

I. Project Title: Evaluation of Nonnative Fish Escapement from Starvation Reservoir.

II. Principal Investigator(s):

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III. Project Summary:

The Recovery Program has determined that control of nonnative fishes is necessary for recovery of the endangered fishes. Chronic escapement of nonnative fishes from reservoirs or other impoundments and dispersal into riverine habitats occupied by the endangered fishes where they potentially pose a significant predatory or competitive threat has been identified as a problem. Screening of reservoir outflow to reduce escapement of target nonnative fishes has been implemented at Highline Reservoir and other such fish barriers are being considered for other upper basin reservoirs (e.g., Elkhead; Miller and Laiho 1997). Control of escapement through screening or other types of fish barriers is costly, and the need for such nonnative fish control measures needs to be evaluated on a case-by-case basis. Starvation Reservoir was identified in the 8 March 2000 version of the RIPRAP for such an evaluation beginning in 2002.

Presently, northern pike are of great concern in the Yampa and middle Green Rivers. However, other highly piscivorous species, including walleye and smallmouth bass, are currently increasing in abundance in the middle Green River. A very likely source for escapement of both walleye and smallmouth bass is Starvation Reservoir. This reservoir is located in the Duchesne River drainage and receives inflow from the Strawberry and Duchesne Rivers. The reservoir is primarily a walleye, smallmouth bass, and brown trout fishery. Locating major sources of these nonnatives to the river system is the first step in controlling the spread and negative impacts these species may be having on recovery efforts for endangered fish species, particularly Colorado pikeminnow and razorback sucker. This project will identify locations and rates of escapement of nonnative sportfish from Starvation Reservoir. A synthesis of available data and literature on fish populations in the Duchesne River adjacent to Starvation Reservoir will also be provided to aid in the evaluation of impacts of escapement. Operation records from Starvation Reservoir from 1986 through 2000 show that spills occur regularly. Starvation Reservoir has

spilled seven out of the previous ten years and is operated with the intent to spill each year. Spills generally occur in June with a duration ranging from a week to nearly one month. Effort for this project is focused on draining the stilling basins of the spillway and outlet of Starvation Reservoir to evaluate escapement. Field work for this project concluded in FY2005; the final report will be completed in early FY2007.

IV. Study Schedule: 2002 - 2006

V. Relationship to RIPRAP:

General Recovery Program Support Action Plan

III. Reduce negative impacts of nonnative fishes and sportfish management activities (nonnative and sportfish management).

III.A. Reduce negative interactions between nonnative and endangered fishes.

III.A.2. Identify and implement viable active control measures.

VI. Accomplishment of FY 2006 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Deliverables for 2006 include a draft final report, peer review, and a final report due in July 2006. Due to turnover in the UDWR Vernal office, the draft final report and peer review have been completed; however, the final report will not be completed until January 2007 (estimated).

2005

2005 was the only year of this study that Starvation Reservoir had a significant spill. The reservoir spilled for several weeks beginning in June. Prior to the spill, the stilling basin was intensively sampled to evaluate presence and relative abundance of fish. The reservoir near the spillway was also sampled at the beginning of the spill for three nights using gillnets to evaluate escapement potential.

The stilling basin was pumped for three weeks in September to allow an evaluation of fish escapement over the spillway during the spill. Toward the end of the pumping period, river flows were increased to allow sampling efforts of other researchers downriver to take place. As a result of these higher flows, the spillway stilling basin completely refilled. It then became necessary to evaluate escapement in the stilling basin using other methods. Gillnets, fyke nets and electrofishing were employed in an effort to sample and collect as many fish as possible and evaluate escapement.

Sampling in the stilling basin prior to the spill resulted in the capture of one brown trout, 2 carp, 168 green sunfish, and nine smallmouth bass. The green sunfish and smallmouth bass captured in this effort were primarily young-of-year likely produced within the stilling basin. The one brown trout and two carp were likely fish that avoided removal during the previous draining.

Reservoir sampling at the beginning of the spill resulted in the capture of nine brown trout, nine Utah chub, 20 walleye and 29 yellow perch (Table 2). The brown trout and Utah chubs were large adults. The walleye and yellow perch were primarily juvenile Age-1 and Age-2 fish.

Intensive sampling of the spillway stilling basin in October following the spill resulted in the capture of 2 brown trout, 12 white sucker, 69 green sunfish, 43 smallmouth bass, three Utah chub, eight walleye and nine yellow perch. Considering the numbers and species collected prior to the spill all fish collected with the exception of the green sunfish escaped from the reservoir during the spill.

2004

Initial Draining of Stilling Basins -

Sampling was focused on the stilling basins of the outlet and spillway of Starvation Reservoir. The stilling basins of the spillway and outlet were drained by pumping prior to spilling and irrigation releases. All fish were removed from the outlet stilling basin. All fish were identified and enumerated and a representative sample of fish were measured and weighed.

Pumping of the outlet stilling basin began on March 15 and was completed on March 17. All fish were removed using a seine. Fish collected included 293 brown trout, two walleye, 2 yellow perch, three largemouth bass, one mountain sucker, eight mountain whitefish and many mottled sculpin.

Pumping of the spillway stilling basin began on March 18 and was completed April 7, 2004. Trammel nets and seines were used to remove fish from the shallow water (< .3 m) remaining in the chute of the spillway structure. Fish removed included 96 smallmouth bass, over 500 green sunfish, one walleye, one brown trout, 10 carp and two Utah chubs.

Evaluation Draining of Stilling Basins 2004-

Starvation Reservoir did not spill in 2004. Therefore, an evaluation draining of the stilling basin was not conducted. Pumping of the outlet stilling basin began on November 1 and was completed on November 3, 2004. Fish removed included 349 brown trout, 16 mountain whitefish, one white sucker, four mountain sucker, nine carp, one walleye and 49 yellow perch.

2002

Initial Draining of Stilling Basins

Sampling was focused on the stilling basins of the outlet and spillway of Starvation Reservoir. The stilling basins of the spillway and outlet were drained by pumping prior to spilling and irrigation releases. All fish were removed from the outlet stilling basin. All fish were identified and enumerated and a representative sample of fish were measured and weighed. A net weir was then installed down river from the spillway stilling basin to block movement of fish from downstream sections of the river into the stilling basin. The block was constructed using stock panels for a rigid frame overlaid with ½" mesh screening and was anchored to the bank using gabion baskets. The center of the block was also anchored to a gabion basket. This block remained in place through the entire study (until September 2005).

Pumping of the outlet stilling basin began on March 4 and was completed on March 8. All fish were removed using a seine. Fish removed included 120 brown trout, 30 carp, 3 green sunfish, 143 mountain whitefish, 5 mountain sucker, 7 rainbow trout, 1 smallmouth bass, 9 Utah chub, and 4 walleye.

Pumping of the spillway stilling basin began on March 12 and was completed as the reservoir began to spill on March 28. The last days of pumping were also very windy creating large waves on the reservoir which caused water to begin spilling over the spillway and filling up the stilling basin. Due to the reservoir beginning to spill as the stilling basin was being pumped out we used an electrofishing boat, trammel nets and seines to get as many fish out as possible before the stilling basin filled. As a result not all of the fish were removed during the initial draining of the Spillway stilling basin. Fish that were removed included 6 brown trout, 230 carp, 501 green sunfish, 184 smallmouth bass, 139 Utah chub, and 48 walleye.

Evaluation Draining of Stilling Basins -

Starvation Reservoir only spilled for a period of 7 days in 2002 beginning March 28 and only a very shallow amount of water came over the spillway. The stilling basin of the spillway was drained a second time in November. Pumping began on October 22 and was completed on November 15. Knowing that the spill in the spring was very short and there was very little chance for escapement, it is assumed that none of the fish removed in the second draining escaped from the reservoir during the 2002 spill. Therefore, the second draining served to remove the remaining fish that were missed during the first draining as a result of the reservoir spilling before the draining was complete. The remainder of the fish removed during the second draining included 4 brown trout, 12 carp, 521 green sunfish, 158 smallmouth bass, 20 Utah chub, and 8 walleye. The stilling basin of the outlet was drained the first week of December resulting in 114 brown trout, 38 mountain whitefish, and 2 walleye.

River Reach Monitoring -

Movement of fish from areas downstream of the block was monitored by electrofishing the three-mile section of river directly below the block before and following runoff. A canoe

equipped for electrofishing using a generator and a Coffelt 2-C electrofishing unit was used to electrofish the entire width of the stream channel as crews moved upstream. Fish species sampled by electrofishing before spring irrigation releases included 1584 brown trout, 2 carp, 1 cutthroat trout, 13 mountain whitefish, 28 rainbow trout, and 1 Utah chub. Fish species sampled during fall stream electrofishing included 1779 brown trout, 57 mountain whitefish, 9 mountain sucker, and 21 rainbow trout. There weren't any walleye, smallmouth bass, or green sunfish observed in the three-mile reach of stream below the stilling basins during spring or fall electrofishing efforts.

Table 1. Number of fish caught by species in the outlet stilling basin of Starvation Reservoir during initial and evaluation draining: 2002 and 2004.

	Species					
	Brown trout	Mountain whitefish	Smallmouth bass	Walleye	Largemouth bass	Yellow perch
Initial March 2002	120	143	1	4	0	0
Evaluation December 2002	114	38	0	2	0	0
Initial March 2004	293	8	0	2	3	2
Evaluation November 2004	349	16	0	1	0	48

Other species collected in low numbers included: carp, green sunfish, mountain sucker, rainbow trout, Utah chub and mottled sculpin.

Table 2. Number of fish caught by species in the spillway stilling basin of Starvation Reservoir (2002 – 2005) and near the dam and spillway in the reservoir (June 2005).

	Species							
	Brown trout	White sucker	Carp	Green sunfish	Smallmouth bass	Utah chub	Walleye	Yellow perch
Initial								
March 2002	6	0	230	501	184	139	48	0
Evaluation								
October 2002	4	0	12	521+	158	20	8	0
Initial								
March 2004	1	0	10	Abund. YOY	96	2	1	0
Reservoir								
June 2005	9	0	0	0	0	9	20	29
Initial								
June 2005	1	0	2	168	9	0	0	0
Evaluation								
October 2005	2	12	0	69	43	3	8	9

Table 3. Number of fish by species captured during electrofishing efforts of approximately three river-miles of the Strawberry River below Starvation Reservoir during spring and fall: 2002.

	Species						
	Brown trout	Carp	Cutthroat trout	Mountain whitefish	Mountain sucker	Rainbow trout	Utah chub
Spring	1584	2	1	13	0	28	1
Fall	1779	0	0	57	9	21	0

- VII. Recommendations: Identify and discuss management alternatives for Starvation Reservoir based on study results.
- VIII. Project Status: Fieldwork is now complete and a draft final report is currently under review.
- IX. FY 2006 Budget Status
- A. Funds Provided: \$63,100
 - B. Funds Expended:\$63,100
 - C. Difference: \$0
 - D. Percent of the FY 2006 work completed, and projected costs to complete: 98% complete, ~\$1000 to complete
 - E. Recovery Program funds spent for publication charges: will be ~\$300
- X. Status of Data Submission (Where applicable): Not applicable
- XI. Signed: Trina Hedrick 6 November, 2006
Principal Investigator Date