

FY-2001 PROPOSED SCOPE OF WORK for:
Duchesne River Instream Flows

Project #: 84

Lead Agencies: U.S. Fish and Wildlife Service
Utah Division of Wildlife Resources

Coperating
Agencies/
Offices: Central Utah Water Conservancy District
355 West University Parkway
Orem, UT 84058

Utah Department of Natural Resources
1594 West North Temple , Suite 3710
Box 145610
Salt Lake City, UT 84114

U.S. Fish and Wildlife Service
266 West 100 North #2
Vernal, UT 84078

U.S. Bureau of Reclamation
125 South State Street
Salt Lake City, UT 84138

Ute Indian Tribe, Uintah/Ouray Agency
Fort Duchesne, UT

Principal
Investigators: Kevin Christophersen
Utah Division of Wildlife Resources
152 E. 100 N.
Vernal, UT 84078
Phone: (435) 789-3103

Tim Modde
U.S. Fish and Wildlife Service
266 West 100 North #2
Vernal, UT 84078
Phone: (435) 789-0354; Fax: (435) 789-4805

Ute Tribe
Representative: Michael Montoya
Ute Tribe Fish and Wildlife Department
P.O. Box 804
Roosevelt, UT 84066
Phone: (435) 722-3941, ext. 305; Fax: (435) 722-0484

DATE: March 21, 2000

Category:

- Ongoing project
- Ongoing-revised project
- Requested new project
- Unsolicited proposal

Expected Funding Source:

- Annual funds
- Capital funds
- Other (explain)

I. Title of Proposal:

Duchesne River: Assessment and Refinement of Instream Flow Needs

II. Relationship to RIPRAP (11 march 1996 revision):

Green River Action Plan — Duchesne River

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

RIPRAP Section 3.0 (Discussion of Sub-basin Recovery Priorities) summarizes the importance of each upper Colorado River sub-basin to the endangered fishes and identifies the Green River as a high or the highest priority area for recovery. Although recovery actions in the Green River are focused on refining operation of Flaming Gorge Dam to enhance habitat conditions for the endangered fishes, flow recommendations are also being developed or refined for some Green River tributaries, including the Yampa, White, Price, and Duchesne rivers. The Recovery Program recognizes the need to carefully coordinate flow recommendations for mainstem and tributary rivers to address recovery needs of the endangered fishes from a sub-basin or basin-wide perspective.

Similar to other large rivers, tributaries to the Green River are likely important for maintaining the functional integrity of the overall river system dynamics. Studies conducted on the Yampa River since the mid 1970's have firmly demonstrated the essential role this river plays in maintenance and recovery of the endangered fishes in the Green River sub-basin. Recent fish surveys on the White River downstream of Taylor Draw Dam have documented the year-round occurrence of adult (in relatively high numbers), and sub-adult Colorado pikeminnow *Ptychocheilus lucius*; and that resident adults spawned at sites in the Green and Yampa rivers (Irving and Modde 1999). Colorado pikeminnow and razorback sucker *Xyrauchen texanus* regularly utilize habitats at the mouth of the Duchesne River, especially during spring runoff (Modde 1997), and cursory sampling in May 1993 documented some use of the lower 15 miles of the Duchesne River by adult Colorado pikeminnow and razorback sucker (Cranney 1993). Fish surveys in the lower 33 miles of the Duchesne River between May and October of 1997 and 1998 resulted in the capture of over twenty Colorado pikeminnow and three razorback suckers. However, existing data on use of the Duchesne River by the endangered fishes and on the river's fish community and physical conditions are inadequate for sound validation or refinement of year-round flow recommendations.

III. Study Background/Rationale:

The lower 2.5 miles of the Duchesne River was designated as critical habitat for razorback sucker in 1994 (Fed. Reg./Vol. 59, No. 54/Monday, March 21, 1994), and Colorado pikeminnow and razorback sucker have been recently collected in the lower 33 miles of the river. Natural flows of the Duchesne River have been substantially altered due to agricultural and municipal development; direct diversions of water have occurred since the late 1800's. The result has been a reduction in the mean annual flow from approximately 768KAF to 220KAF (Duchesne River Biological Opinion, 1998). In January 1995, the U.S. Fish and Wildlife Service (Service) provided preliminary flow recommendations for the Duchesne River. These preliminary flow recommendations will be used to test hypotheses advanced in this ongoing revised study. Research results will be used to establish final flow recommendations that restore and maintain, to the extent possible, natural ecosystem components and functions (physical and biological) that will facilitate recovery of the endangered fishes.

Historic biological information on the Duchesne River, although somewhat limited, indicates that Colorado pikeminnow and razorback suckers inhabited lower reaches of the Duchesne and Uintah rivers (Cranney, Utah Division of Wildlife Resources, UDWR, 1993). Cranney (1993) reported that the presence of Colorado pikeminnow in the Duchesne River was first documented in a 1956 unpublished UDWR stream survey report; eight Colorado pikeminnow (1–15 inches total length (TL); 25–380 mm) were collected by electrofishing during August in a reach from Bridgeland (upstream of the town of Myton, Utah, RM 49) to the Green River confluence. He also noted that Mullan (1975) collected a 3 inch (75 mm) long Colorado pikeminnow in the Uintah River upstream of its confluence with the Duchesne River (RM 14.3) in June 1970, and that Seethaler (1978) reported captures of five Colorado pikeminnow by Ute tribe members at the confluence of the Uintah and Duchesne rivers in spring 1975. The earliest record of razorback suckers in the Duchesne River was May 1978 in a BioWest, Inc. fish survey (Cranney 1993); ten fish were caught during 10–13 May near the confluence of the Duchesne and Green rivers at RM 0.1.

Information on the present seasonal distribution and abundance of the endangered fishes (all life stages) in the Duchesne River is limited. Suspected angler captures of adult or sub-adult Colorado pikeminnow have occurred as far upstream as the vicinity of Myton, Utah (UDWR, unpublished data), and adult Colorado pikeminnow and razorback suckers are collected annually by fishery biologists at the confluence of the Duchesne and Green rivers. In May 1993, electrofishing was conducted by UDWR (Cranney 1993) to document the occurrence and distribution of nonnative fishes in the lower 14.3 miles of the Duchesne River. From that sampling effort (11.51 hours of electrofishing), seven Colorado pikeminnow were collected (RM 1.0/505 mm TL; RM 1.9/510 mm; RM 4.5/471 mm; RM 5.0/545 mm; RM 8.5/462 mm; RM 10.5/458 mm; RM 0.8/573 mm), two adult razorback suckers were positively identified but not captured (RM 11.4, RM 5.0), and 13 other fish species were collected (8 nonnatives, 5 natives). Early results from 1997 and 1998 confirmed that Colorado pikeminnow and razorback suckers still inhabit the Duchesne River. For more detailed discussions of preliminary findings see FY-97 and FY-98 Annual Recovery Program Reports.

Management of flows in the Duchesne River to mimic the natural hydrograph, and thereby possibly (at least in part) restore natural ecosystem functions and fish use, may contribute to recovery of the endangered fishes. Preliminary flow recommendations for the Duchesne River have been developed by the Service and were provided to the Central Utah Water Conservancy District, at their request, by letter dated 23 January 1995. These preliminary flow recommendations have been used in preparing a biological opinion for the Uintah Basin Replacement Project and for the re-initiation of Section 7 consultation for the Bonneville Unit and other features of the Central Utah Project. Results of this research effort, may change the timing and quantity of final flow recommendations for the endangered fishes. Final flow recommendations will be used by the Recovery Program and the State of Utah in pursuit of protection/restoration of habitats on the Duchesne River.

IV. Study Goals, Objectives, Hypotheses, End Product:

Goal — Using data collected during the previous four years, develop a year-round flow recommendation for endangered fishes in the Duchesne River.

Objective — Produce a summary report including final flow recommendations that will be completed as a joint responsibility of FWS and UDWR.

V. Study Area:

The area in which flow recommendations will be proposed include the lower Duchesne River from its confluence with the Green River upstream to the Myton Bridge (highway 40) near the town of Myton, Utah, at RM 34.5.

VI. Study Methods/Approach:

Determination of Flow Recommendations

The biological data collected will be used to determine, what life stages were present and when these lifestages occupy the Duchesne River. Fish collections will be used to determine if spawning occurs, and if it does, where and what habitat is required. Adult surveys together with radio telemetry data will identify what areas of the river used by adult fishes and during what periods of the year. The flow recommendations for the Duchesne River will be dependent on what life stages of endangered fish are present, and if use is year-round or seasonal. Mesohabitat use information from telemetry data will be used to determine which habitats are occupied by endangered fishes. Physical data, together with biological information, will be used to quantify flow needs. Sediment transfer criteria will be used to define high flows necessary to maintain present channel complexity and will represent the high flow recommendation. If the river channel is not in equilibrium, a monitoring program will be necessary to determine the rate of change and how that change will affect flow recommendations.

Flood flow recommendations will be developed based on a determination of channel equilibrium. Equilibrium will be determined using a combination of historic channel

change information together with sediment movement data collected during the study. The baseflow recommendation will be determined using a combination of biological and physical components as described by Modde et al. (1999). A year-round flow recommendation for the Duchesne River will include flows suitable for spawning and nursery habitat (if necessary), base flows for adult habitat and channel maintenance/forming flows (Figure 1). Temperature limitation identified will also be considered in the flow recommendations. Adult surveys and larval fish collections will provide data to determine if and where spawning may be occurring and juvenile and larval fish collections will define the presence and distribution of young of the year fish using the Duchesne River. Base flow needs for endangered fishes will be determined by habitat availability information generated from stream profile relationships to flow reduction and fish use during the baseflow period. In addition, a curve-break geomorphic methodology based on riffle habitat types will also be incorporated. The curve-break approach to defining base flow needs of fish involves using transect measurements and simulation software (RHABSIM) to predict several instream variables (depth, velocity, wetted perimeter, cross sectional area, rise in stage, wetted width, etc.) with declining flows to determine at what point above which the greatest rate of decline occurs. The data point with the greatest regression residual (i.e. curve break) represents the discharge in which the channel characteristics deteriorate at the greatest rate and thus, represent the greatest rate of habitat loss for fish and other aquatic organisms in which fish depend. Information from the curve break flow analysis will be integrated with the biological information (i.e., seasonality of use, spawning requirements, passage requirements, water quality, etc.).

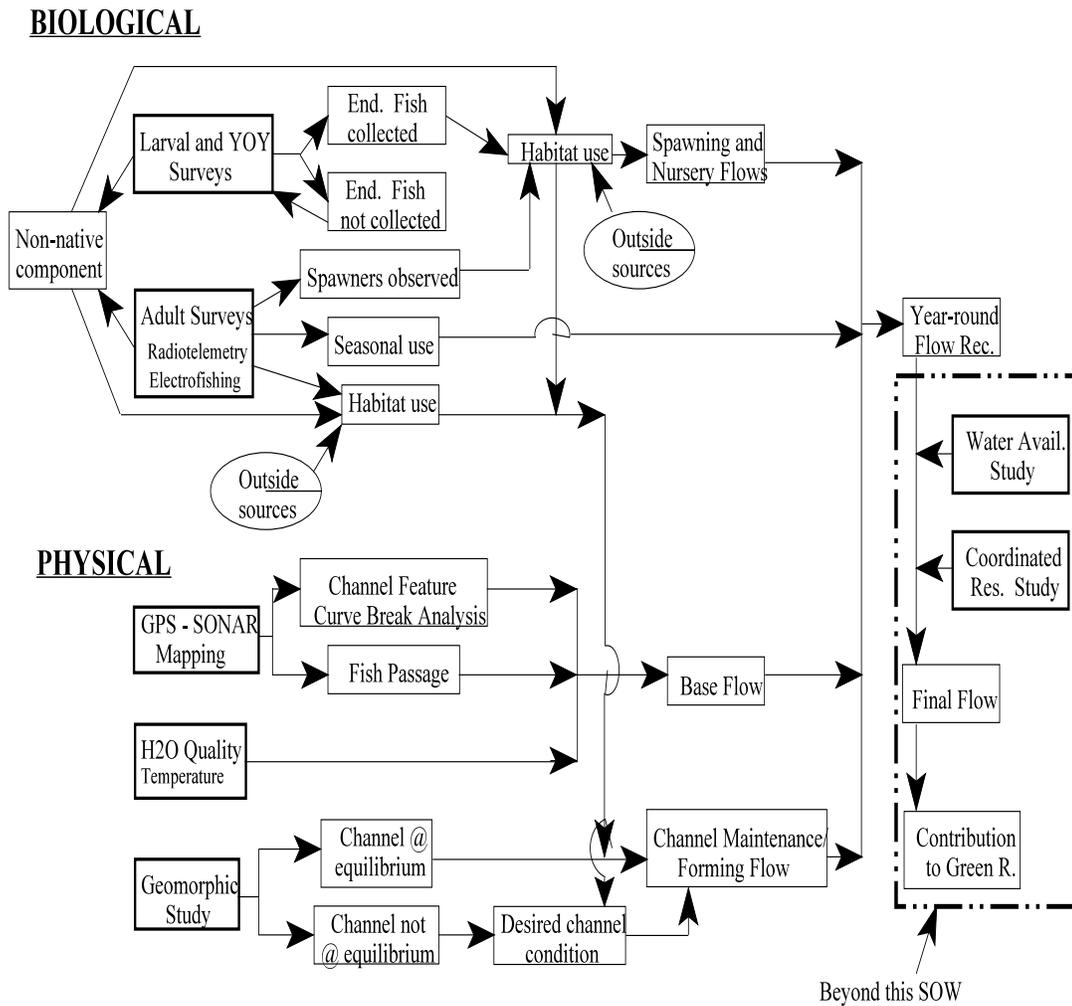


Figure 1. Flow chart identifying factors that will be considered in preparing flow recommendations for the Duchesne River.

VII. FY-2001 Task Description:

Tasks —

1. Analyze stream profile data using RHABSIM and calculating curve-break.
2. Combine geomorphic and biological data and develop an integrated year-round flow recommendation.

VIII. FY-2001 Work:

Deliverables/Due Dates —

- Final Report providing flow recommendations- October, 2001

Budget (\$) —

Task 1, and 2

	Service, Vernal	UDWR	Ute Tribe	USU*	Total
Labor	38.0K	18.0K	1.5.0K	1.5K	59.0K
Travel	2.0K	2.0K	1.0K	1.0K	6.0K
Total	40.0K	20.0K	2.5K	2.5K	65.0K

IX. Budget Summary:

FY-2001

	Service, Vernal	UDWR	Ute Tribe	USU*	Total
Total	40.0K	20.0K	2.5K	2.5K	65.0K

*** Does not include university overhead**

X. References:

Brink, M.S., and J.C. Schmidt. 1996. The Duchesne River channel: a geomorphic history, 1875-1995. Draft Final Report submitted to Utah Division of Wildlife Resources, Salt Lake City, UT.

Cranney, S.J. 1993. Lower Duchesne River fishery investigations - 1993. Draft Report. Utah Division of Wildlife Resources, Vernal, Utah

Irving, D.B., and T. Modde. 1999. Home range fidelity and use of historical habitat by adult Colorado squawfish (*Ptychocheilus lucius*) in the White River, Colorado and Utah. Great Basin Naturalist, in press.

Modde, T. 1997. Fish composition and endangered fish use in the lower Duchesne River. Final Report submitted to Ute Tribe Fish and Wildlife Department, Fort Duchesne, UT. 12 pp.

- Modde, T., W.J. Miller, and R. Anderson (eds.). 1999. Determination of habitat availability, habitat use, and flow needs of endangered fishes in the Yampa River between August and October. Draft Final Report submitted to the Recovery Implementation Program, U.S. Fish and Wildlife Service, Denver, CO. 134 pp.
- Mullan, J.W. 1976. Fisheries habitat plan for the Uintah and Ouray Indian Reservation as affected by the Uintah and Upalco Units of the Central Utah Project. U.S. Fish and Wildlife Service, Vernal, Utah. 132 pp.
- Seethaler, K. 1978. Life history and ecology of the Colorado squawfish (*Ptychocheilus lucius*) in the Upper Colorado River Basin. Masters Thesis, Utah State University, Logan, Utah. 156 pp.