

SCOPE OF WORK

Lead Agencies:

Central Utah Water Conservancy District
U.S. Fish and Wildlife Service
Utah Division of Wildlife Resources

with assistance from Utah State University

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Project Title:

Prepare a long-term management plan for Red Butte Reservoir and Implement Crayfish Control

Project Number:

Project Number: IV.05.03

Relationship to Recovery Program/Category:

This project corresponds to the following tasks identified in the June Sucker (*Chasmistes liorus*) Recovery Plan (Recovery Plan; USFWS 1999):

- 1.2.1 Establish a primary refuge population*
 - 1.2.1.1 Identify and select potential sites*

1.2.1.2 Secure selected refuge sites

1.2.2 Establish secondary refuge populations, with at least one location in the Utah Lake historic drainage

1.2.2.1 Identify and select potential sites

1.2.2.2 Secure selected refuge sites

This project is included under the JSRIP recovery element Genetic Integrity and Augmentation. A major purpose of the refuge population at Red Butte Reservoir is to serve as a “back-up” population for reintroduction should some catastrophic event extirpate June sucker from Utah Lake. In this regard, the Red Butte Reservoir population should have, to the extent possible, genetic diversity similar to the wild population of Utah Lake.

Project Background Information:

Red Butte Reservoir was built in 1930 as a water supply of Fort Douglas at the base of Red Butte Canyon 1.5 miles east of the University of Utah. After 55 years, the fort switched to municipal water supply from Salt Lake City (Southworth 2002). Until recently, the reservoir was in federal ownership and was managed by the United States Forest Service as part of a protected research natural area. In 2004, the ownership and management responsibility for the reservoir was transferred to the Central Utah Water Conservancy District (CUWCD). The reservoir, which covers about 10 acres, is fed by Red Butte Creek. Under current management, the reservoir’s maximum depth is 10.5m but fluctuates throughout the year between 9.5m and 12m.

Red Butte Creek, above Red Butte Reservoir, was chemically treated with rotenone in 1983, 1986, and 1987 to remove brook trout, rainbow trout and an unknown cutthroat trout species. Since 1987, Red Butte Creek has been managed for native Bonneville cutthroat trout. Prior to 1996, Red Butte Reservoir was managed as a recreational fishery for disabled veterans from the Veterans Hospital in Salt Lake City. For this purpose, albino rainbow trout were stocked into the reservoir. To protect the native Bonneville cutthroat trout in Red Butte Creek from potential hybridization, a barrier was placed in the stream at the USGS gaging station. Albino rainbow trout stocking was terminated in 1996 so that the population of Bonneville cutthroat trout residing in Red Butte Creek could expand into the reservoir. The Red Butte Creek/Red Butte Reservoir population has been designated a conservation population in the Conservation Agreement and Strategy for Bonneville Cutthroat Trout (CA&S; Lentsch et al. 1997); however, due to a paucity of Bonneville cutthroat trout in the reservoir this designation is being removed for the reservoir in the revised CA&S (Mike Slater, personal communication).

Following the 1987 chemical treatment of Red Butte Creek 60 Bonneville cutthroat trout were transplanted from Little North Willow Creek, a drainage located about 3 miles south of Red Butte Canyon. In 1992 and 1994 an additional 21 and 50 fish were

transplanted from Little North Willow Creek, respectively. In addition, about 3,400 Bonneville cutthroat trout fry have been released into Red Butte Creek between 1989 and 1996 using a streamside incubator to hatch eggs collected from Little North Willow Creek and Red Butte Reservoir fish (Don Wiley, personal communication).

Approximately 3200 June sucker from the 1987, 1989 and 1991 year classes were introduced into Red Butte Reservoir in 1992. Monitoring efforts in 1996 confirmed that June sucker had spawned in the reservoir in 1995. Subsequent monitoring efforts have confirmed that June sucker have been successfully recruiting each year. IN 2003, after adjusting for tag loss, the estimated June sucker population abundance was 13,556 ($11,499 < N < 16,510$; Crowl and Billman 2004). This is particularly surprising since June suckers have been considered an obligate river spawner (Sigler and Sigler 1987).

The June Sucker Recovery Plan identifies the need to develop protocols to protect genetic integrity of captive stock and to maximize genetic diversity. Guidelines are being developed and incorporated into a Captive Fish Management Plan as information becomes available (Andersen 2004). The intent of a refuge population is to serve as a protected source population. In the event that the natural population is extirpated, the refuge population would serve as the founder population for reintroducing June sucker into their natural habitat. In this regard, the genetic composition of the natural population should be reflected to the maximum extent possible in the refuge population.

Recent results of genetic analyses indicate that the Red Butte Reservoir population of June sucker has lower genetic diversity than the Provo River spawning population and that the two populations are genetically divergent (Karen Mock, unpublished data).

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

As stated in the Environmental Assessment for the Property Transfer and Improvements of Red Butte Dam and Reservoir (EA; SWCA 2002), operation and management will focus on providing a long-term refuge for June sucker. Opportunities for assisting in the conservation of Bonneville cutthroat trout will be coordinated through the JSRIP with the Utah Division of Wildlife Resources, as they have management authority for the species.

Recently, a nonnative crayfish species was illegally introduced into the reservoir. Researchers from Utah State University used mark-recapture techniques to calculate a population estimate of 7,381 individuals in the spring of 2003. After this initial estimate, 3982 crayfish were removed throughout the course of the summer. At the end of the summer, another recapture effort resulted in a population estimate of 11,660 individuals (Crowl and Rigsby, 2004 status report). In the spring of 2004 the population was estimated at 8181 individuals. Throughout the spring and early summer of 2004, 252

female crayfish (mostly gravid) were removed from the system. The response in the population included a shift in size distribution with fewer small individuals and a shift in sex ratio (male:female sex ratio of 1:1 in 2003; 4:1 in 2004).

Some general observations of the current status of the Red Butte Reservoir aquatic community include: 1) crayfish were first observed in Red Butte Creek above the reservoir in 2002 (Crowl, personal communication); if crayfish become established (i.e. reproduce and recruit) above the reservoir, their eradication from the system will be extremely difficult; 2) over the past decade the reservoir has shifted from a clear water state with rooted aquatic macrophytes to a turbid state devoid of macrophytes; 3) as a result of this shift, the hypolimnion is experiencing anoxic conditions and these conditions were more extreme in 2004 than 2003; 4) a cyanobacteria (blue-green algae) bloom occurred in the reservoir in 2004, a phenomenon not previously noted for the system; 5) the combination of hypolimnetic anoxia and cyanobacteria elevate the concern of the potential for a fish kill.

Members of the JSRIP technical committee have concluded that a long-term management plan that integrates the maintenance of a June sucker refuge population with Bonneville cutthroat trout conservation is needed. The technical committee also concludes that crayfish control/eradication is a necessary component of managing Red Butte Reservoir and control efforts should be implemented as soon as possible. The purpose of this scope is two-fold: 1) lay the groundwork for completing the management plan; and 2) identify and outline the most effective course of action for initiating crayfish control in 2005.

Goals, Objectives and End Product(s):

The initial goal of this project is to develop a management plan for Red Butte Reservoir that integrates the long-term maintenance of the June sucker refuge population with conservation of Bonneville cutthroat trout.

Management Plan Development

The objectives include:

- 1) incorporate genetic conservation management planning into long-term maintenance of the June sucker gene pool in Red Butte Reservoir;
- 2) identify strategies to promote the long-term conservation of June sucker in the presence of Bonneville cutthroat trout (and potentially other native aquatic species as a simulation of the natural community of Utah lake) through natural community dynamics;
- 3) develop dam and reservoir operation and management protocols;

- 4) determine the threats posed by nonnative crayfish and identify mechanisms for their eradication/control;
- 5) develop population targets (i.e. population size, age structure, etc.) for June sucker and Bonneville cutthroat trout;
- 6) identify opportunities for habitat improvements to benefit the aquatic community;
- 7) determine monitoring needs and develop a long-term monitoring plan for the reservoir fish community and associated habitats; and,
- 8) determine potential long-term research opportunities for the reservoir fish community that may provide ecological insight into recovery and conservation efforts on Utah Lake.

The purpose of developing this plan is to coordinate conservation and recovery efforts and to provide managers with a long-term (15-year) plan for the conservation of fish species and their related habitats in Red Butte Reservoir. The end product will be a written document detailing the long-term management plan for Red Butte Reservoir.

Management Actions

The goal of management actions to be initiated in 2005 is to control/eradicate nonnative crayfish and provide a mechanism that allows for increasing the genetic diversity of the June sucker population in Red Butte Reservoir.

Management objectives for 2005 include:

- 1) insure National Environmental Policy Act (NEPA) compliance for proposed action;
- 2) collect and transfer June sucker;
- 3) drain the reservoir; and,
- 3) implement crayfish control.

Methods and Approach:

A planning committee with representatives from various agencies and technical experts as designated will continue to operate as a subcommittee to the JSRIP Technical Committee and will coordinate in the drafting of the plan.

The plan will consist of the following:

- 1) a comprehensive history that includes management of the reservoir and its fish species, ecological shifts, research, etc.;
- 2) a clear and comprehensive statement of desired future conditions of the Red Butte Reservoir fish community and associated habitat;
- 3) clearly defined goals and objectives for the reservoir fish community, and the role of the reservoir in the long-term, range wide recovery and conservation of June sucker and Bonneville cutthroat trout;
- 4) justification for selection of goals and objectives over possible alternatives;
- 5) identification of issues associated with goals and objectives and mechanisms to resolve issues;
- 6) action strategies, to include timelines and budgets, for achieving the goals and objectives for the reservoir fish community;
- 7) a thorough assessment of available science from literature, on-site data, expert opinion, and sound professional judgment to support the management plan;
- 8) identification of an adaptive management process which allows for effective coordination, interaction, and cooperation of responsible authorities, including the JSRIP, Utah Division of Wildlife Resources, U.S. Forest Service, U.S. Fish and Wildlife Service, CUWCD, and possibly others; and
- 9) incorporation of an ecosystem approach in consideration of the broader goals and objectives of the U.S. Forest Service management plan for the Red Butte Canyon Research Natural Area;

Research/Management Actions will consist of the following:

- 1) complete NEPA compliance – the U.S. Fish and Wildlife Service will draft and submit an amendment to the EA
- 2) collect and transfer June sucker and Bonneville cutthroat trout – the UDWR will lead the effort to transfer fish from the reservoir as it is drained. Trammel nets will be the most efficient method of removing all size classes of suckers from the reservoir. Sinking large-mesh, floating large-mesh, and small-mesh trammel nets will be used. We will maintain a set duration for trammel nets of one hour. Trapnets, minnow traps, and electrofishing will also be used to remove suckers. Seine hauls will be conducted with assistance from Bill Loy, commercial

fisherman. All June suckers captured, greater than 150 mm (~7,000), will be PIT tagged, weighed, measured, and placed in hatchery trucks/trailers and transported to Utah Lake and released daily. All June suckers less than 150 mm (~ 6,500) will be transported to a separate holding facility on Friday afternoon.

Bonneville cutthroat trout collected in these efforts will be released at suitable locations in Red Butte Creek above the reservoir.

3) drain reservoir (May-June) – the CUWCD will manage draining the reservoir. Draining will be initiated the first week in May and continue through the end of June. Releases from the reservoir will not exceed those that have occurred in the recent period of record. The reservoir will be totally drained by the end of June.

5) removal of crayfish in reservoir and tributary – mechanical crayfish removal (traps and removal by hand) from Red Butte Creek above the reservoir and from the reservoir basin will be initiated prior to the breeding season in 2005. Approximately 100 baited minnow traps will be set five days per week in the reservoir and tributary beginning March 25. Mechanical removal will continue as the reservoir is drained until catch-rates decline to where it is no longer effective, or through October 31. Biomass of crayfish removed will be determined by extrapolation of a representative sub-sample. For disposal, captured crayfish will be frozen and transported to Hogle Zoo where they will be used in animal feeds. The reservoir will be maintained without water through winter in an attempt to freeze possible remaining crayfish. The effectiveness of removal efforts will be evaluated on an ongoing basis. Prior to filling the reservoir a thorough survey for crayfish will be conducted (Spring 2006).

If it is determined necessary, chemical control (rotenone) for crayfish may be initiated in the reservoir basin once the reservoir is drained and repeated as necessary throughout the summer.

Project Work/Task Description and Schedule:

The following tasks will be included as part of developing and drafting a long-term management plan for Red Butte Reservoir:

- 1) the subcommittee will meet every 4-6 weeks to work on the management plan;
- 2) a draft management plan will be available for review in August 2005;
- 3) the draft management plan will be reviewed by the Technical Committee and other parties as deemed necessary in September 2005;
- 4) comments will be incorporated into a final draft plan in October – December 2005.

The following management actions will take place in 2005:

- 1) An amendment to the EA will be completed by the end of February;
- 2) Removal of June sucker and Bonneville cutthroat trout from Red Butte Reservoir will begin in mid-April and continue while draining the reservoir until mid-June. Draining of the reservoir will begin in May. A schedule of five foot drop increments and a three to four day holding period will be continued through the end of June, until the reservoir is drained. This schedule allows UDWR personnel to remove fish at a consistent rate. The removal effort will be adaptive to unforeseen circumstances or conditions. Fish removal will be conducted for five days a week for eight weeks. An additional two weeks of removal will be conducted with extended UDWR field crew for a total of ten sampling weeks.
- 3) The reservoir draining will be initiated the first week in May. Draining will occur at intervals of approximately 5 feet and will be coordinated with fish removal efforts. The reservoir will not be filled prior to the spring of 2006;
- 4) Crayfish control will be initiated in mid-March on Red Butte Creek above the reservoir. and continue through the summer as necessary.

Budget Summary:

Fish Transfers

Task	Personnel/Supplies	# Days	Cost	Total
Translocations	Program	3	630	
	Biologist	36	6,480	
	Hatchery Personnel	30	7200	
	Technicians	300	30,000	
	Commercial Fisherman		5,000	
	Vehicle		6,000	
	Supplies		26,850	82,160
			Sub-total	82,160
Indirect costs (on labor only)			15%	<u>5566.5</u>
			Total	\$87,727

Crayfish Removal

Task	Personnel/Supplies	# Days	Cost	Total
Mechanical control on Red Butte Creek and Reservoir	Senior tech @ 8 hrs/wk	31	2,976	
	2 techs @ 20 hrs/week	155	9,920	
	Travel		2,220	
	Traps and supplies		1,750	
			Sub-total	16,866
Indirect costs			15%	2,530
			Total	\$19,396

Budget Grand Total

Task	Cost
Fish Transfers	87,727
Crayfish Removal	19,396
Grand Total	\$107,123

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