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

II. Principal Investigators:

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III. Project Summary:

This project provides 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 were taken at riffle and run cross-sections. Little evidence of

Colorado pikeminnow and razorback sucker spawning in the Duchesne River has been observed to date as a result of adult and larval fish sampling; however, one possible razorback sucker larva was captured in 1998. Adult endangered fish use appears to be greater in the spring and summer, but they are also present in late fall. Other native fishes, such as 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: 1997 - 2001

V. Relationship to RIPRAP: Green River Action Plan: Duchesne River
I. Provide and Protect Instream Flows
II. Restore Habitat

VI. Accomplishments of FY 2000 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Task 1. Aerial telemetry data collection.

Aerial surveys were conducted on the Green River between Jensen Bridge and Sand Wash, on the Duchesne River between the confluence and Myton, and on the lower 5 miles of the White River. These surveys were conducted on March 6, April 15, May 26, July 8, and September 8. As the signal strength was diminished, it was not possible to identify to code; therefore only presence/absence were noted. Unlike previous years, tagged fish moved into the Duchesne River earlier in the season, recording some tags on the March 6 survey. Six tagged fish were recorded on the April 15th survey; however no tagged fish were found in the Duchesne on the May 26th survey. There were several contacts made in the Green River both upstream and downstream within 5 miles of the confluence. The July 8th survey confirmed that no tagged fish moved into the Duchesne, but were more dispersed with the majority of contacts between Ouray NWR and Horseshoe Bend. The September 8th survey revealed a distribution pattern similar to the May 26th survey with one significant exception: a contact was made on September 8th at Duchesne RM 32 near Myton.

Task 2. Twenty four hour radio tracking.

Twenty-four hour monitoring was conducted on April 25-26 at Duchesne RM 13.4 - 13.8 and again on May 3-4 between RM 13.6 and 14.2. The radio tagged Colorado pikeminnow moved into riffle areas from early evening (dusk) through the night, moving between riffles and pools. Typical substrate was 3-5 inch cobble. During the daytime, they showed less movement between habitat types, preferring pools, but more movement in the river between pools. Two additional twenty-four hour survey were initiated. Crews went out on May 10-11 but made no contact despite several hours walking upstream and downstream, beginning at

five locations (South Side, Red Bridge, 24-Hour, Hawks Landing, and Pipeline) where contact had previously been made. On May 17th and 18th we conducted raft-based telemetry from RM 14.8 to the confluence. No contact was made. After reviewing the base station telemetry at RM 1.8 and making aerial contact with tags in the Green River on May 26th, it was concluded that the tagged fish that moved into the Duchesne in March, moved out during the first week in May. An additional raft telemetry run was made on July 17th with no contacts made. In summary, it appears that the tagged fish did not to move back into the Duchesne either before or after the spawning period, with the exception of one tagged fish contacted at RM 32 on September 8th.

Task 3. Electrofishing.

Pre-ice-up sampling conducted 15-18 November 1999 collected one Colorado pikeminnow (406 TL mm) about 1/4 mile below the Myton Bridge. Post-ice-out sampling 21-24 March 2000 captured eight Colorado pikeminnow, one near Randlett (RM 14.7) and the rest below the pipeline (RM 6.7).

Task 4. Collect geomorphic data for estimating channel maintenance flow requirements.

A.) GIS Database of Historic Channel Change: A time series of geomorphic channel maps documenting channel and floodplain evolution between 1936 to present has been developed from historical stereo aerial photography. Intensive field mapping of floodplain and near-channel surfaces was conducted in June 2000 in order to ground-truth air photo interpretations.

Eight Arc/Info coverages showing sequential channel positions, bar configurations, and changes in floodplain and terrace morphology have been prepared. Automated GIS methods to calculate erosion/deposition rates and changes in sediment storage are under development.

B.) Detailed Study Reaches Established: In April 2000, three detailed study reaches were established between the Uinta River and the oil shack, and topographic channel surveys and surface sediment sampling was conducted. A fourth detail study reach was established and surveyed in July 2000. Each study reach consists of 4-6 channel cross sections, topographic mapping of bar and floodplain surface elevations, surface sediment sampling on 2-3 riffles at each site, and one bulk subsurface sediment sample per site. All subsurface sediment samples were collected in July. All topographic channel surveys will be repeated in spring 2001 at high discharge for hydraulic model calibration and change detection. Persistent low flow in 2000 precluded high-discharge surveys this year. Also, single-cross-section surveys were conducted at two locations downstream of the oil shack.

C.) Near-channel Stratigraphy and Dendrochrology: Four pilot trenches were hand-dug in November 2000 to reveal stratigraphic relationships between terrace,

floodplain, bar, and abandoned-channel fill deposits. Tamarisk stems adjacent to the trenches were collected for subsequent analysis to be conducted over the

winter. This analysis is intended to provide data on the rates and timing of floodplain deposition.

D.) Substrate Mapping: Sand storage in pools and on the insides of meander bends was evaluated by repeat substrate mapping between the confluences with the Uinta River and the Green River during October 1999 and August 2000.

E.) Development of a hydraulic model for use in evaluation of stage-discharge relationships and sediment transport is underway.

Other accomplishments.

Funding for data analysis for determining minimum stream flow was postponed until FY 01. The Duchesne River workgroup participants did, however, hold a meeting in Fort Collins on 11 July 2000 with Ken Bovee, USGS. The purpose of the meeting was to discuss how we can approach base flow recommendations using the data we currently have on hand (cross sections collected by FWS and USU and hydroacoustic data by the Ute Tribe and Chad Gubala). The workgroup decided the best conceptual approach was to determine riffle area vs discharge and to use curve break analysis to determine flows for which the channel variables (depth, wetted width, velocity, wetted perimeter, cross sectional area, rise in stage, wetted width, etc.) decrease at the greatest rate with declining flows.

VII. Recommendations:

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

VIII. Project Status: This project is on track and ongoing.

IX. FY 2000 Budget Status:

		Service, Vernal	UDWR	Ute Tribe	USU	Total
A.	Funds Provided:	15.8K	25.15K	15.75K	51.0K	107.7K
B.	Funds Expended:	15.8K	25.15K	15.75K	51.0K	107.7K
C.	Difference:	0	0	0	0	0

D. Recovery Program funds spent for publication charges: $0.00

X. Status of Data Submission:

Data have not been submitted to the database manger. Findings of 1997-2000 activities have been presented in a progress report to technical team and work group members. Adult and early life history data are being entered in dBASE and excel files and will be submitted to the program data base manager upon completion of the study.

XI. Signed: *Bruce Haines*
Kevin D. Christopherson
Principal Investigators

December 7, 2000
Date

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.

	OURAY			UINTA			MYTON			
Species	Adult	Subadult	YOY [a]	Adult	subadult	YOY	Adult	Subadult	YOY	TOTAL
bluehead sucker	0	0	**2**	0	0	**1**	0	0	6	9
chub (Gila sp.)	0	0	0	0	0	**28**	0	0	**34**	62
flannelmouth sucker	0	0	**8**	0	0	**1**	0	0	0	9
speckled dace	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 (*Gila* 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	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%
Cutthroat Trout	1	0	0	1	0.1%
Grass Carp	1	0	0	1	0.1%

Sections Sampled

Species	Lower	Middle	Upper	Total	Percent
Unidentified Sucker	0	2	0	2	0.2%
Total	621	157	460	1236	100%