

**FY-2014-2018 PROPOSED SCOPE OF WORK for:**

**Project #: 115**

Monitoring effects of Flaming Gorge Dam releases on the Lodore and Whirlpool Canyon fish communities

Reclamation Agreement number *[if applicable & known]*: \_\_\_\_\_  
Reclamation Agreement term *[if applicable & known, e.g., Oct. 1, 2013 – Sep. 30, 2018]*: \_\_\_\_\_

Lead Agency: Larval Fish Laboratory, CSU; Bureau of Reclamation; U.S. Fish and Wildlife Service  
Jointly Submitted by: Larval Fish Laboratory, CSU; Bureau of Reclamation; U.S. Fish and Wildlife Service

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Category:

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

Expected Funding Source:

- Annual funds
- Capital funds
- Other (explain)

I. Title of Proposal:

Monitoring Effects of Flaming Gorge Dam releases on the Lodore/Whirlpool fish community

## II. Relationship to RIPRAP:

See RIPRAP at <http://www.coloradoriverrecovery.org/documents-publications/foundational-documents/recovery-action-plan.html>

### Green River Action Plan: Mainstem

II.D. Evaluate and revise as needed flow regimes to benefit endangered fish populations.

III. Study Background/Rationale and Hypotheses: In FY01, the Recovery Implementation Program (RIP) revised the RIP Recovery Action Plan to include evaluating and revising, as needed, flow recommendations for the endangered fish throughout the Upper Colorado River Basin. Flaming Gorge Flow and Temperature Recommendations (FGFTR; Muth et al. 2000) were approved by the RIP in FY01. A Record of Decision was written in 2005 and flow and temperature recommendations have been implemented. Another change in operations at Flaming Gorge Dam has resulted from implementation of the Larval Trigger Study Plan, and has effects primarily on timing and magnitude of releases in spring from Flaming Gorge Dam.

An expectation of implementation of flow and temperature recommendations was that native and endangered fishes will benefit via expanded distribution and abundance. It is also possible that new flow and temperature regimes for native endangered fishes may also enhance distribution and abundance of certain nonnative fishes. This is a major concern of managers of the Colorado River Basin, where expanding non-native fish populations are detracting from conservation efforts. Effects of full implementation of new flow and temperature regimes of the Green River downstream from Flaming Gorge Dam need to be evaluated to determine relative benefits to native and endangered fishes and other non-native elements of the fish community.

An increased emphasis was placed on non-native fish removal in this study beginning in 2005. Expanded populations of non-native fish predators have been detected since 2002 due in part, to warmer water temperatures and lower flows. The proposed non-native fish removal and native fish monitoring study is a logical extension of work conducted by Bestgen and Crist (2000), more recent sampling in 2002 to 2006 (Bestgen et al. 2006, Bestgen et al. 2007). That more recent work was conducted to evaluate changes in the fish community that occurred since 1996 in response to partial implementation of new flow recommendations and to expansion and removal of non-native predaceous fishes in the Green River. Aspects of the new flow and temperature recommendations and the Larval Trigger Study Plan that were realized since 1996 were relatively higher spring peak flows in 1997, 1999, 2011, and 2012 and low and warm flows in the summer seasons from 2002 to 2007, followed by relatively high flows from 2008-2011, and lower flows in 2012; 2013 is expected to be a low flow year as well. A number of changes in the fish community were observed during sampling from 2002 to 2012. Those included an expanded population of smallmouth bass *Micropterus dolomieu* in Lodore and Whirlpool canyons, and reproduction by that species in Lodore Canyon, as well as in downstream Whirlpool Canyon. We also detected upstream expansion and increased abundance of red shiner *Cyprinella lutrensis* in some years and channel catfish *Ictalurus punctatus* in several years. However, in the higher and cooler water year in 2008 resulted in delayed spawning of smallmouth bass and small size going into winter. Particularly problematic has been expansion

of northern pike reproduction and abundance in Browns Park in the upstream portion of the study area.

We also made interesting observations of native fishes during the 2002-2012 sampling. Sampling and telemetry work (Kitcheyan and Montagne 2005) revealed increased use of Lodore Canyon in summer by Colorado pikeminnow *Ptychocheilus lucius*. In 2006 and 2010, we also detected reproduction by Colorado pikeminnow in Lodore Canyon, and in 2011 and 2012, detected aggregations of Colorado pikeminnow in or at the mouth of Vermillion Creek in spring during runoff. Seine sampling in lower Lodore Canyon in summer 2003 captured an early juvenile razorback sucker *Xyrauchen texanus* x white sucker *Catostomus commersonii* hybrid (29 mm TL), which indicated attempted reproduction by razorback suckers there in spring or early summer 2003. We also detected continued presence of humpback chub *Gila cypha* in Whirlpool Canyon in 2002, 2003, and 2004, along with a relatively large population of roundtail chub *Gila robusta*, which has subsequently declined. We also captured (N = 16 scanned for PIT tags) or observed (N = 60) bonytail *Gila elegans* in autumn 2004 in the Green River from the Echo Park boat ramp to downstream about 11 km a short time after their stocking at Echo Park (Bestgen et al. 2008). Humpback chub captures are now rare, as are roundtail chub; occasional bonytail are captured that are recently stocked fish.

An ongoing understanding of shifts in distribution and abundance patterns of non-native predaceous fishes and native/endangered fishes associated with Flaming Gorge operations will provide managers with information necessary to assess effects of full implementation of new flow and temperature recommendations. Of particular interest are continued assessment of recent changes in distribution and abundance of predaceous species such as smallmouth bass, northern pike, and other native fishes. This study provides important non-native fish removal activities, as well as information to describe the response of native fishes to removal of smallmouth bass and other non-native piscivores. This adds information to a continued management process (along with other ongoing studies downstream) that addresses uncertainties in flow and temperature recommendations that may affect the fish community (Muth et al. 2000).

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

**Goal:** Remove non-native fishes and determine if changes in Green River flow and thermal regimes are associated with changes in distribution and abundance patterns of native and nonnative fishes in Browns Park, Lodore and Whirlpool canyons, and Island-Rainbow Park.

Objective 1. Remove non-native fishes and determine if shifts in distribution and abundance of large-bodied fishes have occurred in Lodore Canyon and Whirlpool Canyon by comparing the results of shoreline electrofishing and trammel net surveys with the results of previous studies, particularly Bestgen and Crist (2000), Bestgen et al. (2007) and results of the 2007-2012 sampling.

Objective 2. Remove non-native fishes and determine if shifts in the distribution and abundance of small-bodied fishes have occurred in Brown's Park, Lodore and Whirlpool canyons, and Island-Rainbow Park by comparing results of low-velocity, nearshore seining with the results of previous studies, particularly Bestgen and Crist (2000), Bestgen et al. (2007), and results of the

2002 to 2012 sampling.

Objective 3. Determine if Colorado pikeminnow spawn in the Green River upstream from the Yampa River confluence by sampling with drift nets in lower Lodore Canyon, and by summer sampling to determine presence of ripe adults. Drift net sampling will be done only occasionally when Green River flows are low and warm (conditions when pikeminnow spawning might be expected) and will be done in conjunction with drift-net sampling in the Yampa River (project 22f).

Objective 4. Analyze hydrological records as recorded by the USGS at their gaging station (09234500) near Greendale, Utah, to compare differences in current and historical operations.

Objective 5. Analyze temperature records of the Green River through Browns Park, Lodore Canyon, and Whirlpool Canyon to compare differences in current and historical operations. This activity has been expanded with more thermographs in other locations to further document warming and mixing patterns of the Green River, especially downstream of the Yampa River.

Objective 6. Continue to analyze past otolith samples and those collected in 2007-2012 to understand smallmouth bass spawning periodicity to assist with flow-related management of that species.

Objective 7. Based on results of objectives 1–6, determine physical effects of new operations and subsequent effects on the fish community of the Green River downstream of Flaming Gorge Dam.

End Product: Remove non-native fishes and assessment of effects of non-native fish removal and effects of new flow and temperature regimes based on the fish community response.

## V. Study area

In general, the fish community of the Green River will be sampled between the Swinging Bridge in Brown's Park and the lower end of Rainbow Park in Dinosaur National Monument. Additional northern pike sampling in upstream reaches will also be conducted but specific areas dependent on habitat availability. Specific reaches and gear include:

**Boat, raft or seine sampling for small-bodied fishes and northern pike:** Beginning upstream near Red Creek in Brown's Park and extending downstream through Island-Rainbow Park.

**Raft-based electrofishing and trammel-netting:** Lodore Canyon: Entire Canyon, which consists of four contiguous, 5-mile reaches and; Whirlpool Canyon: Entire Canyon, which consists of 2 contiguous, 5-mile reaches.

## VI. Study Methods/Approach

Sampling methods will be patterned closely after those used in 2002 to 2012 sampling. Data will

be collected in a manner that generates catch per unit effort (CPUE) metrics (fish/hour electrofishing, small-bodied fish/m<sup>2</sup> habitat seined, larval fish/m<sup>3</sup> water, fish/hour trammel-netting) with associated variance estimates to enable within-study, and annual comparative statistical analyses. Additional sampling techniques (e.g., angling, hoop nets) will be used on an experimental basis. Flow data collected by USGS and temperature data (U. S. Fish and Wildlife Service) at several of its gauging stations on the Green and Yampa rivers will be used to address Objectives 4 and 5.

Three sampling trips will be conducted each year. Sampling will begin in early to mid-summer and ending in autumn. We envision two sampling trips using electrofishing and a third trip using primarily netting gear. Seine sampling will occur on all trips. The two electrofishing trips will be 5-days in length and utilize a 7-8 person crew; netting trips will have similar requirements.

***Large-bodied fishes; Electrofishing:*** Two electrofishing rafts will simultaneously sample the left and right shoreline. Each two-person crew (one boat operator and one netter) will collect all fish. Each 5-mile reach will be sampled in segments, usually about 1-2 miles each. At the lower end of each section all fish will be enumerated as an adult or sub-adult (based on pre-determined total length ranges per species) and electrofishing effort will be recorded. Rare fish (T&E species) will be weighed, measured, and PIT-tagged. Thus, mean CPUE/trip/reach will be generated from the section samples.

In addition to simple enumeration, all fish will be measured and weighed in two sections (both shorelines) of each reach on each trip to characterize size structure and length/weight relationships. Non-native fishes (except salmonids) will be removed.

Descriptive statistics will be used to describe CPUE, lengths, and weights of fish and appropriate comparisons with previously collected data will be made. This sampling also plays a role in determining burbot escapement from Flaming Gorge Reservoir, and is especially important given the expanded releases in some years for implementing the Larval Trigger study plan. These data have been reported at several presentations in the recent past.

***Large-bodied fishes; Trammel netting:*** Multi-filament trammel nets (23m x 1.8m; 25-cm outer mesh; 2.5-cm inner mesh) will be set at locations in Lodore and Whirlpool canyons with a main goal of sampling chubs in the genus *Gila*. Trammel nets collect a variety of species, but have been used in other studies as a primary gear type to collect native chubs in canyon-bound reaches of the Green (Chart and Lentsch 1999) and Colorado Rivers (Chart and Lentsch 2000, Valdez and Ryel 1995, McAda 2000). Trammel nets will be fished during crepuscular and nighttime hours at sites in Lodore and Whirlpool canyons. Nets will be set in low velocity habitats and along eddy lines. The number of nets set will be contingent on habitat availability and accessibility. Nets will be checked every 2 hours.

All fish will be measured, weighed, and tagged as necessary. Dorsal and anal fin rays will be enumerated from all chubs collected. Any suspected humpback chub will be photographed, primarily for the purpose of acquainting other researchers with the chubs found in Whirlpool Canyon. Appropriate morphometric measurements (as identified in Douglas et al. 1998) will be

collected. Descriptive statistics will be used to describe CPUE, lengths, and weights of fish and appropriate comparisons with data previously collected will be made. This sampling also plays a role in determining burbot escapement from Flaming Gorge Reservoir, and is especially important given the expanded releases in some years for implementing the Larval Trigger study plan.

***Large-bodied fishes; other gear types:*** In addition to electrofishing and trammel netting, other sampling techniques such as angling and trap nets may be employed to evaluate their efficiency. Angling will also be used to supplement total numbers of adult Colorado pikeminnow collected and marked for movement and length/weight analyses.

***Small-bodied fishes; Seining:*** The purpose of this sampling will be to track shifts in distribution and abundance of the small-bodied nonnative (red shiner, sand shiner, fathead minnow) and native (speckled dace) cyprinids, and YOY of all other species. We will sample mostly backwaters, eddies, and shorelines; other habitat types (e.g., riffles) will be sampled as needed to detect species of interest. Two or more seine hauls will be taken in each sampled habitat and each seine haul will represent a sample. Physical measurements including area seined and habitat area will be gathered to quantify habitat dimensions and calculate CPUE. Seines used in this study will conform with the ISMP-recommended gear type. Readily identified endangered species will be measured and released alive. Other fish will be preserved in 10% buffered formalin and identified at CSU/LFL.

We will also begin to conduct analyses to understand timing and intensity of smallmouth bass reproduction in the Green River. This will be accomplished by analyzing otolith daily increments of smallmouth bass collected and preserved in ethanol during past years (2002-2012 as available). This will require analysis of several years of samples to understand effects of different flow and temperature regimes on timing and intensity of spawning. This analysis began in 2007 and results will be available as data are collected to understand the need for additional analyses. Presentations of these results have been prepared for annual meetings each year since 2008.

***Northern pike habitat and fish sampling:*** This item was added at the request of the Program Director's office because northern pike reproduction was detected in autumn 2005 in Browns Park. The first facet of this investigation assessed habitat available for northern pike in Browns Park (from near Beaver Creek downstream of Flaming Gorge Dam downstream to Lodore boat ramp). We have continued to sample areas where northern pike are concentrated by sampling areas where age-0 pike have been captured in the past, with the intent of removal of as many pike as possible. In past years we concentrated on nearshore areas and will continue to assess nearshore and main channel habitat for presence of age-0 and adult northern pike. In 2006, we also captured smallmouth bass in Browns Park at two locations (Bestgen et al. 2007). Browns Park sampling would also be used to assess if smallmouth bass populations are expanding or remain isolated. Sampling through 2012 showed that smallmouth bass were sporadic but pike were persistent in Browns Park, but concentrated mainly in the upper Browns Park area near Beaver Creek. Continued sampling in 2013 is ongoing to monitor if populations are expanding or maintaining at low levels. We think about three weeks of intensive sampling would be sufficient to survey most of the available areas; sampling effort upstream will be supplemented

by Utah Division of Wildlife sampling. Timing of sampling would also be dependent on the above-referenced information and the timing of Flaming Gorge flow releases. This sampling also plays a role in determining burbot escapement from Flaming Gorge Reservoir, and is especially important given the expanded releases in some years for implementing the Larval Trigger study plan. These data have been reported at several non-native fish workshop meetings in the last few years, and details capture rates, size structure, and timing of spawning of northern pike relative to flow and water temperature patterns.

**VII. Task Description and Schedule**

Task 1: remove non-native fishes and sample main-channel fish community (large-bodied fishes)

Task 2: remove non-native fishes and sample small-bodied fish community, with pike sampling in Browns Park

Task 3: process preserved samples of small-bodied fish and conduct otolith analyses (fish from seine samples)

Task 4: prepare and submit annual report

Schedule: FY-2014 (Tasks 1-4)

Task	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	x								x	x	x	x
2								x	x	x	x	x
3	x	x	x	x	x	x					x	x
4	x	x										

Schedule: FY-2015

Task	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	x								x	x	x	x
2								x	x	x	x	x
3	x	x	x	x	x	x					x	x
4	x	x										

Similar sampling schedules are envisioned for 2016-2018.

**VIII. Deliverables, Due Dates, and Budget by Fiscal Year: Sampling, sample processing, and annual reporting.**

– Deliverables/Due Dates: Annual Reports of field activities due to PD’s office November 2012 and November 2013.

– LFL Budget:

Travel: Travel costs for field work based on estimated per diem rates for Colorado State University for the area we are working in. Mileage is based on the standard rate for Motor Pool vehicles, which varies depending on age and size of the vehicle. We will use

\$ 0.50 per mile for 2014. Meeting costs include three nites of hotel, per diem, and mileage to travel to meetings. These include costs for two people.

Personnel: Salaries include 27% fringe rate, an estimate for 2014, plus overhead. Overhead is calculated on all items (including salary plus fringe rate) at 17.5%, per our agreement with BOR.

Supplies: Supplies are used in the conduct of field sampling and lab analysis of specimens and otoliths. Containers and preservatives are to hold field specimens and to curate specimens in the lab, preservative are formalin and ethanol for preservation of samples. Camping gear includes tents, kitchen supplies for field camping, and coolers. Nets include seines and trammel nets, disposable goods that need replacements due to attrition. Fyke nets are stationary gear for pike sampling and need to be replaced due to attrition. Tools for repairs include hammers, pitons, rock bags, wrenches, and other hand tools to assist with sampling and gear repair in the field. Raft gear includes personal flotation devices, straps and other rigging for rafts, oars, frame repair or replacement, and flooring. Estimated costs based on current prices procured from various online sources (local vendors for camping supplies, NRS rafting supplies, Christiansen Inc, for net supplies, Fischer Scientific for preservatives, sample jars).

Budget notes: Costs were reduced to accommodate Program requirements. This was accomplished by not building in raises in salary between 2013 and 2014 and decreasing costs for sample identification and other analyses; budget was static from 2011-2013. Increases needed to support mandated raises for personnel and if additional funds are available, increased sample costs should be added.

**Larval Fish Lab and USBR Fish Community Monitoring Trip Costs and Reporting (Tasks 1-4)**: five trips total, one in each of June/July, August, and September (6-day trip plus two-days of gear and trip preparation per trip) plus the additional pike habitat and sampling assessment in Browns Park, to address: Task 1 (monitor large-bodied fish), Task 2 (monitor small-bodied fish with seines, plus pike sampling and habitat assessment) and Task 3 (process seine samples and conduct otolith analyses). We maintained salary costs from 2010-2013; an increase in budget for 2014 and beyond is detailed below. Fringe rates (27% in 2014) and overhead (17.5%) are figured into the per day costs for LFL items.

Larval Fish Laboratory, FY2014

Tasks 1 and 2, sample small- and large-bodied fishes

Item	Units	Cost/unit	Cost
Labor			
Principal investigator (d)	13	560	\$7,280
Senior technician (d)	50	226	\$11,300



Technician (d)	80	145	\$11,600
			subtotal \$30,180
Travel			
Per diem (d)	110	25	\$2,750
Mileage (miles)	7500	0.5	\$3,750
			subtotal \$6,500
Supplies			
gas (\$4/gal)	5	4	\$20
containers, preservative	18	25	\$450
camping gear	3	200	\$600
seines, trammel nets	3	130	\$390
fyke nets	1	756	\$756
tools for repairs	5	22	\$110
raft gear	6	140	\$840
			subtotal \$3,166
			Total \$39,846

Task 3, process preserved fish samples and otoliths from pike and smallmouth bass

Item	Units	Cost/unit	Cost
Labor			
Principal investigator (d)	7	560	\$3,920
Senior technician (d)	25	226	\$5,650
Technician (d)	50	145	\$7,250
			Total \$16,820

Task 4, annual report preparation

Item	Units	Cost/unit	Cost
Labor			
Principal investigator (d)	8	560	\$4,480
Senior technician (d)	7	226	\$1,582
Technician (d)	7	145	\$1,015
			subtotal \$7,077
Travel			
planning mtg	2	400	\$800
			subtotal \$800

Total \$7,877

Total tasks 1-4 \$64,543

Larval Fish Laboratory, FY2015

Tasks 1 and 2, sample small- and large-bodied fishes

Item	Units	Cost/unit	Cost
<b>Labor</b>			
Principal investigator (d)	13	576.8	\$7,498
Senior technician (d)	50	232.78	\$11,639
Technician (d)	80	149.35	\$11,948
			subtotal \$31,085
<b>Travel</b>			
Per diem (d)	110	25	\$2,750
Mileage (miles)	7500	0.5	\$3,750
			subtotal \$6,500
<b>Supplies</b>			
gas (\$4/gal)	5	4	\$20
sampling containers, preservative, dip nets	18	25	\$450
tents, field kitchen gear	3	200	\$600
seines, trammel nets	3	130	\$390
fyke nets	2	756	\$1,512
misc tools for repairs	5	22	\$110
raft gear (oars, flotation, straps, cooler)	6	140	\$840
			subtotal \$3,922
			Total \$41,507

Task 3, process preserved fish samples and otoliths from pike and smallmouth bass

Item	Units	Cost/unit	Cost
<b>Labor</b>			
Principal investigator (d)	7	576.8	\$4,038
Senior technician (d)	25	232.78	\$5,820

Technician (d)	50	149.35		\$7,468
			Total	\$17,325

Task 4, annual report preparation

Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	8	576.8		\$4,614
Senior technician (d)	7	232.78		\$1,629
Technician (d)	7	149.35		\$1,045
			subtotal	\$7,289
Travel				
planning mtg	2	600		\$1,200
			subtotal	\$1,200
			Total	\$8,489
Total tasks 1-4				\$67,321

Larval Fish Laboratory, FY2016

Tasks 1 and 2, sample small- and large-bodied fishes

Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	13	594.104		\$7,723
Senior technician (d)	50	239.7634		\$11,988
Technician (d)	80	153.8305		\$12,306
			subtotal	\$32,018
Travel				
Per diem (d)	110	25		\$2,750
Mileage (miles)	7500	0.5		\$3,750
			subtotal	\$6,500
Supplies				
gas (\$4/gal)	5	4		\$20

sampling containers, preservative, dip nets	18	25	\$450
tents, field kitchen gear	3	200	\$600
seines, trammel nets	3	130	\$390
fyke nets	2	756	\$1,512
misc tools for repairs	5	22	\$110
raft gear (oars, flotation, straps, cooler)	6	140	\$840
			subtotal \$3,922

Total \$42,440

Task 3, process preserved fish samples and otoliths from pike and smallmouth bass

Item	Units	Cost/unit	Cost
Labor			
Principal investigator (d)	7	594.104	\$4,159
Senior technician (d)	25	239.7634	\$5,994
Technician (d)	50	153.8305	\$7,692
			Total \$17,844

Task 4, annual report preparation

Item	Units	Cost/unit	Cost
Labor			
Principal investigator (d)	8	594.104	\$4,753
Senior technician (d)	7	239.7634	\$1,678
Technician (d)	7	153.8305	\$1,077
			subtotal \$7,508
Travel			
planning mtg	2	600	\$1,200
			subtotal \$1,200
			Total \$8,708

Total tasks 1-4 \$68,992

Larval Fish Laboratory, FY2017

Tasks 1 and 2, sample small- and large-bodied fishes

Item			Cost
Labor	Units	Cost/unit	
Principal investigator (d)	13	611.9271	\$7,955
Senior technician (d)	50	246.9563	\$12,348
Technician (d)	80	158.4454	\$12,676
			subtotal \$32,979
Travel			
Per diem (d)	110	25	\$2,750
Mileage (miles)	7500	0.5	\$3,750
			subtotal \$6,500
Supplies			
gas (\$4/gal)	5	4	\$20
sampling containers, preservative, dip nets	18	25	\$450
tents, field kitchen gear	3	200	\$600
seines, trammel nets	3	130	\$390
fyke nets	2	756	\$1,512
misc tools for repairs	5	22	\$110
raft gear (oars, flotation, straps, cooler)	6	140	\$840
			subtotal \$3,922
			Total \$43,401

Task 3, process preserved fish samples and otoliths from pike and smallmouth bass

Item			Cost
Labor	Units	Cost/unit	
Principal investigator (d)	7	611.9271	\$4,283
Senior technician (d)	25	246.9563	\$6,174
Technician (d)	50	158.4454	\$7,922
			Total \$18,380

Task 4, annual report preparation

Item			Cost
Labor	Units	Cost/unit	
Principal investigator (d)	8	611.9271	\$4,895
Senior technician (d)	7	246.9563	\$1,729

Technician (d)	7	158.4454		\$1,109
			subtotal	\$7,733
Travel				
planning mtg	2	600		\$1,200
			subtotal	\$1,200
			Total	\$8,933
				Total tasks 1-4 \$70,713

Larval Fish Laboratory, FY2018

Tasks 1 and 2, sample small- and large-bodied fishes

Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	13	630.2849		\$8,194
Senior technician (d)	50	254.365		\$12,718
Technician (d)	80	163.1988		\$13,056
			subtotal	\$33,968
Travel				
Per diem (d)	110	25		\$2,750
Mileage (miles)	7500	0.5		\$3,750
			subtotal	\$6,500
Supplies				
gas (\$4/gal)	5	4		\$20
sampling containers, preservative, dip nets	18	25		\$450
tents, field kitchen gear	3	200		\$600
seines, trammel nets	3	130		\$390
fyke nets	2	756		\$1,512
misc tools for repairs	5	22		\$110
raft gear (oars, flotation, straps, cooler)	6	140		\$840
			subtotal	\$3,922
				Total \$44,390

Task 3, process preserved fish samples and otoliths from

pike and smallmouth bass

Item	Units	Cost/unit	Cost
Labor			
Principal investigator (d)	7	630.2849	\$4,412
Senior technician (d)	25	254.365	\$6,359
Technician (d)	50	163.1988	\$8,160
			Total \$18,931

Task 4, annual report preparation

Item	Units	Cost/unit	Cost
Labor			
Principal investigator (d)	8	630.2849	\$5,042
Senior technician (d)	7	254.365	\$1,781
Technician (d)	7	163.1988	\$1,142
			subtotal \$7,965
Travel			
planning mtg	2	600	\$1,200
			subtotal \$1,200
			Total \$9,165

Total tasks 1-4 \$72,486

**USFWS, Vernal Fish Community Monitoring Trip Costs and Reporting (Tasks 1-2)** : three trips total, one in each of June/July, August, and September (5-day trip plus two-days of gear and trip preparation per trip), to address: Task 1 (monitor large-bodied fish), Task 2 (monitor small-bodied fish with seines).

**2014**

**Tasks 1&2 – USFWS Sample Fish Population**

	Rate \$/hr	Total hours	Cost
<b>Labor</b>			
GS-12 Supervisory Fish Biologist	\$52.31	120	\$6,277
GS-11 Fish Biologist	\$45.06	120	\$5,407
GS-9 Admin. Officer	\$36.89	116	\$4,279

WG-5 Boat Operators (2)	\$18.91	160	\$3,026
<b>Subtotal</b>			<b>\$18,989</b>

**Travel**

Shuttle (3 trucks/trip x \$150/truck x 3 trips) Lodore to Split Mountain			\$1,350
<b>Subtotal</b>			<b>\$1,350</b>

**Equipment**

(2 trucks/trip x 175 mi/truck x \$0.31/mi x 3 trips) Vernal to Lodore, round trip			\$326
(12 gal gas/boat x 2 boats/trip x \$4.00/gal x 3 trips)			\$288
(1 qts motor boat oil/boat x 3 boats/trip x \$11/qt)			\$22
GSA trucks (2 trucks x 1 months)	\$313	2	\$626
Maintenance/replacement of rafting gear, sampling nets, electrofishing gear, etc.			\$1,022
GS-8 Fish Tech maintenance work	\$37.49	261	\$9,785
<b>Subtotal</b>			<b>\$12,069</b>
<b>Task 1 Total</b>			<b>\$32,408</b>

**2015**

**Tasks 1&2 – USFWS Sample Fish Population**

	<b>Rate \$/hr</b>	<b>Total hours</b>	<b>Cost</b>
<b>Labor</b>			
GS-12 Supervisory Fish Biologist	\$53.36	120	\$6,403
GS-11 Fish Biologist	\$45.96	120	\$5,515
GS-9 Admin. Officer	\$38.65	116	\$4,483
WG-5 Boat Operators (2)	\$19.29	160	\$3,086
<b>Subtotal</b>			<b>\$19,487</b>

**Travel**

Shuttle (3 trucks/trip x \$150/truck x 3 trips) Lodore to Split Mountain			\$1,350
<b>Subtotal</b>			<b>\$1,350</b>

**Equipment**

(2 trucks/trip x 175 mi/truck x \$0.32/mi x 3 trips) Vernal to Lodore, round trip			\$336
(12 gal gas/boat x 2 boats/trip x \$4.00/gal x 3 trips)			\$288
(1 qts motor boat oil/boat x 2 boats/trip x \$11/qt)			\$22



GSA trucks (2 trucks x 1 months)	\$320	2	\$640
Maintenance/replacement of rafting gear, sampling nets, electrofishing gear, etc.			\$1,022
GS-8 Fish Tech maintenance work	\$38.24	261	\$9,981
<b>Subtotal</b>			<b>\$12,289</b>
<b>Task 1 Total</b>			<b>\$33,126</b>

**2016**

<b>Tasks 1&amp;2 – USFWS Sample Fish Population</b>	<b>Rate \$/hr</b>	<b>Total hours</b>	<b>Cost</b>
<b>Labor</b>			
GS-12 Supervisory Fish Biologist	\$54.43	120	\$6,532
GS-11 Fish Biologist	\$46.88	120	\$5,626
GS-9 Admin. Officer	\$39.43	116	\$4,574
WG-5 Boat Operators (2)	\$19.68	160	\$3,149
<b>Subtotal</b>			<b>\$19,881</b>

**Travel**

Shuttle (3 trucks/trip x \$150/truck x 3 trips) Lodore to Split Mountain			\$1,350
<b>Subtotal</b>			<b>\$1,350</b>

**Equipment**

(2 trucks/trip x 175 mi/truck x \$0.33/mi x 3 trips) Vernal to Lodore, round trip			\$347
(12 gal gas/boat x 2 boats/trip x \$4.00/gal x 3 trips)			\$288
(1 qts motor boat oil/boat x 2 boats/trip x \$11/qt)			\$22
GSA trucks (2 trucks x 1 months)	\$325	2	\$650
Maintenance/replacement of rafting gear, sampling nets, electrofishing gear, etc.			\$1,022
GS-8 Fish Tech maintenance work	\$39.01	261	\$10,182
<b>Subtotal</b>			<b>\$12,511</b>
<b>Task 1 Total</b>			<b>\$33,742</b>

**2017**

<b>Tasks 1&amp;2 – USFWS Sample Fish Population</b>	<b>Rate \$/hr</b>	<b>Total hours</b>	<b>Cost</b>
<b>Labor</b>			
GS-12 Supervisory Fish Biologist	\$55.52	120	\$6,662

GS-11 Fish Biologist	\$47.82	120	\$5,738
GS-9 Admin. Officer	\$40.22	116	\$4,666
WG-5 Boat Operators (2)	\$20.07	160	\$3,211
<b>Subtotal</b>			<b>\$20,277</b>

**Travel**

Shuttle (3 trucks/trip x \$150/truck x 3 trips) Lodore to Split Mountain			\$1,350
<b>Subtotal</b>			<b>\$1,350</b>

**Equipment**

(2 trucks/trip x 175 mi/truck x \$0.34/mi x 3 trips) Vernal to Lodore, round trip			\$357
(12 gal gas/boat x 2 boats/trip x \$4.00/gal x 3 trips)			\$288
(1 qts motor boat oil/boat x 2 boats/trip x \$11/qt)			\$22
GSA trucks (2 trucks x 1 months)	\$332	2	\$664
Maintenance/replacement of rafting gear, sampling nets, electrofishing gear, etc.			\$1,022
GS-8 Fish Tech maintenance work	\$39.79	261	\$10,385
<b>Subtotal</b>			<b>\$12,738</b>
<b>Task 1 Total</b>			<b>\$34,365</b>

**2018**

**Tasks 1&2 – USFWS Sample Fish Population**

	<b>Rate \$/hr</b>	<b>Total hours</b>	<b>Cost</b>
<b>Labor</b>			
GS-12 Supervisory Fish Biologist	\$56.63	120	\$6,796
GS-11 Fish Biologist	\$48.78	120	\$5,854
GS-9 Admin. Officer	\$41.02	116	\$4,758
WG-5 Boat Operators (2)	\$20.47	160	\$3,275
<b>Subtotal</b>			<b>\$20,683</b>

**Travel**

Shuttle (3 trucks/trip x \$150/truck x 3 trips) Lodore to Split Mountain			\$1,350
<b>Subtotal</b>			<b>\$1,350</b>

**Equipment**

(2 trucks/trip x 175 mi/truck x \$0.35/mi x 3 trips) Vernal to			\$368
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Lodore, round trip			
(12 gal gas/boat x 2 boats/trip x \$4.00/gal x 3 trips)			\$288
(1 qts motor boat oil/boat x 2 boats/trip x \$11/qt)			\$22
GSA trucks (2 trucks x 1 months)	\$332	2	\$664
Maintenance/replacement of rafting gear, sampling nets, electrofishing gear, etc.			\$1,022
GS-8 Fish Tech maintenance work	\$40.58	261	\$10,591
<b>Subtotal</b>			<b>\$12,955</b>
<b>Task 1 Total</b>			<b>\$34,988</b>

IX. Budget Summary

**Budget Summary: condenses tables above**

Description	LFL	USFWS	Total
Fish Comm. Monitor. + report (Tasks 1-4) , 2014	64,543	32,408	96,951
Fish Comm. Monitor. + report (Tasks 1-4) , 2015	67,321	33,126	100,447
<b>FY2014-2015 TOTAL</b>	<b>131,864</b>	<b>65,534</b>	<b>197,398</b>

– Deliverables/Due dates: Annual Report of field activities and sampling results due to PD’s office  
November of each year.

X. Reviewers

Doug Osmundson, U.S. Fish and Wildlife Service, Grand Junction, CO  
Kirk LaGory, Argonne National Laboratory, Argonne, IL

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