COLORADO RIVER RECOVERY PROGRAM
FY 2011 ANNUAL PROJECT REPORT

RECOVERY PROGRAM
PROJECT NUMBER: 29B

I. Project Title: Operation and Maintenance of Ouray National Fish Hatchery

II. Principal Investigator(s):

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III. Project Summary: Ouray National Fish Hatchery (ONFH) was established in May 1996 as a fish refuge and technology development facility to assist in the recovery of the four listed Colorado River fish: razorback sucker, Colorado pikeminnow, bonytail, and humpback chub. Currently, the primary focus of ONFH is the propagation of the razorback sucker, but as of 2007, the Upper Colorado River Endangered Fish Recovery Program (Recovery Program) has been capturing humpback chub and transferring them to ONFH to keep them in a refuge, and for future broodstock development.

ONFH is located 57 kilometers (km) southwest of Vernal, Utah, on the Ouray National Wildlife Refuge (ONWR). The facility consists of an 114,000 liter (l) indoor recirculation hatchery with 27, 2.4 meter (m) circular fiberglass tanks and 30, 1.2 m circular fiberglass tanks. The isolation room consists of twelve 0.9 m^2 circular fiberglass tanks that can be run as single pass cold water tanks or run as a separate re-use system. There are also 24, 0.1 hectare (ha) ponds covered by bird netting, and 12, 0.2 ha ponds, three of which have been covered in bird netting. The water source consists of seven shallow wells (15 m deep) located near the Green River approximately 0.8 km from the hatchery. The hatchery has its administrative office located in a fisheries complex shared with the Colorado River Fisheries Project (CRFP), Utah Fish and Wildlife Conservation Office (UFWCO), and Jones Hole National Fish Hatchery in Vernal, Utah.

The basic operation plan for the facility is to operate a genetically sound captive propagation program to maintain approximately 500 captive razorback sucker broodstock and produce sufficient larvae needed for floodplain wetland studies and hatchery production. The production goal is to rear 14,895, 300+ millimeter (mm) (all lengths presented are total lengths) sub-adult razorback sucker to stock into the middle and lower Green River in Utah. This stocking goal was established by the Recovery Program.

IV. Study Schedule: 1996 - Ongoing

V. Relationship to RIPRAP:

General Recovery Program Support Action Plan

IV.	Manage genetic integrity and augment or restore populations.
IV.A.	Genetics management.
IV.A.4	Secure and manage genetic stocks in refugia.
IV.A.4.a.	Razorback sucker
IV.A.4.c	Humpback chub
IV.A.4.a.(1)	Middle and Lower Green River.
IV.C.	Operate and maintain facilities.

IV.C.1.Ouray National Fish Hatchery.

Green River Action Plan: Main Stem.

IV.A.	Augment or restore populations as needed.
IV.A.1.	Develop State stocking plan for the four endangered fishes in the Green River.
V.A.1.c.	Implement plan.

VI. Accomplishment of FY 2011 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Stocking

The Randlett Unit of the ONFH had an interesting year in 2011, exceeding the Recovery Program's stocking goal in size for razorback sucker. In total 14,510 razorbacks (total requested 14,890) weighing 6,391 kilograms were PIT tagged, measured, weighed and stocked into the Green River in 2011. These fish averaged 340 mm total length (request 300 mm) with an average weight of 440 grams (g) per fish. A 300 mm fish averages approximately 300 g/fish. As discussed with the Recovery Program earlier this year, fish less than 300 mm were not to be stocked into the receiving waters, consequently 706 razorbacks less than 300 mm remain on the station from the 2010 year class. These remaining 2010 fish ranged from 280–295 mm in length and are healthy, they just needed a longer growing season to make 300 mm.

The Middle Green River was stocked with 9,036 razorback sucker throughout the fall of 2011 at the ONWR boat ramp. The Lower Green River (at the town of Green River, Utah) was stocked three times with a total of 5,474 razorback sucker.

In 2011, the Randlett Unit of the ONFH continued to make a concerted effort to increase the size of the razorback sucker produced. Two factors that led to the initiation of these efforts were: 1) the study on survival rates of stocked razorback suckers by Zelasko, et al. 2011; and 2) efforts to determine the maximum growth potential for razorback sucker in a hatchery environment. The Zelasko et al. 2011 study concluded that survival rates increased as the length of the razorback sucker at stocking increased. In an attempt to increase survival rates in the wild, ONFH began increasing the size of fish stocked as well as increasing the numbers stocked. To achieve these goals loading densities at the

hatchery were adjusted to maximize growth while attempting to maintain sufficient

numbers and meet the requested stocking schedule.

Young of the year (YOY) razorback sucker from 2010 (stocked in 2011) were smaller than in previous years. This is likely a consequence of higher survival rates (86%) during the first growing season. In hatchery environments higher survival rates generally equates to higher densities, which in turn equates to smaller fish. The average size of YOY last year was approximately one half the sizes of previous years where survival rates ranged around 55%.

Lower fish densities in the ponds (700 fish maximum) and feeding only razorback sucker diet rather than less expensive trout formulations are important in maximizing growth. Similar practices should be continued because the short optimal growing season at Randlett (water temp above 18^{o}C) is limited to three summer months each year.

Razorback Sucker Spawning

On April 29, 2011 ONFH spawned 40 female and 40 male razorback sucker captive broodstock, producing nearly 1,662,000 eggs. The hatching rate was 41%, resulting in over 687,060 larvae produced. The broodstock were brought in when the pond water temperatures warmed to 12–13°C. Historically human chorionic gonadotropin (HCG) injections were administered at these temperatures and then the brooders were warmed to 16°C. This year, in an attempt to increase hatching success, the brood fish were warmed to 16°C the day before the initial injections and held at these temperatures for the duration of the spawning period. The recirculation system in the isolation room was fed ammonium chloride and inoculated with nitrifying bacteria two weeks prior to spawn and it was also discovered that formalin used to treat fungus on eggs in this system was lingering longer than anticipated. Manipulating these factors increased the hatch rate from 17% last year to 41% this year.

A total of 79,450 razorback sucker larvae from 15 different crosses were proportionally stocked immediately after swim-up into four 0.2 ha broodstock ponds (ponds normally reserved for brooders). An additional 33,951 larvae from the 15 individual crosses were stocked on top of 15 ponds of production fish in an attempt to develop replacement broodstock without impacting overall production. This information could also be used to assess the possibility of producing two year classes in one pond (a process referred to as double cropping), to determine effects of competition between year classes and ultimately to generate acceptable stocking densities if this practice is to be utilized in the future. Double cropping could potentially be of great benefit if we are to produce 400 mm fish.

This fall a total of 59,439 YOY razorbacks (1,181kg) were harvested from three 0.2 ha brood ponds. Approximately 12,000 excess fish were stocked back into one of the 0.2 ha ponds to assess YOY overwinter survival in hatchery ponds and provide additional fish for the next production cycle. The fourth 0.2 ha pond containing approximately 30,000 YOY razorbacks in excess of ONFH production needs, was left to overwinter again to

assess overwinter survival in hatchery ponds. In the past overwintering of YOY fish in the hatchery ponds at Randlett proved to be unsuccessful. A total of 19,391 YOY (the largest fish) were placed in tanks inside and kept for the 2012 production year.

We experimented with pond fertilization at ONFH this year in three of the four YOY ponds in an attempt to produce larger fish. Although it was difficult in one year to quantify the overall impact of fertilization on YOY growth, the trends suggest that inoculating with zooplankton and fertilizing in combination with feeding razorback sucker diet did produce larger fish than did feeding the razorback sucker diet alone. With abundant larvae this year we stocked approximately 30,000 larvae into a fifth 0.2 ha pond to determine the effects of utilizing only pond fertilization and natural forage to produce YOY razorback sucker. The pond had yet to be harvested but it appears (no surprise) at these loading rates pond fertilization and zooplankton inoculation with supplemental feeding produced larger fish than did fertilization and natural forage alone.

ONFH is currently maintaining approximately 500 (25 lots) genetically sound Green River razorback sucker broodstock and continues to rear approximately 19,391 YOY razorback suckers from 2011 spawning to meet the Recovery Plan goal for 2012. This year, we had the highest recorded rate of return from the nursery ponds (90%) YOY and we initially stocked larvae at lower densities to attain the largest average size possible.

Humpback Chubs

ONFH staff and others collected approximately 200 Yampa Canyon *Gila* spp. in October of 2007, in an effort to begin building a potential captive broodstock of Yampa River humpback chub. Of the original 200 chubs 30 of them were suspected to be humpback chub, and 170 were thought to be roundtail chub. Of the original 30 humpback chub, 18 remain alive on station. The remaining 137 roundtail chub were stocked back into the Green River in Dinosaur National Monument October 27, 2010. On August 5, 2011 ten humpback chub were imported from J.W. Mumma fish hatchery. Of these, 6 remain alive for a total of 24 Yampa River chubs on station. There are no plans to collect any additional chubs from the Yampa River until an ad hoc group determines which populations of humpback chub we may need in a refuge.

A population estimate conducted by Julie Jackson in 2005, and a more recent estimate done by Paul Badame (pers. comm., UDWR, Moab), have shown a dramatic decline in the number of humpback chub in the Green River, in Desolation/Gray Canyons and that they hover near and perhaps have fallen below the minimum viable population estimated in the 2002 humpback chub recovery goals. As a result it has been decided to begin taking them into captivity to preserve as much of a diverse gene pool as possible. ONFH and the UDWR captured 25 adult humpback chubs from Desolation/Gray Canyon and brought them into captivity on October 22, 2009. Of the original 25 humpback chub, 17 remain alive on station. It is anticipated that the collection of humpback chub from Desolation/Gray Canyon will continue in the foreseeable future, and the wild fish will be transferred to the Randlett unit of the ONFH and kept as a refuge until or if a propagation program is initiated.

Fish Health

The Randlett Unit of ONFH was given a clean bill of health from the Bozeman Fish Health Center in 2011.

Public Outreach/ Visitors

The ONFH staff conducted many tours of the facility for various groups and individuals in 2011. The hatchery also participated in the annual ONWR open house on May 14, 2011. The public was able to see adult razorback broodstock, one year old razorback sucker, and razorback sucker larvae. Due to continued outreach efforts, total of 552 individuals toured the facilities in 2011. Additionally Congressman Matheson with several staff members, including Pam Juliano, visited the hatchery.

Staff

The hatchery staff gained two members, as manager Karl "Dave" Schnoor came on board in January, and maintenance worker Trenton Thompson joined the staff in August. Fish Biologist Larry Zeigenfuss left for a new position as Hatchery manager at Carson NFH in Washington State. Ouray's biological technician Matthew Fry has been acting as the Fish Biologist in Larry's absence. ONFH underwent a major reorganization and was complexed with the Grand Valley Endangered Fish Facility in Grand Junction, CO to form the Ouray National Fish Hatchery with two units. ONFH is now referred to the Ouray National Fish Hatchery - Randlett Unit, and the Grand Valley Endangered Fish Facility in Grand Junction (aka Road 24 hatchery) is now the ONFH - Grand Valley Unit.

The two hatcheries are also complexed with the Grand Junction, CO and Vernal, UT Colorado River Fishery Project (CRFP) offices and the Utah Fish and Wildlife Conservation Office in Vernal. The project leader has also changed as Michelle Shaughnessy has accepted the Assistant Regional Director's position for Ecological Services in Albuquerque, NM. The project leader of the complex has not been replaced. Dale Ryden of CRFP in Grand Junction, CO and Dave Schnoor of Ouray National Fish Hatchery have shared the project leader responsibilities over the last year. Dolores Manning continues to serve as the hatchery's administrative officer.

Station Cyclical Maintenance/ Construction

In March and July of 2011, the large Burgess Iron Removal Media (BIRM) filters became clogged with manganese. These filters were bypassed while they were cleaned and rebuilt. The fact that they had clogged after being rebuilt just five months earlier indicates that they are not able to handle the large amount of iron and manganese in the well water. Tests have confirmed that just doubling the amount of filtration without increasing filtration efficiency will not solve the problem. The hatchery staff continues to work with other experts to resolve the situation. Currently a consulting service is being

retained to diagnose the water quality issues at ONFH-Randlett Unit and hopefully will be able to recommend solutions to help improve water quality.

The large turbine pumps supplying water from the water treatment building to the production building and fish ponds had deteriorated to the point that they needed work. These pumps were reconditioned in March and April of 2011 and, as expected, there was a dramatic increase in the amount of water available from the pumps. However, due to years of buildup of manganese in the pipes supplying water to the ponds, the lines are restricting the flow and need to be jetted out. More water was available to the ponds this year and with careful management there was enough to maintain oxygen levels and reduce stress on the fish. However, feeding rates were decreased during critical periods in an attempt to reduce biological oxygen demand. When the lines are jetted out we should be able to more efficiently rear the requested production fish.

In the spring of 2009, nets were installed over three of the 0.2 ha broodstock ponds so they could be used as production ponds. Over 41,000 YOY razorbacks were reared in two of these ponds in 2010. The nets are proving to be problematic; due to their large surface area they are easily damaged by winds, and have been repeatedly ripped and torn. Several ideas have been implemented including hog ringing the nets to the support wires across the ponds and using a cable to secure the ends of the nets. These efforts have proven ineffective as the nets tend to be vulnerable to the powerful winds and microbursts that are common in the Uintah Basin. We have a few more ideas but the realization that these ponds are too large to be covered in such a windy area is becoming apparent.

I want to extend a special thanks to Larry, Matt, and Trenton for their dedication, hard work and ingenuity which made this a productive and successful year at the ONFH.

Future Outlook

The future remains bright at ONFH as we have a great crew and the Recovery Program is looking into helping address some of the more pressing needs of the hatchery. No fish less than 300 mm were stocked this year, therefore we missed our target by 380 fish. However, the average size of the fish stocked this year was 340 mm, which not only met but exceed our target value. We have 706 razorback sucker on station from the 2010 year class which are robust fish but just short (280–295 mm) of the 300 mm minimum. We have successfully implemented a broodstock replacement program, as some of our current brooders are 20 years old. We are experimenting with double cropping our production ponds and increasing YOY growth with fertilization and zooplankton inoculations. We are modifying formalin-treatment use to control fungus on razorback sucker eggs and implementing an improved nitrification cycle which should shorten the biofilter response time in the isolation room. We are making progress on the water quality and quantity issues facing ONFH-Randlett. The station is still understaffed but hopefully that will be a short lived issue. ONFH-Randlett also has humpback chub on station from two wild locations and is being considered as a refuge location and potentially as a production unit for this species. Being complexed with ONFH-Grand Valley Unit has greatly increased communication, cooperation and efficiency of both units. It is anticipated that the station will soon be fully staffed and both units of ONFH

will continue to meet the goals and needs of the Upper Colorado River Endangered Fish Recovery Program.

VIII. Project Status: Project in ongoing and on track

IX. FY 2011 Budget Status

A. Funds Provided: $507,127
B. Funds Expended: $507,127
C. Difference: $0
D. Percent of the FY 2011 work completed, and projected costs to complete: 100%
E. Recovery Program funds spent for publication charges: $0

X. Status of Data Submission: PIT tag data submitted on September 30, 2011.

XI. Signed: Karl Schnoor, Assistant Project Leader

Literature Cited.

Zelasko, K.A., K.R. Bestgen and G.C. White. 2011. Survival rate estimation of hatchery-reared razorback suckers *Xyrauchen texanus* stocked in the Upper Colorado River Basin, Utah and Colorado, 2004–2007. Final Report of Colorado State University Larval Fish Laboratory, Department of Fish, Wildlife, and Conservation Biology to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.