RECOVERY PROGRAM Recovery Program Project Number: ___158__
FY 2018-2019 SCOPE OF WORK for:

Assessment of larval Colorado pikeminnow presence and survival in low velocity habitats in the middle Green River

Reclamation Agreement number: __R14AP00007__
Reclamation Agreement term: __May 1, 2014 – September 30, 2018__

Note: Recovery Program FY18-19 scopes of work are drafted in May 2017. They often are revised before final Program approval and may subsequently be revised again in response to changing Program needs. Program participants also recognize the need and allow for some flexibility in scopes of work to accommodate new information (especially in nonnative fish management projects) and changing hydrological conditions.

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Category:
X Ongoing project
__ Ongoing-revised project
__ Requested new project
__ Unsolicited proposal

Expected Funding Source:
X Annual funds
__ Capital funds
__ Other *[explain]*

I. Title of Proposal:

Assessment of larval Colorado pikeminnow presence and survival in low velocity habitats in the middle Green River

II. Relationship to RIPRAP:

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

III.	Reduce negative impacts of nonnative fishes and sportfish management activities (nonnative and sportfish management).
III.A.	Reduce negative interactions between nonnative and endangered fishes.
III.A.2.	Identify and implement viable active control measures.
III.A.2.c.	Implement and evaluate the effectiveness of viable active control measures.
III.A.2.f.	Develop control program for removal of small nonnative cyprindids in backwaters and other low velocity habitats.

GREEN RIVER ACTION PLAN: MAINSTEM

III.	Reduce impacts of nonnative fishes and sportfish management activities (nonnative and sportfish management).
III.A.4.	Develop and implement control programs for nonnative fishes in river reaches occupied by the endangered fishes to identify require levels of control.
III.A.4.b.	Nonnative cyprinids and centrarchids in nursery habitats.
III.A.4.b.(1)	Small nonnative cyprinids from backwaters and other low velocity habitats in the lower Green River

III. Study Background/Rationale and Hypotheses:

Fall Interagency Standardized Monitoring Program (ISMP) sampling of age-0 Colorado pikeminnow (CPM) has been conducted annually since the mid-1980s to assess the abundance and distribution of young fish. Since 1994, these surveys have shown a reduction in the abundance of age-0 CPM in the alluvial section of the Green River between Split Mountain and Desolation Canyon (Breen et al. 2011). Other studies monitoring the upstream abundance of larval CPM drifting from the Yampa Canyon spawning site during the same time suggest that larval fish production has not decreased from previous levels when age-0 CPM were more abundant in this reach (Bestgen et al. 1998; Bestgen et al. 2006). Several possibilities exist for why age-0 CPM are not being caught as frequently as they once were, including an increase in nonnative predatory fishes, nonnative competitors, and habitat changes. Other researchers have been, or are currently, investigating environmental conditions such as changes in habitat related to flow and temperature (see Bestgen and Hill 2012). This study seeks to monitor the arrival and entrainment of larval CPM into backwaters in this reach and investigate the possible influence nonnative fishes may have on age-0 CPM as they arrive and grow in backwater habitats.

Preliminary data from 2009-2010 and 2012 are being analyzed and will be summarized in a final report (2017). Early analyses have allowed us to estimate transport abundances for the Split Mountain drift net site and compare those to the Echo Park site upstream. These data have confirmed that Colorado pikeminnow larvae are arriving in the nursery reach. We have also been able to document larvae arriving in backwater habitats, successfully deplete those

areas of nonnative fish (≥ 90%) before implementing a variety of blocking treatments, and track the occupancy of those habitats through the summer. Continuing this work in future years will build a more robust dataset, allowing for comparisons across years with different hydrologic regimes. More specifically, in the previous years with hydrology that favored pikeminnow recruitment (2009-2010), this was essentially a pilot project. Numerous changes then led to a better experimental design (allowing for statistical comparisons among treatments) that was implemented in 2012. Unfortunately, 2012 was a dry year with poor recruitment.

IV. Study Goals, Objectives, End Product(s):

Goal:

Increase survival and growth of larval CPM in middle Green River backwaters via reduction of nonnative fishes.

Objectives:

1. Estimate transport abundance of CPM larvae arriving at the upstream extent of the nursery reach (Split Mtn. drift site).
2. Document abundance of larval CPM in backwaters as the season progresses.
3. Reduce densities of nonnative fish, particularly cyprinids, in backwater habitats before and after arrival of CPM larvae.
4. Determine success of manipulating backwaters to increase CPM larval survival in backwaters from Red Wash to the Ouray Refuge by removing and excluding nonnative fish followed by the use of various blocking treatments.
5. Assess small-bodied fish community effects from removing nonnative fishes from backwaters.

End Product:

1. Documentation of relative abundance of larval CPM spawned in the Yampa River arriving in the Ouray reach.
2. Expected persistence time of larval CPM without any treatment.
3. Determination of whether blocking backwaters depleted of nonnatives is a successful method for increasing the survival and growth of larval CPM in the Ouray reach of the middle Green River.

Revision from previous SOW:

Future implementation of the field portion of this project is currently pending a final report and the associated recommendations. Changes in protocol are a certainty (mainly tasks 2 and 3), but until analyses and reporting are complete for the first three years of study, it is unclear what those changes will be. This scope of work is meant as a placeholder for future implementation following recommendation approval, hopefully prior to FY 2018.

V. Study Area:

The study area encompasses the middle Green River from Red Wash boat ramp (RM 298.1) to the Duchesne River confluence (RM 247.9).

VI. Study Methods/Approach:

Our first focus will be to determine the abundance of larval CPM drifting into the study reach and arriving in backwater habitats. This will be accomplished by drift netting above the Jensen area and seining all backwaters along the Ouray National Wildlife Refuge and selected backwaters from Red Wash to the Duchesne River. We will not sample backwaters selected for manipulation (see below), as they will be intensively sampled during nonnative control and monitoring. Drift net sampling will be initiated at the Split Mountain boat ramp/campground area within twenty-four hours after CSU Larval Fish Lab field sampling indicates a pulse of CPM larval drift at Echo Park. Previous work indicated that there is approximately a one day lag time between pulses of larvae at Echo Park and Split Mountain in low discharge years (Bestgen et al. 1998). Sampling will be targeted at times of higher drift and coordinated with LFL personnel. Previous work showed that samples collected in the two sites were most consistent with one another when more larvae were available and the sites were sampled during the same pulse event (Bestgen et al. 1998). We will also attempt to coordinate drift net activities with turbidity events detected by the LFL site upstream. We propose more limited drift net collections than the Echo Park site because our objective is only to confirm arrival of larval drift at Split Mountain in similar numbers as in Echo Park. The Echo Park site will still document extent and timing of the entire drift period, whereas the Split Mountain site will confirm that those drift events are continuing downstream and in similar numbers. One drawback to the methodology proposed for Split Mountain will be the possibility of missing drift events if the larvae are present at lower densities over a longer time. This has been observed in years with lower flow and less turbidity.

The sampling design will duplicate that of LFL, namely three nets will be set near shore for 1-2 hours daily at dawn. Nets will be attached to steel frames and deployed in water 0.5-1 m in depth. Flow meters in the net mouth and deployment times will be used to compute the volume of water sampled. Samples will be preserved in ethanol and placed in containers for later sample identification, measurement for length, and enumeration, by both USFWS and LFL.

The other aspect of monitoring will be seining backwaters at Ouray National Wildlife Refuge during late July and early August. This will be done to gather data comparable to that collected from 1990-1996 (Day et al. 1999). All backwaters will be seined on Ouray National Wildlife Refuge, along with reference backwaters used in Argonne National Laboratory's ongoing work, and selected backwaters from Red Wash to the confluence with the Duchesne River, as feasible. The goal of the Ouray sampling is to collect data that can be used to compare larval densities to previous studies conducted during years with higher CPM recruitment. The Argonne backwaters will be sampled to further refine and verify backwater models as they relate to CPM entrainment; the other backwaters will be sampled to increase the odds in detecting the presence of larvae. As mentioned previously, backwaters targeted for nonnative depletions will not be sampled during this portion of the work. Six backwaters

within the Red Wash to Duchesne River reach have been identified for this purpose. Seine hauls will be taken at three transects perpendicular to the axis of the backwater, similar to ISMP sampling. For small backwaters, the entire backwater will be seined. Deep backwaters will be seined parallel to shore. The work by Day et al. (1999) sampled as many as 84 backwaters on the Ouray NWR using this methodology. Depending on overall total length and ability to verify species at sampling time, larval CPM will be identified and released, if possible, or preserved in ethanol for identification in Vernal, and subsequently sent to the Larval Fish Lab for verification. If field crews encounter abundant, putative larval CPM the sampling protocol may be adjusted to minimize larval mortality (as was the case in 2010). Backwater habitat measurements and metrics for catch per effort will also be collected after seining to prevent disturbing fish. The objective of this sampling regime is to verify larval CPM are arriving in nursery habitats in numbers comparable to past data from the 1980s-early 1990s and comparable to drift samples upstream in Echo Park. Data currently being collected involves the early stages of drift and fall juvenile counts, and these data indicate there continues to be low recruitment of individuals from the time of drift into fall. If numbers of larvae arriving have declined, determining the point of loss will involve investigating mortality upstream during drift from Echo Park to Split Mountain. Comparable numbers of larvae in this study reach to numbers observed in upper study reaches will allow us to focus efforts on mortality in nursery habitats, after the drift.

The second component of this project is to reduce nonnative fish abundance in nursery habitats to determine the effect on larval CPM survival. Several key results were apparent from our 2010 data that warrant changes to this portion of our study. Observations were as follows: (1) fish community composition was similar for each of three backwater treatment types, primarily consisting of red shiners, sand shiners, and fathead minnows; (2) we observed more carp in control backwaters, suggesting that we were successful at excluding larger fish with blocking treatments; (3) small-bodied nonnative cyprinids were more abundant in blocked backwaters than controls; (4) the study design was not robust enough to test for statistical differences in backwater blocking treatments and their effect on the survival of age-0 CPM. Following initial depletions, control backwaters contained a total of 1100 fishes, the backwaters blocked by the ½ inch mesh block nets had 1,761 fish and the backwaters blocked by the ¼ inch mesh block nets had 5,065 fish. Three hypotheses may explain an increase in nonnatives with increased exclusion: (1) our initial depletion efforts were not 100% effective at removing cyprinids, (2) immigration of nonnative fish into blocked backwaters occurred through our nets, and (3) smaller cyprinids that passed through our nets were more successful with the exclusion of larger predators. It appears that smaller fish are surviving in the backwaters blocked by the smallest mesh size because there is a lack of predation in these backwaters. Finally, as the level of exclusion increases, larval CPM abundance also increased. In the control backwaters, mean CPM abundance was 0.8 ± 0.37, in the backwaters blocked by the ½ inch mesh block nets, mean CPM abundance was 1.4 ± 1.4, and in the backwaters blocked by the ¼ inch mesh block nets, mean CPM abundance was 9.2 ± 4.04. This suggests that by blocking backwaters, we are increasing YOY CPM survival by decreasing predation from larger fish. In 2012, the study was repeated with a robust study design (i.e., sufficient replicate backwaters of each treatment) to effectively measure depletion, monitor the fish community temporally and measure survival of age-0 CPM. Results demonstrated all backwaters were successfully depleted by 90-99% and numbers remained suppressed for 1.5 months in the three treatments. Also, as observed in 2010, the sizes of small-bodied cyprinids were differential among

treatments for the 1.5 months abundance was suppressed. The smallest individuals were in ¼ inch, larger in ½ inch and largest in control backwaters (Skorupski et al. 2012). Although 2012 demonstrated backwaters can be successfully depleted and blocking backwaters can reduce the size of cyprinids for 1.5 months, the survival of age-0 CPM could not be evaluated because larval abundance was limited due to drought conditions. This demonstrates the importance of conducting the project over multiple flow regimes to effectively determine if blocking backwaters is successful by improving the survival of age-0 CPM.

Backwaters for this portion of the study will include three treatments, all of which will be initially depleted of nonnatives: (1) four control backwaters that will not be blocked after initial depletions; (2) four backwaters blocked by ½ inch mesh nets; and (3) four backwaters that are blocked by a ¼ inch mesh nets. Blocking will be accomplished using ¼ and ½ inch mesh nets reinforced with chicken wire to protect them from beaver damage, thus allowing for some small-bodied fish movement. Depletions will initially occur before arrival of larval CPM. We will sample all backwaters following the YOY CPM sampling protocol every two weeks after initial depletions to determine levels of nonnative fish encroachment through time. However, we will monitor backwaters weekly to ensure that the block nets remain intact.

During this investigation, habitat information essential for ISMP sampling will be collected, as well as information on backwater temperature using temperature loggers. We will enumerate nonnatives and take a sub-sample to determine average total length of nonnative species in addition to total lengths for all native fish collected. Backwater and seine haul dimensions will be recorded.

VII. Task Description and Schedule:

Task 1. Determine abundance of larval CPM present in drift at Split Mountain and arriving in backwaters in the Ouray reach.

Task 2. Deplete nonnative fish in backwaters prior to larval CPM drift and apply backwater blocking treatments.

Task 3. Determine fish community composition in manipulated and control backwaters throughout the summer base flow period.

Task 4. Data analysis and reporting.

Task 5. Field support for Argonne backwater topography data collection.

Schedule: FY18-FY22

Task	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1						X	X	X				
2							X					
3							X	X	X			
4										X	X	X
5					X	X	X	X	X			

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

Deliverables and Due Dates:
Final/Interim report to be completed in 2017.
Annual report each year of implementation due to the Recovery Program in November.

Budget:

FY 2018

FWS Vernal 2018 Budget

Task Activity	Rate $/h	Hours	Cost
Task 1a-Drift net sampling (25 days)			
Labor			
GS-12 Biologist	$60.84	80	$4,867
GS-05 Technician	$23.16	200	$4,632
Subtotal			**$9,499**
Equipment			
(1 trucks/trip x 52 mi/truck x $0.33/mi x 25 days) Vernal to Split Mtn., round trip			$429
GSA truck (rate/mo x # truck-months)	$250	2	$500
drift net	$585	1	$585
flow meter	$400	1	$400
ethanol (5 gallon containers)	$91	5	$455
Sample containers (1 case-20mL glass scintillation vials)	$70.00	2	$140
Subtotal			**$2,509**
Task 1b-seining backwaters (10 days)			
Labor			
GS-12 Biologist	$60.84	80	$4,867
GS-05 Technician (x3)	$23.16	240	$5,558
Subtotal			**$10,426**
Equipment			
(2 trucks/trip x 80 mi/day x $0.33/mi x 10 days) Vernal to Ouray NWR, round trip			$528
GSA truck (rate/mo x # truck-months)	$250	1	$250
seine	$65	1	$65
ethanol (5 gallon containers)	$91	5	$455
Sample containers (1 case-20mL glass scintillation vials)	$70.00	200	$14,000
boat gas (12 gal/boat x 2 boats/day x $4/gal x 10 days)			$960
GS-8 Fish Tech maintenance work	$43.43	80	$3,474
Subtotal			**$19,733**
TASK 1 TOTAL			**$42,167**

Task 4- Data Analysis, Reporting, Administration			
Labor			
GS-12 Supervisory Fish Biologist	$60.84	80	$4,867
GS-9 Admin Assist.	$41.57	80	$3,326
TASK 4 TOTAL			**$8,193**

Task 5-Field support for backwater topography	Rate $/h	Hours	Cost
Labor			
WG-5 Boat Operator	$23.16	80	$1,513
WG-5 Boat Operator trip prep	$23.16	16	$303
GS-8 Fish Tech	$43.43	96	$3,599
Subtotal			**$5,414**
Equipment			
(2 trucks/day x 55 mi/truck x $0.33/mi x 8 days) Vernal to Ouray NWR, round trip			$290
(12 gal gas/boat x 2 boats/day x $4.00/gal x 8 days)			$768
GSA truck (rate/mo x # truck-months)	$250	1	$313
GS-8 Fish Tech maintenance work	$43.43	40	$1,500
Subtotal			**$2,871**
TASK 5 TOTAL			**$8,285**
FWS FY 18 TOTAL			**$58,645**

UDWR-Vernal FY2018 Budget:

Task 2. Deplete nonnative fish in backwaters prior to larval pikeminnow drift and experiment with a blocking scenario to keep backwaters free of nonnative fish.	Rate	Hours/Units	Cost
Labor			
Project Leader	36.95	140	5173.00
Biologist II	33.77	100	3377.00
Journey Maintenance/Construction Specialist	34.34	120	4120.80
Technician I	16.89	80	1350.86
Shuttle Drivers	17.25	40	689.99
		Subtotal	**$14,712**
Travel			
2 trucks @ 5% of annual use[a]	16000.00	0.05	800.00
Per diem (8 day trips x 4 people)	14.00	32	448.00
		Subtotal	**$1,248**
Equipment			
Boat fuel (gallons)	4.00	48	192.00
Boat oil (quarts)	11.00	3	33.00

Block nets (Memphis Net & Twine)	1000.00	2	2000.00
Replacement seines (Memphis Net & Twine)	150.00	1	150.00
Ethanol (20 L)	70.00	1	70.00
Sample vials	4.00	25	100.00
Boat/motor repair and maintenance[b]			500.00
Sampling equipment[c]			700.00
		Subtotal	**$3,745**
		Task 2 Total	**$19,705**

Task 3. Determine fish community in manipulated and control backwaters.

	Rate	Hours/Units	Cost
Labor			
Project Leader	36.95	240	8868.00
Biologist II	33.77	240	8104.80
Journey Maintenance/Construction Specialist	34.34	300	10302.00
Shuttle Drivers	17.25	120	2070.00
		Subtotal	**$29,345**
Travel			
2 trucks @ 10% of annual use[a]	16000.00	0.1	1600.00
Per diem (24 day trips x 3 people)	14.00	72	1008.00
		Subtotal	**$2,608**
Equipment			
Boat fuel (gallons)	4.00	144	576.00
Ethanol (20 L)	70.00	1	70.00
Sample vials	4.00	25	100.00
Boat/motor repair and maintenance[b]			1000.00
Sampling equipment[c]			1400.00
		Subtotal	**$3,146**
		Task 3 Total	**$35,099**

Task 4. Data entry, analysis and annual reporting.

	Rate	Hours/Units	Cost
Labor			
Project Leader	36.95	120	4434.00
Biologist II	33.77	100	3377.00
Technician II	18.19	200	3638.00
		Task 4 Total	**$11,449**
		UDWR FY 2018 Total	**$66,252**

(a) The State of Utah uses Automotive Resources Inc. for motor pool operations. Rental is approximately $8,000/year/vehicle (includes fleet rental, mileage, and gas), which is based on the average annual cost for all trucks used in our program.
(b) Boat/motor repair and maintenance includes, but is not limited to prop/water pump/filters/lower unit oil/grease/gas can/misc. maintenance items ($500), shop supplies/tools/safety gear/misc. small parts ($500).
(c) Sampling equipment includes, but is not limited to rebar/t-posts/chicken wire/zipties ($500), batteries ($200), waders (Simms-$400), livewell/buckets/fish nets/measuring boards ($300).

FY 2019

FWS Vernal 2019

Task Activity	Rate $/h	Hours	Cost
Task 1a-Drift net sampling (25 days)			
Labor			
GS-12 Biologist	$62.05	80	$4,964
GS-05 Technician	$23.63	200	$4,726
Subtotal			**$9,690**
Equipment			
(1 trucks/trip x 52 mi/truck x $0.34/mi x 25 days) Vernal to Split Mtn., round trip			$442
GSA truck (rate/mo x # truck-months)	$255	2	$510
drift net	$585	1	$585
flow meter	$400	1	$400
ethanol (5 gallon containers)	$93	5	$464
Sample containers (1 case-20mL glass scintillation vials)	$71.40	2	$143
Subtotal			**$2,544**
Task 1b-seining backwaters (10 days)			
Labor			
GS-12 Biologist	$62.05	80	$4,964
GS-05 Technician (x3)	$23.63	240	$5,671
Subtotal			**$10,635**
Equipment			
(2 trucks/trip x 80 mi/day x $0.34/mi x 10 days) Vernal to Ouray NWR, round trip			$544
GSA truck (rate/mo x # truck-months)	$255	1	$255
seine	$65	1	$65
ethanol (5 gallon containers)	$93	5	$464
Sample containers (1 case-20mL glass scintillation vials)	$71.40	200	$14,280
boat gas (12 gal/boat x 2 boats/day x $4/gal x 10 days)			$960
GS-8 Fish Tech maintenance work	$44.29	80	$3,543
Subtotal			**$20,112**
TASK 1 TOTAL			**$42,981**
Task 4- Data Analysis, Reporting, Administration			
Labor			
GS-12 Supervisory Fish Biologist	$62.05	80	$4,964
GS-9 Admin Assist.	$42.69	80	$3,415
TASK 4 TOTAL			**$8,379**

Task 5-Field support for backwater topography	Rate $/h	Hours	Cost
Labor			
WG-5 Boat Operator	$23.63	80	$1,513
WG-5 Boat Operator trip prep	$23.63	16	$303
GS-8 Fish Tech	$44.29	96	$3,599
Subtotal			**$5,414**
Equipment			
(2 trucks/day x 55 mi/truck x $0.34/mi x 8 days) Vernal to Ouray NWR, round trip			$299
(12 gal gas/boat x 2 boats/day x $4.00/gal x 8 days)			$768
GSA truck (rate/mo x # truck-months)	$255	1	$313
GS-8 Fish Tech maintenance work	$44.29	40	$1,500
Subtotal			**$2,880**
TASK 5 TOTAL			**$8,294**
FWS FY 19 TOTAL			**$59,654**

UDWR-Vernal FY2019 Budget:

Task 2. Deplete nonnative fish in backwaters prior to larval pikeminnow drift and experiment with a blocking scenario to keep backwaters free of nonnative fish.	Rate	Hours/Units	Cost
Labor			
Project Leader	37.69	140	5276.46
Biologist II	34.45	100	3444.54
Journey Maintenance/Construction Specialist	35.03	120	4203.22
Technician I	17.22	80	1377.87
Shuttle Drivers	17.59	40	703.79
		Subtotal	**$15,006**
Travel			
2 trucks @ 5% of annual use[a]	16320.00	0.05	816.00
Per diem (8 day trips x 4 people)	14.28	32	456.96
		Subtotal	**$1,273**
Equipment			
Boat fuel (gallons)	4.08	48	195.84
Boat oil (quarts)	11.22	3	33.66
Block nets (Memphis Net & Twine)	1020.00	2	2040.00
Replacement seines (Memphis Net & Twine)	153.00	1	153.00
Ethanol (20 L)	71.40	1	71.40
Sample vials	4.08	25	102.00
Boat/motor repair and maintenance[b]			510.00
Sampling equipment[c]			714.00
		Subtotal	**$3,820**
		Task 2 Total	**$20,099**

Task 3. Determine fish community in manipulated and control backwaters.			
	Rate	Hours/Units	Cost
Labor			
Project Leader	37.69	240	9045.36
Biologist II	34.45	240	8266.90
Journey Maintenance/Construction Specialist	35.03	300	10508.04
Shuttle Drivers	17.60	120	2111.40
		Subtotal	**$29,932**
Travel			
2 trucks @ 10% of annual use[a]	16320.00	0.1	1632.00
Per diem (24 day trips x 3 people)	14.28	72	1028.16
		Subtotal	**$2,660**
Equipment			
Boat fuel (gallons)	4.08	144	587.52
Ethanol (20 L)	71.40	2	142.80
Sample vials	4.08	50	204.00
Boat/motor repair and maintenance[b]			1020.00
Sampling equipment[c]			1428.00
		Subtotal	**$3,382**
		Task 3 Total	**$35,974**

Task 4. Data entry, analysis and annual reporting.			
	Rate	Hours/Units	Cost
Labor			
Project Leader	37.69	120	4522.68
Biologist II	34.45	100	3444.54
Technician II	18.55	200	3710.76
		Task 4 Total	**$11,678**
	UDWR	**FY 2019 Total**	**$67,751**

FY 2020

FWS Vernal 2020

Task Activity	Rate $/h	Hours	Cost
Task 1a-Drift net sampling (25 days)			
Labor			
GS-12 Biologist	$63.30	80	$5,064
GS-05 Technician	$24.10	200	$4,820
Subtotal			**$9,884**
Equipment			
(1 trucks/trip x 52 mi/truck x $0.34/mi x 25 days) Vernal to Split Mtn., round trip			$442
GSA truck (rate/mo x # truck-months)	$260	2	$520
drift net	$585	1	$585
flow meter	$400	1	$400
ethanol (5 gallon containers)	$95	5	$474
Sample containers (1 case-20mL glass scintillation vials)	$72.83	2	$146
Subtotal			**$2,566**
Task 1b-seining backwaters (10 days)			
Labor			
GS-12 Biologist	$63.30	80	$5,064
GS-05 Technician (x3)	$24.10	240	$5,784
Subtotal			**$10,848**
Equipment			
(2 trucks/trip x 80 mi/truck x $0.34/mi x 10 days) Vernal to Ouray NWR, round trip			$544
GSA truck (rate/mo x # truck-months)	$260	1	$260
seine	$65	1	$65
ethanol (5 gallon containers)	$95	5	$474
Sample containers (1 case-20mL glass scintillation vials)	$72.83	200	$14,566
boat gas (12 gal/boat x 2 boats/day x $4/gal x 10 days)			$960
GS-8 Fish Tech maintenance work	$46.34	80	$3,707
Subtotal			**$20,575**
TASK 1 TOTAL			**$43,874**
Task 4- Data Analysis, Reporting, Administration			
Labor			
GS-12 Supervisory Fish Biologist	$63.30	80	$5,064
GS-9 Admin Assist.	$44.42	80	$3,554
TASK 4 TOTAL			**$8,618**

Task 5-Field support for backwater topography	Rate $/h	Hours	Cost
Labor			
WG-5 Boat Operator	$24.10	80	$1,513
WG-5 Boat Operator trip prep	$24.10	16	$303
GS-8 Fish Tech	$46.34	96	$3,599
Subtotal			**$5,414**
Equipment			
(2 trucks/day x 55 mi/truck x $0.34/mi x 8 days) Vernal to Ouray NWR, round trip			$299
(12 gal gas/boat x 2 boats/day x $4.00/gal x 8 days)			$768
GSA truck (rate/mo x # truck-months)	$260	1	$313
GS-8 Fish Tech maintenance work	$46.34	40	$1,500
Subtotal			**$2,880**
TASK 5 TOTAL			**$8,294**
FWS FY 20 TOTAL			**$60,785**

UDWR-Vernal FY2020 Budget:

Task 2. Deplete nonnative fish in backwaters prior to larval pikeminnow drift and experiment with a blocking scenario to keep backwaters free of nonnative fish.	Rate	Hours/Units	Cost
Labor			
Project Leader	38.44	140	5381.99
Biologist II	35.13	100	3513.43
Journey Maintenance/Construction Specialist	35.73	120	4287.28
Technician I	17.57	80	1405.43
Shuttle Drivers	17.95	40	717.87
		Subtotal	**$15,306**
Travel			
2 trucks @ 5% of annual use[a]	16646.40	0.05	832.32
Per diem (8 day trips x 4 people)	14.57	32	466.10
		Subtotal	**$1,298**
Equipment			
Boat fuel (gallons)	4.16	48	199.76
Boat oil (quarts)	11.44	3	34.33
Block nets (Memphis Net & Twine)	1040.40	2	2080.80
Replacement seines (Memphis Net & Twine)	156.06	1	156.06
Ethanol (20 L)	72.83	1	72.83
Sample vials	4.16	25	104.04
Boat/motor repair and maintenance[b]			520.20
Sampling equipment[c]			728.28
		Subtotal	**$3,896**
		Task 2 Total	**$20,501**

Task 3. Determine fish community in manipulated and control backwaters.				
	Rate		Hours/Units	Cost
Labor				
Project Leader	38.44		240	9226.27
Biologist II	35.13		240	8432.23
Journey Maintenance/Construction Specialist	35.73		300	10718.20
Shuttle Drivers	17.95		120	2153.63
		Subtotal		**$30,530**
Travel				
2 trucks @ 10% of annual use[a]	16646.40		0.1	1664.64
Per diem (24 day trips x 3 people)	14.57		72	1048.72
		Subtotal		**$2,713**
Equipment				
Boat fuel (gallons)	4.16		144	599.27
Ethanol (20 L)	72.83		2	145.66
Sample vials	4.16		50	208.08
Boat/motor repair and maintenance[b]				1040.40
Sampling equipment[c]				1456.56
		Subtotal		**$3,450**
		Task 3 Total		**$36,694**
Task 4. Data entry, analysis and annual reporting.				
	Rate		Hours/Units	Cost
Labor				
Project Leader	38.44		120	4613.13
Biologist II	35.13		100	3513.43
Technician II	18.92		200	3784.98
		Task 4 Total		**$11,912**
		UDWR FY 2020 Total		**$69,106**

FY 2021

FWS Vernal 2021

Task Activity	Rate $/h	Hours	Cost
Task 1a-Drift net sampling (25 days)			
Labor			
GS-12 Biologist	$66.37	80	$5,310
GS-05 Technician	$24.58	200	$4,916
Subtotal			**$10,226**
Equipment			
(1 trucks/trip x 52 mi/truck x $0.35/mi x 25 days) Vernal to Split Mtn., round trip			$455
GSA truck (rate/mo x # truck-months)	$265	2	$530
drift net	$585	1	$585
flow meter	$400	1	$400
ethanol (5 gallon containers)	$97	5	$483
Sample containers (1 case-20mL glass scintillation vials)	$74.28	2	$149
Subtotal			**$2,602**
Task 1b-seining backwaters (10 days)			
Labor			
GS-12 Biologist	$66.37	80	$5,310
GS-05 Technician (x3)	$24.58	240	$5,899
Subtotal			**$11,209**
Equipment			
(2 trucks/trip x 80 mi/truck x $0.35/mi x 10 days) Vernal to Ouray NWR, round trip			$560
GSA truck (rate/mo x # truck-months)	$265	1	$265
seine	$65	1	$65
ethanol (5 gallon containers)	$97	5	$483
Sample containers (1 case-20mL glass scintillation vials)	$74.28	200	$14,857
boat gas (12 gal/boat x 2 boats/day x $4/gal x 10 days)			$960
GS-8 Fish Tech maintenance work	$47.26	80	$3,781
Subtotal			**$20,971**
TASK 1 TOTAL			**$45,007**
Task 4- Data Analysis, Reporting, Administration			
Labor			
GS-12 Supervisory Fish Biologist	$66.37	80	$5,310
GS-9 Admin Assist.	$45.61	80	$3,649
TASK 4 TOTAL			**$8,958**

Task 5-Field support for backwater topography	Rate $/h	Hours	Cost
Labor			
WG-5 Boat Operator	$24.58	80	$1,513
WG-5 Boat Operator trip prep	$24.58	16	$303
GS-8 Fish Tech	$47.26	96	$3,599
Subtotal			**$5,414**
Equipment			
(2 trucks/day x 55 mi/truck x $0.35/mi x 8 days) Vernal to Ouray NWR, round trip			$308
(12 gal gas/boat x 2 boats/day x $4.00/gal x 8 days)			$768
GSA truck (rate/mo x # truck-months)	$265	1	$313
GS-8 Fish Tech maintenance work	$47.26	40	$1,500
Subtotal			**$2,889**
TASK 5 TOTAL			**$8,303**
FWS FY 21 TOTAL			**$62,268**

UDWR-Vernal FY2021 Budget:

Task 2. Deplete nonnative fish in backwaters prior to larval pikeminnow drift and experiment with a blocking scenario to keep backwaters free of nonnative fish.	Rate	Hours/Units	Cost
Labor			
Project Leader	39.21	140	5489.63
Biologist II	35.84	100	3583.70
Journey Maintenance/Construction Specialist	36.44	120	4373.03
Technician I	17.92	80	1433.54
Shuttle Drivers	18.31	40	732.23
		Subtotal	**$15,612**
Travel			
2 trucks @ 5% of annual use[a]	16979.33	0.05	848.97
Per diem (8 day trips x 4 people)	14.86	32	475.42
		Subtotal	**$1,324**
Equipment			
Boat fuel (gallons)	4.24	48	203.75
Boat oil (quarts)	11.67	3	35.02
Block nets (Memphis Net & Twine)	1061.21	2	2122.42
Replacement seines (Memphis Net & Twine)	159.18	1	159.18
Ethanol (20 L)	74.28	1	74.28
Sample vials	4.24	25	106.12
Boat/motor repair and maintenance[b]			530.60
Sampling equipment[c]			742.85
		Subtotal	**$3,974**
		Task 2 Total	**$20,911**

Task 3. Determine fish community in manipulated and control backwaters.				
	Rate		Hours/Units	Cost
Labor				
Project Leader	39.21		240	9410.79
Biologist II	35.84		240	8600.88
Journey Maintenance/Construction Specialist	36.44		300	10932.56
Shuttle Drivers	18.31		120	2196.70
		Subtotal		**$31,141**
Travel				
2 trucks @ 10% of annual use[a]	16979.33		0.1	1697.93
Per diem (24 day trips x 3 people)	14.86		72	1069.70
		Subtotal		**$2,768**
Equipment				
Boat fuel (gallons)	4.24		144	611.26
Ethanol (20 L)	74.28		2	148.57
Sample vials	4.24		50	212.24
Boat/motor repair and maintenance[b]				1061.21
Sampling equipment[c]				1485.69
		Subtotal		**$3,519**
		Task 3 Total		**$37,428**
Task 4. Data entry, analysis and annual reporting.				
	Rate		Hours/Units	Cost
Labor				
Project Leader	39.21		120	4705.40
Biologist II	35.84		100	3583.70
Technician II	19.30		200	3860.67
		Task 4 Total		**$12,150**
		UDWR FY 2021 Total		**$70,488**

FY 2022

FWS Vernal 2022

Task Activity	Rate $/h	Hours	Cost
Task 1a-Drift net sampling (25 days)			
Labor			
GS-12 Biologist	$67.70	80	$5,416
GS-05 Technician	$25.07	200	$5,014
Subtotal			**$10,430**
Equipment			
(1 trucks/trip x 52 mi/truck x $0.36/mi x 25 days) Vernal to Split Mtn., round trip			$468
GSA truck (rate/mo x # truck-months)	$271	2	$542
drift net	$585	1	$585
flow meter	$400	1	$400
ethanol (5 gallon containers)	$99	5	$493
Sample containers (1 case-20mL glass scintillation vials)	$75.77	2	$152
Subtotal			**$2,639**
Task 1b-seining backwaters (10 days)			
Labor			
GS-12 Biologist	$67.70	80	$5,416
GS-05 Technician (x3)	$25.07	240	$6,017
Subtotal			**$11,433**
Equipment			
(2 trucks/trip x 80 mi/truck x $0.36/mi x 10 days) Vernal to Ouray NWR, round trip			$576
GSA truck (rate/mo x # truck-months)	$271	1	$271
seine	$65	1	$65
ethanol (5 gallon containers)	$99	5	$493
Sample containers (1 case-20mL glass scintillation vials)	$75.77	200	$15,154
boat gas (12 gal/boat x 2 boats/day x $4/gal x 10 days)			$960
GS-8 Fish Tech maintenance work	$48.21	80	$3,857
Subtotal			**$21,376**
TASK 1 TOTAL			**$45,878**
Task 4- Data Analysis, Reporting, Administration			
Labor			
GS-12 Supervisory Fish Biologist	$67.70	80	$5,416
GS-9 Admin Assist.	$46.53	80	$3,722
TASK 4 TOTAL			**$9,138**

Task 5-Field support for backwater topography	Rate $/h	Hours	Cost
Labor			
WG-5 Boat Operator	$25.07	80	$1,513
WG-5 Boat Operator trip prep	$25.07	16	$303
GS-8 Fish Tech	$48.21	96	$3,599
Subtotal			**$5,414**
Equipment			
(2 trucks/day x 55 mi/truck x $0.36/mi x 8 days) Vernal to Ouray NWR, round trip			$317
(12 gal gas/boat x 2 boats/day x $4.00/gal x 8 days)			$768
GSA truck (rate/mo x # truck-months)	$271	1	$313
GS-8 Fish Tech maintenance work	$48.21	40	$1,500
Subtotal			**$2,897**
TASK 5 TOTAL			**$8,312**
FWS FY 22 TOTAL			**$63,328**

UDWR-Vernal FY2022 Budget:

Task 2. Deplete nonnative fish in backwaters prior to larval pikeminnow drift and experiment with a blocking scenario to keep backwaters free of nonnative fish.

	Rate	Hours/Units	Cost
Labor			
Project Leader	40.00	140	5599.42
Biologist II	36.55	100	3655.37
Journey Maintenance/Construction Specialist	37.17	120	4460.49
Technician I	18.28	80	1462.21
Shuttle Drivers	18.67	40	746.87
		Subtotal	**$15,924**
Travel			
2 trucks @ 5% of annual use[a]	17318.91	0.05	865.95
Per diem (8 day trips x 4 people)	15.15	32	484.93
		Subtotal	**$1,351**
Equipment			
Boat fuel (gallons)	4.33	48	207.83
Boat oil (quarts)	11.91	3	35.72
Block nets (Memphis Net & Twine)	1082.43	2	2164.86
Replacement seines (Memphis Net & Twine)	162.36	1	162.36
Ethanol (20 L)	75.77	1	75.77
Sample vials	4.33	25	108.24
Boat/motor repair and maintenance[b]			541.22
Sampling equipment[c]			757.70
		Subtotal	**$4,054**
		Task 2 Total	**$21,329**

Task 3. Determine fish community in manipulated and control backwaters.			
	Rate	Hours/Units	Cost
Labor			
Project Leader	40.00	240	9599.01
Biologist II	36.55	240	8772.90
Journey Maintenance/Construction Specialist	37.17	300	11151.22
Shuttle Drivers	18.67	120	2240.63
		Subtotal	**$31,764**
Travel			
2 trucks @ 10% of annual use[a]	17318.91	0.1	1731.89
Per diem (24 day trips x 3 people)	15.15	72	1091.09
		Subtotal	**$2,823**
Equipment			
Boat fuel (gallons)	4.33	144	623.48
Ethanol (20 L)	75.77	2	151.54
Sample vials	4.33	50	216.49
Boat/motor repair and maintenance[b]			1082.43
Sampling equipment[c]			1515.41
		Subtotal	**$3,589**
		Task 3 Total	**$38,176**

Task 4. Data entry, analysis and annual reporting.			
	Rate	Hours/Units	Cost
Labor			
Project Leader	40.00	120	4799.50
Biologist II	36.55	100	3655.37
Technician II	19.69	200	3937.89
		Task 4 Total	**$12,393**
		UDWR FY 2022 Total	**$71,898**

IX. Budget Summary:

	UDWR	GRBFWCO	Total
FY 2018	$66,252	$58,645	$124,897
FY 2019	$67,751	$59,654	$127,405
FY 2020	$69,106	$60,785	$129,891
FY 2021	$70,488	$62,268	$132,756
FY 2022	$71,898	$63,328	$135,226
		TOTAL	**$650,175**

X. Reviewers: Recovery Program Directors Office – May 2017; Biology Committee – July 2017

XI. References:

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