecosystem, the fish community, the early fishing industry, early resorts around the lake, boating, sport fishing and what the lake has meant to the people living in the area. Robert has compiled his information into the most thorough chronologic account of Utah Lake available, beginning with pre-history and continuing though the present.

To supplement the information compiled by Mr. Carter, Vanguard staff have conducted 25 one hour, one-on-one interviews with local senior citizens to obtain personal accounts and photographs of Utah Lake and its native fish. Interviews were recorded on tape and transcribed. Exerts from personal interviews are being integrated with the information compiled by Mr. Carter to add a personal touch to the book.

The information compiled by Mr. Carter was considerably more thorough than originally anticipated. Including historic photographs and accounts from personal interviews with Mr. Carter's text would have made the book much longer than the 200 pages originally intended. Through consultation with the PDO, staff at Vanguard have been using Mr. Carter's text as a guide for information to combine with personal accounts and photographs for the book. It is anticipated that a first draft of the book's text will be completed by mid-July 2003. The goal is to have a final version of the book available in the fall of 2003 for the Great Salt Lake Book Festival organized by the Utah Humanities Council.

Accomplishments:

A thorough chronologic history of Utah Lake with emphasis on its native fish has been compiled. Twenty-five one-on-one interviews were completed and hundreds of historic photographs have been reviewed and catalogued. Through the summer of 2003, the PDO will be coordinating with Vanguard to synthesize components of the chronology with exerts from personal interviews and historic photographs into a book that reflects the overall image and vision of the JSRIP.

Budget:

Funds Provided:	$60,000.00
Funds Expended:	$38,131.78 (as of March 2003)
Remaining Balance:	$21,868.22 (as of March 2003)

PROGRAM MANAGEMENT

Project Number: VII.02.01 Program Director's Office Management

Contact Person:

Reed E. Harris
Program Director's Office
1594 West North Temple, Suite 3310
Salt Lake City, Utah 84114
(801) 538-7420
Fax: (801) 538-5544
reedharris@utah.gov

Chris Keleher
Program Director's Office
Central Utah Water Conservancy District
355 West University Parkway
Orem, Utah 84058
(801) 226-7147
Fax: (801) 437-3168
ckeleher@cuwcd.com

Project Summary:

The 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 accomplishment, budgeting, and reporting.

Accomplishments:

This *JSRIP Program Accomplishments* report provides the details of CY 2002 efforts.

Project Status: This project is ongoing.

Budget:

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

Project Number: VII.02.02 **Participation in Program Committee Meetings**

Contact Person:

Reed E. Harris
Program Director's Office
1594 West North Temple, Suite 3310
Salt Lake City, Utah 84114
(801) 538-7420
(801) 538-5544 (fax)
reedharris@utah.gov

Project Summary:

This recovery element provides an estimate of "in-kind" costs to agencies participating in the JSRIP. Costs for attendance at all Administration Committee and TC meetings, work assignment related to the JSRIP and all other costs associated with agency's involvement in organizing and implementing program goals and objectives.

Project Status: This project is an ongoing effort.

Budget:

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

Project Number: VII.02.02 **UDWR Administration Costs for Project Number V.01.06 and IV.01.09**

Contact Person:

Reed E. Harris
Program Director's Office
1594 West North Temple, Suite 3310
Salt Lake City, Utah 84114
(801) 538-7420
Fax: (801) 538-5544
reedharris@utah.gov

Project Summary:

UDWR provided a one-time cost to help them administer staff and to provide technical support and guidance above that effort assigned to specific UDWR projects.

Budget:

Funds Provided: $60,000.00
Funds Expended: $60,000.00
Remaining Balance: $0