

**COLORADO RIVER RECOVERY PROGRAM
FY-2009 PROPOSED SCOPE OF WORK for:**

Project No.: 138

Annual fall monitoring of YOY Colorado pikeminnow and small-bodied native fishes

Lead Agency: Utah Division of Wildlife Resources

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Category:

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

Expected Funding Sources:

- Annual funds
- Capital funds
- Other (explain)

I. Title of Proposal:

Annual fall monitoring of YOY Colorado pikeminnow and small-bodied native fishes

II. Relationship to RIPRAP:

Green River Action Plan: Mainstem

- V.A. Measure and document population and habitat parameters to determine status and biological response to recovery actions.
- V.B.2. Conduct appropriate studies to provide needed life history information.

Colorado River Action Plan: Mainstem

- V.A. Measure and document population and habitat parameters to determine status and biological response to recovery actions.
- V.B.2. Conduct appropriate studies to provide needed life history information.

III. Study Background/Rationale and Hypotheses:

Larval Colorado pikeminnow monitoring is an ongoing effort to evaluate spawning success. Monitoring of juvenile Colorado pikeminnow (*Ptychocheilus lucius*) occurs in conjunction with adult population estimates in the Green and Colorado rivers. However, survival of young-of-year (YOY) can vary greatly between years independent of spawning success and can have an impact on the juvenile component of Colorado pikeminnow populations. For example, biotic and abiotic factors such as flow variation, backwater temperatures, competition and predation by nonnative fish (e.g., gamefish and small-bodied cyprinids), and over-winter mortality can hinder spawning success (i.e., high mortality of YOY fish) resulting in a smaller number of juvenile Colorado pikeminnow available for recruitment into the adult population (Bestgen et al. 2006). Recruitment of other native species such as bluehead sucker (*Catostomus discobolus*), flannelmouth sucker (*Catostomus latipinnis*), roundtail chub (*Gila robusta*), and speckled dace (*Rhinichthys osculus*) is affected similarly.

As a result of decreased recruitment, control actions targeting nonnative gamefish species, primarily smallmouth bass (*Micropterus dolomieu*) and northern pike (*Esox lucius*), are being evaluated across the upper Colorado River Basin to determine the level of reduction necessary to minimize the threat to the recovery of Colorado pikeminnow and other endangered Colorado River fishes. Successful implementation of nonnative fish removal will likely be measured by the response of endangered fish and other native species (i.e., increased abundance). However, nonnative fish removal efforts are preliminary, thus the first observed positive response will likely be evident in early life-stages of the native fish community (Bestgen et al. 2007a). An adult response to nonnative removal may not be detectable initially for a number of reasons, one of which is the large home range of adults (UDWR 2006). Furthermore, a positive response by adult endangered species may be difficult to measure statistically without extensive observations due to generation times of endangered fish populations (e.g. Bestgen et al. 2007b).

Data necessary to evaluate the recovery status of native fishes will be generated by current and future YOY sampling in conjunction with nonnative fish removal efforts. For instance, documenting size and relative abundance of YOY Colorado pikeminnow and other native species may provide valuable information about the probable survival of any particular year class. Together with existing YOY data compiled from the Interagency Standardized Monitoring Program (ISMP; 1987 - present), results from this project should provide the basis for a predictive model to help identify recruitment rates required to sustain wild populations of Colorado pikeminnow. Continued monitoring of YOY Colorado pikeminnow will provide information toward refinement of the model and an indication of population health prior to detection by adult population estimates. Efforts to control nonnatives will likely have the greatest affect on YOY fish (i.e., decreased predation and increased survival). Therefore, monitoring this component of the Colorado pikeminnow will provide information toward evaluating nonnative control projects. Additionally, this project ensures continuation of existing, standardized data series (ISMP) that document trends in abundance of early-life stage Colorado pikeminnow (USFWS 1987). Finally, response of early life-stages of native and small-bodied fish to removal of nonnative predators will serve as indicators of the response that would be experienced by endangered fish species occupying the same habitats.

NOTE: UDWR has been responsible for monitoring YOY Colorado pikeminnow abundance since 1986. In 2004, this project was expanded to explore linkages between trends in YOY abundance (collected in this study), with abundances of larval (current Project No. 22f) and juvenile pikeminnow (old ISMP data set; and current Project No. 128). Also, beginning in 2004, there was reference to the use of predictive modeling to correlate trends in these multiple life stages with environmental variables. Those analyses were not completed. In late 2008, in conjunction with uncertainties identified in the *Green River Study Plan*, the Recovery Program decided to conduct a separate comprehensive synthesis of the effect of changes in physical habitat (as a function of flow and flow variability) and other environmental conditions on the small bodied fish community (emphasis on Colorado pikeminnow). That comprehensive synthesis will be initiated in 2009, entitled *Historical assessment of factors affecting young Colorado pikeminnow abundance and physical habitat availability in the Green River, Utah*. Although this historical assessment is a separate project, work for it is included under the young-of-year project this year; however, beginning in FY2010, it will be a separate project. The UDWR's analysis under Project 138 will once again focus solely on long term trends in YOY pikeminnow / small bodied fishes abundance and correlations with flow and temperature beginning in 2010.

IV. Study Goals, Objectives, End Product:

1. Determine size and relative abundance of YOY Colorado pikeminnow at the end of their first growing season to complement larval and juvenile sampling data.
2. Estimate the response of small-bodied and YOY native fish to removal of northern pike and smallmouth bass.

3. Determine relationships between YOY Colorado pikeminnow CPE abundance estimates with respect to flow and temperature.
4. Using new and existing data, develop predictive model that relates larval and YOY Colorado pikeminnow abundance (to be included as separate project in future years).
5. Using new and existing data, develop predictive model that relates YOY and juvenile Colorado pikeminnow abundance (to be included as separate project in future years).

V. Study Area

The study area for this project includes identified Colorado pikeminnow nursery habitat area in the Green and Colorado rivers in Utah (Valdez et al. 1982; Archer et al. 1985; Tyus and Haines 1991). Specifically, Split Mountain to Sand Wash (RM 319 – RM 215) on the middle Green River, Green River State Park to the confluence with the Colorado River (RM 120 – RM 0) on the lower Green River, and Cisco to the confluence with the Green River (RM 111 – RM 0) on the Colorado River.

VI. Study Methods/Approach

Objectives 1-2:

Annual YOY Colorado pikeminnow and native fish sampling will be conducted in late summer/early fall between the second week of September and the third week of October.

The first 2 backwater/low velocity habitats encountered every five river-miles will be sampled dependent upon the availability of suitable habitats within each subreach. Response of small-bodied and YOY native fish to nonnative predator removal will be evaluated by sampling 3 backwaters every five miles (middle Green River only). Field sampling will be conducted using the ISMP protocol so that long-term trends can be maintained. Data collected in addition to the ISMP protocol will be used to increase the statistical power of the sample, and to compare with ISMP trends.

Backwater/low velocity habitats will be sampled using a 1.2 m x 4 m seine with 3 mm mesh. At least two non-overlapping seine hauls will be conducted in each habitat sampled. Seine hauls will be parallel to one another and perpendicular to the axis of the backwater. However, if water depth is too great seine hauls will be completed along one shoreline. The first 2 seine hauls will be taken at $\frac{1}{3}$ and $\frac{2}{3}$ the distance from the mouth of the backwater. Additional seine hauls may be completed in any portion of the backwater including the mouth or shallow tail end. Length of each seine haul, maximum depth, and average depth will be recorded for each sample. All endangered and native fish will be enumerated, identified, measured (total length in mm), and returned alive to the habitat. Ray counts will be completed for all chubs (*Gila* spp.) captured. All nonnative fishes will be enumerated (first seine haul only) and removed. In subsequent seine hauls, common (i.e., highly abundant) nonnative species will be ignored and other less common nonnative species will be enumerated.

In addition, physical habitat measurements to be collected at each site include habitat

type, habitat length, habitat width, habitat temperature, main channel temperature, habitat turbidity, and main channel turbidity. Location of each habitat will be recorded as the approximate river mile and in UTM coordinates using GPS technology.

Objectives 3-5:

Data from past and present efforts monitoring YOY Colorado pikeminnow will be analyzed with respect to CPE abundance estimates, size, flow and temperature. Data from YOY Colorado pikeminnow monitoring through fall 2008 in the middle Green, lower Green and Colorado rivers will be included in the final analysis of the data.

Although the following data will not be incorporated into the final young-of-year report, it will still be contained under this project through FY2009. Starting in FY2010, this information will be contained under a separate synthesis project. Larval drift net data from the Yampa River, lower Green River and Colorado River will be incorporated into the analysis as well as information from McAda and Ryel (1999). Data analysis will determine the annual relationships between larval and YOY Colorado pikeminnow and multi-year relationships between YOY and juvenile Colorado pikeminnow with respect to all variables. Uncertainties such as ages at length will be addressed during the predictive model development process. Adequacy of spatial sampling scope will be addressed either through separate data analyses or during model development.

Appropriate statistical analyses to determine relationships and develop a predictive model will be determined through statistical consultation with Dr. Kevin Bestgen (Colorado State University).

VII. Task Description and Schedule:

Task 1- 3: Seine backwater/low velocity habitats to collect data for endangered, native and nonnative fish. Collect physical habitat data.

Task 1. Middle Green River - Fall 2009

Task 2. Lower Green River - Fall 2009

Task 3. Colorado River - Fall 2009

Task 4: Data entry.

Database management Fall 2009

Task 5: Data Analysis and Report Preparation

Draft final report to Recovery Program coordinator – June 18, 2009

Draft final report to peer reviewers and Biology Committee – July 18, 2009

Final report to Biology Committee – September 18, 2009

Annual Report November 2009

Task 6: Develop and refine predictive models – included under separate synthesis report beginning in FY2010.

VIII. Deliverables, Due Dates, and Budget by Fiscal Year

FY2009

FY 2009 Budget

| Task 1 – Seining Middle Green | UDWR Vernal | UDWR Moab | LFL | Total |
|--|------------------------|----------------------|------------|----------------|
| Labor | | | | |
| Proj. leader (4 days @ Vernal @ \$438/day) | \$1,752 | \$0 | \$0 | \$1,752 |
| Biologist (8 days @ Vernal @ \$340/day) | \$2,720 | \$0 | \$0 | \$2,720 |
| Technician (16 days @ Vernal @ \$195/day) | \$3,120 | \$0 | \$0 | \$3,120 |
| Travel | | | | |
| Vehicle (16 days) | \$300 | \$0 | \$0 | \$300 |
| Per diem (8 days/ 4 people @ \$30 per day) | \$960 | \$0 | \$0 | \$960 |
| Equipment (maintenance and repair) | \$1,000 | \$0 | \$0 | \$1,000 |
| Task 1 subtotal | \$9,852 | \$0 | \$0 | \$9,852 |

^a Calculated as average miles traveled per day * cost per mile + daily rental fee = 75

* \$0.42 + \$5 = \$36.50/day

^b Includes repair or replacement of outboard motor lower units, and net repair and replacement.

| Task 2 - Seining Lower Green | UDWR Vernal | UDWR Moab | LFL | Total |
|--|------------------------|----------------------|------------|----------------|
| Labor | | | | |
| Proj. leader (4 days @ Moab @ \$438/day) | \$0 | \$1,752 | \$0 | \$1,752 |
| Biologist (8 days @ Moab @ \$340/day) | \$0 | \$2,720 | \$0 | \$2,720 |
| Technician (16 days @ Moab @ \$195/day) | \$0 | \$3,120 | \$0 | \$3,120 |
| Travel | | | | |
| Vehicle (2 trucks for 2 days) | \$0 | \$168 | \$0 | \$168 |
| Per diem (4 days/ 8 people @ \$30 per day) | \$0 | \$960 | \$0 | \$960 |
| Equipment (maintenance and repair) | \$0 | \$1,000 | \$0 | \$1,000 |
| Task 2 subtotal | \$0 | \$9,720 | \$0 | \$9,720 |

^a Calculated as average miles traveled per day * cost per mile + daily rental fee

=100 * \$0.42 + \$5 = \$42.00/day

^b Includes repair or replacement of outboard motor lower units, and net repair and replacement.

| Task 3 – Seining Lower Colorado | UDWR Vernal | UDWR Moab | LFL | Total |
|--|------------------------|----------------------|------------|--------------|
| Labor | | | | |
| Proj. leader (4 days @ Moab @ \$438/day) | \$0 | \$1,752 | \$0 | \$1,752 |
| Biologist (8 days @ Moab @ \$340/day) | \$0 | \$2,720 | \$0 | \$2,720 |
| Technician (16 days @ Moab @ \$195/day) | \$0 | \$3,120 | \$0 | \$3,120 |
| Travel | | | | |
| Vehicle (2 trucks for 2 days) | \$0 | \$168 | \$0 | \$168 |
| Per diem (4 days/ 8 people @ \$30 per day) | \$0 | \$960 | \$0 | \$960 |

| | | | | |
|------------------------------------|-----|---------|-----|---------|
| Equipment (maintenance and repair) | \$0 | \$1,000 | \$0 | \$1,000 |
| <i>Task 3 subtotal</i> | \$0 | \$9,720 | \$0 | \$9,720 |

^a Calculated as average miles traveled per day * cost per mile + daily rental fee
=100 * \$0.42 + \$5 = \$42.00/day

^b Includes repair or replacement of outboard motor lower units, and net repair and replacement.

| Task 4 – Data Entry | UDWR Vernal | UDWR Moab | LFL | Total |
|--|------------------------|----------------------|-----------------|-----------------|
| Labor | | | | |
| Proj. leader (2 days @ Moab & Vernal @ \$438/day) | \$876 | \$876 | \$0 | \$1,752 |
| Biologist (2 days @ Moab & Vernal @ \$340/day) | \$680 | \$680 | \$0 | \$1,360 |
| Technician (3 days @ Moab & Vernal @ \$195/day) | \$585 | \$585 | \$0 | \$1,170 |
| <i>Task 4 subtotal</i> | \$2,141 | \$2,141 | \$0 | \$4,282 |
| Task 5 – Data Analysis/Report Preparation | UDWR Vernal | UDWR Moab | LFL | Total |
| Labor | | | | |
| Proj. leader (10 days @ Moab & Vernal @ \$438/day) | \$4,380 | \$4,380 | \$0 | \$8,760 |
| Statistician (13.84 days @ LFL @ \$434/day) | \$0 | \$0 | \$6,007 | \$6,007 |
| Biologist (15 days @ Moab & Vernal @ \$340/day) | \$5,100 | \$5,100 | \$0 | \$10,200 |
| <i>Task 5 subtotal</i> | \$9,480 | \$9,480 | \$6,007 | \$24,967 |
| Task 6 – Develop and refine predictive models | UDWR Vernal | UDWR Moab | LFL | Total |
| Labor | | | | |
| Statistician (30 days @ LFL @ \$434/day) | \$0 | \$0 | \$13,020 | \$13,020 |
| <i>Task 6 subtotal</i> | \$0 | \$0 | \$13,020 | \$13,020 |
| FY 2009 TOTAL | \$21,473 | \$31,061 | \$19,027 | \$71,561 |

IX. Program Budget Summary

| | <u>UDWR Vernal</u> | <u>UDWR Moab</u> | <u>LFL</u> | <u>Total</u> |
|--------|--------------------|------------------|-----------------|-----------------|
| FY2009 | <u>\$21,473</u> | <u>\$31,061</u> | <u>\$19,027</u> | <u>\$71,561</u> |

X. Reviewers

XI. References

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