

I. Project Title: Duchesne River: assessment and refinement of instream flow needs

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III. Project Summary:

This project is designed to provide biological and physical/habitat data to validate or refine existing instream flow recommendations for the Duchesne River to facilitate recovery of endangered fish. There are three aspects to this study: measurement of physical features and inundation at various flows; study of adult fish use of the river; investigation into spawning of endangered fish and habitat use by young-of-the-year endangered fish. All research is being conducted between Myton, UT, and the confluence with the Green River. Work on measurement of physical features and inundation at various flows was initiated in late FY98. Preliminary observations suggest that the Duchesne River is not in equilibrium and that sediment is accumulating in the lower river being used by Colorado pikeminnow and razorback sucker. A detailed contour map of the lower Duchesne River was made in 1999 using integrated hydroacoustic and global

positioning methods. Physical habitat data was taken at riffle and run cross-sections. Evidence of Colorado pikeminnow and razorback sucker spawning in the Duchesne River has not been observed to date as a result of adult and larval fish sampling. Endangered fish use appears to be limited to spring and summer. However, other native fishes, like flannelmouth sucker, bluehead sucker, roundtail chub, and speckled dace, spawn and live year-round in the Duchesne River. A better understanding of distribution, relative abundance and habitat use of native and nonnative fishes has resulted from fish sampling methods and radio telemetry.

IV. Study Schedule:

- a. Initial year: 1997
- b. Final year: 2001

V. Relationship to RIPRAP:

Green River Action Plan: Duchesne River

- I. Provide and Protect Instream Flows
- II. Restore Habitat

VI. Accomplishments of FY99 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Task 1. Conduct fish surveys (adult sampling and radio tagging/radio telemetry, early life stage sampling). Establish habitat monitoring stations for determining changes over time.

Adult:

Habitat monitoring stations were identified in 1997. Adult fish were sampled 27 April - 24 June during pre-peak and peak flows using an electrofishing raft. All native fish were weighed and measured; all nonnative fish were counted and a sample (usually >50%) weighed and measured. Nine Colorado pikeminnow (all in the lower river between rm 3.3 and 14.2) but no razorback sucker were captured in spring sampling.

Pre-ice-up sampling conducted 15-18 November collected one Colorado pikeminnow (406 TL mm) about 1/4 mile below the Myton Bridge; this fish was PIT tagged and released. The sampling was done by electrofishing raft between Myton (rm 34.5) and the confluence with the Green River (rm 0.0).

Radio telemetry:

Radio transmitters were implanted into 16 Colorado pikeminnow between 10 May and 10 June, 1999. Three of these fish either died or expelled their transmitters. Those fish with transmitters were followed by aerial flights and ground monitoring approximately weekly

from 20 June -15 September and opportunistically thereafter; the last flight was on 10 November. Fish were documented to leave the Duchesne River at various times through the spring and summer. As of 10 November 1999, no fish implanted appeared to remain in the Duchesne River.

Early life stages:

Early life stage sampling was conducted from 26 April through 22 July. Evidence of endangered fish spawning was investigated by sampling the lower river (below the confluence with the Uinta River) for drifting larvae. Suitable habitats located from the confluence with the Uinta River to the confluence with the Green River were sampled using light traps, drift nets, dipnets and seines. Six larval light traps were set overnight twice each week (n = 101) in low velocity habitats. On June 1 through June 4, a 24-hour larval drift net station was established near river-mile 6.4 (Pipeline) to assess possible larval drift time periods. A bank of three larval drift nets were set at 4-hour intervals for a duration of 20 to 30 minutes (n=58). Drift netting occurred in other locations along the lower sections of river beginning 28 April and continued through 8 June. Backwater habitats were sampled with the use of seines (n = 120 backwaters) from 26 April to 22 July. All samples containing larvae and other unidentified fish were sent to the Larval Fish Laboratory (LFL), Colorado State University for processing.

Analysis of larval fish samples is not complete at this point. However, on quick observation, these samples did contain numerous sucker larvae. The majority of these were likely flannelmouth sucker (*Catostomus latipinnis*) and white sucker (*C. commersoni*) larvae. The first sucker larvae were collected on 26 May with the use of light traps in a large backwater near river mile 6.4 (Pipeline). Flows were near 1100 cfs and main channel water temperatures had been near or above 15 °C for several days. On 4 June this backwater was sampled again during the night using dipnets and flashlights and resulted in the collection of over 50 sucker larvae within two hours. Drift net samples collected at the 24-hour drift net station did not contain any sucker larvae. Two juvenile Colorado pikeminnow (67 and 69 mm) were collected by seining in a backwater at river-mile 3.6 on 1 July.

Distribution and relative abundance of young-of-the-year endangered fish and other native and nonnative fishes were sampled from 31 August through 9 September (total of 51 samples) using a 4 m x 1 m seine of 3 mm mesh. All backwater and low velocity habitats within the two, two-mile (RM 29-27; RM 13.8-11.8) and one three-mile (RM 3.0-0.0) monitoring stations, established in FY-97, were sampled. Physical measurements of these habitats were also collected. All fish captured were identified and counted in the field or preserved and examined in the UDWR lab in Vernal. Ten of fourteen species captured were introduced species. None of the four native species were endangered species. Native species collected were bluehead suckers (*C. discobolus*), flannelmouth suckers, roundtail chubs (*Gila robusta*) and speckled dace (*Rhinichthys osculus*). There was some stratification of species within the river. Redside shiners (*Richardsonius balteatus*) were caught almost exclusively above the confluence with the

Uinta River, while sand shiners were caught almost exclusively below that point. Round tail chubs were also primarily found in the sections of river above the Uinta confluence. Furthermore, sampling resulted in the first young-of-the-year largemouth bass (*Micropterus salmoides*) collected over the past three years. See attached tables in appendix for more comprehensive results of Duchesne River fish sampling from 1999.

Task 2. Collect geomorphic data necessary to estimate base flow requirements and initiate channel maintenance flow requirement analysis. Calculation of curve break data and completion of channel maintenance flow determination to be completed in out year 4.

The geomorphic data was collected in two efforts. The first was to determine stream profile characteristics and habitat availability. A detailed (0.02m resolution) river contour map from Randlett downstream to the confluence with the Green River (14.5 miles) was constructed using high resolution integrated hydroacoustic and global positioning methods. This data was collected in mid- June at about 2500 cfs (Randlett Gauge). This map will provide a profile for the entire study area. Steam cross sections were located with GPS at 48 sites (approximately half at runs and half at riffles). Staff gauges were placed at cross-section sites in early July and read on three or four occasions throughout the summer. A shortcoming of the hydroacoustic survey was that profiles were taken prior to peak flows and therefore surface elevations at lower flows for the profiles measured were not attained. As a consequence, the value of hydroacoustic data in determining curve-break values is questionable. In an effort to remedy the potential problem, an additional 30 cross-section profiles with velocity measurements were collected at riffle sites using standard survey techniques during the summer low flow period. These profiles can be compared to those collected in late June with hydroacoustic methods to determine extent of channel change between high and low flow.

The geomorphic effort by Utah State University personnel involved collecting data to determine channel maintenance flows. From an aerial flight taken in mid-April over the Duchesne River drainage, geomorphologists concluded that the Duchesne River is not in equilibrium and that it is possible that sediment may be accumulating, particularly in the lower river which is causing aggradation. This wave of sediment may be working its way upstream and could affect the area currently being used by Colorado pikeminnow. Visits on the ground in June/July and October suggested that a major source of sediment may be irrigation return flows above the Uinta River confluence.

Task 3. Outline and define the Scope of Work for FY-2000.

This is an ongoing task.

VII. Recommendations:

This project is on track to produce an instream flow recommendation; continue to follow through on the proposed scope of work.

Table 1. Results of catch, by species and study reach, for post-larval fish sampling (seining) on the Duchesne River: 31 August through 9 September, 1999.

Species	OURAY			UINTA			MYTON			TOTAL
	Adult	Subadult	YOY ^a	Adult	subadult	YOY	Adult	Subadult	YOY	
<i>bluehead sucker</i>	0	0	2	0	0	1	0	0	6	9
<i>chub (Gila sp.)</i>	0	0	0	0	0	28	0	0	34	62
<i>flannelmouth sucker</i>	0	0	8	0	0	1	0	0	0	9
<i>speckled dace</i>	0	0	15	0	9	0	4	0	11	35
black bullhead	0	0	0	2	0	0	0	0	0	2
carp	0	0	21	0	0	13	0	0	4	38
fathead minnow	167	124	--	791	306	--	69	5	--	1462
green sunfish	0	0	7	0	3	0	1	0	6	17
redside shiner	0	0	--	0	0	--	13	16	--	29
red shiner	727	711	--	567	231	--	100	32	--	2368
smallmouth bass	0	0	8	0	0	7	0	0	9	24
sand shiner	116	140	--	10	2	--	0	0	--	268
largemouth bass	0	0	0	0	0	1	0	0	0	1
white sucker	0	0	6	0	0	29	0	1	9	45

^a YOY = young-of-the-year

Table 2. Numbers by species and life stage for fish collected using seines summarized for the Myton, Uinta and Ouray sample reaches of the Duchesne River: August - September 1999.

Species		Life Stage			Total	%
		adult	subadult	YOY		
native	bluehead sucker	0	0	9	9	0.21
	chub (<i>Gila</i> spp.)	0	0	62	62	1.42
	flannelmouth sucker	0	0	9	9	0.21
	speckled dace	4	9	26	35	0.80
nonnative	black bullhead	2	0	0	2	0.05
	black crappie	0	0	0	0	0.00
	bluegill sunfish	0	0	0	0	0.00
	carp	0	0	38	38	0.87
	channel catfish	0	0	0	0	0.00
	fathead minnow	1,027	435	--	1,462	33.46
	green sunfish	1	3	13	17	0.39
	redside shiner	13	16	—	29	0.66
	red shiner	1,394	974	--	2,368	54.20
	smallmouth bass	0	0	24	24	0.55
	sand shiner	126	142	--	268	6.13
	largemouth bass	0	0	1	1	0.02
	white sucker	0	1	44	45	1.03

Table 3. Species composition of fish collected from the Duchesne River by electrofishing 27 April to 24 June, 1999.

Sections Sampled					
Species	Lower	Middle	Upper	Total	Percent
Carp	171	42	124	337	27.3%
Channel Catfish	94	0	0	94	7.6%
Flannelmouth Sucker	273	44	97	414	33.5%
Smallmouth Bass	20	2	1	23	1.9%
Bluehead Sucker	22	2	5	29	2.3%
White Sucker ⁴	18	27	36	81	6.6%
Colorado Pikeminnow	9	0	0	9	0.7%
Black Bullhead	1	0	0	1	0.1%
Green Sunfish	0	0	0	0	0.0%
Northern Pike	1	0	0	1	0.1%
Utah Chub	0	0	0	0	0.0%
Mountain Whitefish	1	22	160	183	14.8%
Brown Trout	2	5	23	30	2.4%
Speckled Dace	4	0	1	5	0.4%
Razorback Sucker	0	0	0	0	0.0%
Roundtail Chub	0	0	0	0	0.0%
Rainbow Trout	0	1	0	1	0.1%
Red Shiner	0	0	0	0	0.0%
Flannelmouth x White Sucker	2	1	0	3	0.2%
Mountain Sucker	0	9	13	22	1.8%
Bluehead x White Sucker	1	0	0	1	0.1%

Sections Sampled

Species	Lower	Middle	Upper	Total	Percent
Cutthroat Trout	1	0	0	1	0.1%
Grass Carp	1	0	0	1	0.1%
Unidentified Sucker	0	2	0	2	0.2%
Total	621	157	460	1236	100%