RECOVERY PROGRAM Recovery Program Project Number: 158
FY 2014-2015 SCOPE OF WORK for:

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

Reclamation Agreement number: R09AP40902
Reclamation Agreement term: October 01, 2010 – November 30, 2013

Lead agency: Utah Division of Wildlife Resources

Submitted by: Joseph A. Skorupski Jr. / Matthew J. Breen
Utah Division of Wildlife Resources
Northeast Regional Office
318 North Vernal Avenue
Vernal, Utah 84078
Phone: 435-790-9785; Fax: 435-789-8343
E-mail: mattbreen@utah.gov

Tildon Jones
Colorado River Fish Project
U. S. Fish and Wildlife Service
Vernal, UT 84078
Phone: (435) 789-0366; Fax: (435) 789-4805
E-mail: tildon_jones@fws.gov

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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 required 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 (K. Bestgen, pers. comm.; Bestgen et al. 1998). 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 working on issues such as changes in habitat related to flow and temperature. This study seeks to address the arrival and entrainment of larval CPM into backwaters in this reach and the possible influence nonnative fishes may have on age-0 CPM as they arrive and grow in backwater habitats.

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. Verify that larval CPM are arriving in nursery habitat.
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 using various blocking techniques and depletion treatments.
5. Assess small-bodied fish community effects from removing nonnative fishes from backwaters.

End Product:

1. Documentation of whether larval CPM spawned in the Yampa River still arrive in summer at the Ouray reach of the middle Green River in similar numbers as in 1992.
2. Expected persistence time of larval CPM without any treatment.
3. Determination of whether blocking backwaters is a successful method for increasing the survival and growth of larval CPM in the Ouray reach of the middle Green River.

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 those 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 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 meter 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 and 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 if blocking backwaters statistically changed the fish community and increased 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 seen 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. Results are currently inconclusive until identification is complete; however it is likely that if larval CPM were present their abundance was limited due to drought conditions, which would not provide a robust sample size among treatments. 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 1/2 inch mesh nets; and (3) four backwaters that are blocked by a 1/4 inch mesh nets. Blocking will be accomplished using 1/4 and 1/2 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 experiment with a blocking scenario to keep backwaters free of nonnative fish.

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

Task 4. Data analysis and reporting.

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

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

FY 2014

Note: Field work will not be conducted for this project in 2014 so that a mid-term report summarizing the first three years of data can be completed, thus providing further guidance for the future of this project.

Task 1. Determine abundance of larval CPM drifting into and arriving in middle Green River nursery habitat by drift net and seining backwaters.

Task 1 Total	$0

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

Task 2 Total	$0

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

Task 3 Total	$0

Task 4. Data entry, analysis and reporting.

	Hourly Rate	Hours	UDWR-Vernal	CRFP-Vernal
Labor				
Project Leader	31.63	100	3194.56	
Biologist II	32.38	240	7847.99	
GS-12 Biologist	52.69	160		8430.40
Task 4 Total			**$11042.05**	**$8430.40**

Task 5. USFWS - -Field support for backwater topography.

Task Activity	Rate $/h	Hours	Cost
Task 5.			
Labor			
WG-5 Boat Operator	$18.91	80	$1,513
WG-5 Boat Operator trip prep	$18.91	16	$303

GS-8 Fish Tech		$37.49	96	$3,599
	Subtotal			**$5,414**
Equipment				
(2 trucks/day x 55 mi/truck x $0.31/mi x 8 days) Vernal to Ouray NWR, round trip				$273
(12 gal gas/boat x 2 boats/day x $4.00/gal x 8 days)				$768
GSA truck (rate/mo x # truck-months)		$313	1	$313
GS-8 Fish Tech maintenance work		$37.49	40	$1,500
	Subtotal			**$2,854**
	TASK 5 TOTAL			**$8,268**

FY 2014 TOTAL $27,740.45

Final/Interim Report due to Recovery Program by February 28, 2014

FY 2015

Task 1. USFWS - Determine abundance of larval CPM drifting into and arriving in middle Green River nursery habitat by drift net and seining backwaters.

2015

Task Activity	Rate $/h	Hours	Cost
Task 1a-Drift net sampling (25 days)			
Labor			
GS-12 Biologist	$53.36	80	$4,269
GS-05 Technician	$19.29	200	$3,858
Subtotal			**$8,127**
Equipment			
(1 trucks/trip x 52 mi/truck x $0.32/mi x 25 days) Vernal to Split Mtn., round trip			$416
GSA truck (rate/mo x # truck-months)	$319	2	$638
drift net	$585	1	$585
flow meter	$400	1	$400
ethanol (25 gals. X $14/gal)	$14	25	$350
sample vials (200 x $0.51)	$0.51	200	$102
Subtotal			**$2,491**
Task 1b-seining backwaters (10 days)			
Labor			
GS-12 Biologist	$53.36	80	$4,269
GS-05 Technician (x3)	$19.29	240	$4,630

Subtotal			**$8,898**

Equipment

(2 trucks/trip x 80 mi/truck x $0.32/mi x 10 days) Vernal to Ouray NWR, round trip			$512
GSA truck (rate/mo x # truck-months)	$319	1	$319
Seine	$65	1	$65
ethanol (25 gals. X $14/gal)	$14	25	$350
sample vials (200 x $0.51)	$0.51	200	$102
boat gas (12 gal/boat x 2 boats/day x $4/gal x 10 days)			$960
oil for boats (2 qts/day x 2 boats/day x $11/qt x 10 days)			$440
GS-8 Fish Tech maintenance work	$38.45	127	$4,883
Subtotal			**$7,631**
TASK 1 TOTAL			**$27,147**

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

	Rate	Hours/Units	Cost
Labor			
Project Leader	32.58	120	3910
Biologist II	33.35	100	3335
Journey Maintenance/Construction Specialist	26.44	100	2644
Technician I	16.23	80	1298
Shuttle Drivers	16.58	40	663
		Subtotal	**$11,851**
Travel[a]			
2 trucks @ 5% of annual use	13600.00	0.05	680
Per diem (8 day trips x 4 people)	13.00	32	416
		Subtotal	**$1,096**
Equipment			
Boat fuel (gallons)	4.00	48	192
Boat oil (quarts)	11.00	3	33
Block nets	900.00	2	1800
Seine	100.00	1	100
Ethanol (20 L)	70.00	2	140
Sample vials	3.50	50	175
Boat/motor repair and maintenance			789
Sampling equipment			500
		Subtotal	**$3,729**
		Task 2 Total	**$16,676**

[a] The State of Utah uses Automotive Resources Inc. for motor pool operations. Rental is approximately $6,800/year/vehicle (includes fleet rental, mileage, and gas), which is based on the average annual cost for all trucks used in our program.

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

	Rate	Hours/Units	Cost
Labor			
Project Leader	32.58	240	7820
Biologist II	33.35	240	8004
Journey Maintenance/Construction Specialist	26.44	300	7933
Shuttle Drivers	16.58	120	1990
		Subtotal	**$25,747**
Travel[a]			

2 trucks @ 10% of annual use	13600.00	0.1	1360
Per diem (24 day trips x 4 people)	13.00	96	1248
		Subtotal	**$2,608**
Equipment			
Boat fuel (gallons)	4.00	144	576
Ethanol (20 L)	70.00	2	140
Sample vials	3.50	50	175
Boat/motor repair and maintenance			500
Sampling equipment			500
		Subtotal	**$1,891**
		Task 3 Total	**$30,246**

[a] The State of Utah uses Automotive Resources Inc. for motor pool operations. Rental is approximately $6,800/year/vehicle (includes fleet rental, mileage, and gas), which is based on the average annual cost for all trucks used in our program.

Task 4. Data entry, analysis and reporting (UDWR–Vernal).

	Rate	Hours/Units	Cost
Labor			
Project Leader	32.58	100	3258
Biologist II	33.35	120	4002
Technician II	22.24	200	4448
		Task 4 Total	**$11,709**
		UDWR-FY15 Total	**$58,631**

Task 4- Data Analysis, Reporting, Administration-USFWS

Labor	Rate $/h	Hours	Cost
GS-12 Supervisory Fish Biologist	$53.36	80	$4,269
GS-9 Admin Assist.	$38.54	116	$4,471
TASK 4 TOTAL			**$8,740**

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

Task Activity	Rate $/h	Hours	Cost
Task 5.			
Labor			
WG-5 Boat Operator	$19.29	80	$1,543
WG-5 Boat Operator trip prep	$19.29	16	$309
GS-8 Fish Tech	$38.24	96	$3,671
Subtotal			**$5,523**
Equipment			
(2 trucks/day x 55 mi/truck x $0.32/mi x 8 days) Vernal to Ouray NWR, round trip			$282
(12 gal gas/boat x 2 boats/day x $4.00/gal x 8 days)			$768
GSA truck (rate/mo x # truck-months)	$320	1	$320
GS-8 Fish Tech maintenance work	$38.24	40	$1,530
Subtotal			**$2,899**
TASK 5 TOTAL			**$8,422**

FY 2016

Task 1. USFWS - Determine abundance of larval CPM drifting into and arriving in middle Green River nursery habitat by drift net and seining backwaters.

Task Activity	Rate $/h	Hours	Cost
Task 1a-Drift net sampling (25 days)			
Labor			
GS-12 Biologist	$54.43	80	$4,354
GS-05 Technician	$19.68	200	$3,936
Subtotal			**$8,290**
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)	$325	2	$650
drift net	$585	1	$585
flow meter	$400	1	$400
ethanol (25 gals. X $14/gal)	$14	25	$350
sample vials (200 x $0.51)	$0.51	200	$102
Subtotal			**$2,516**
Task 1b-seining backwaters (10 days)			
Labor			
GS-12 Biologist	$54.43	80	$4,354
GS-05 Technician (x3)	$19.68	240	$4,723
Subtotal			**$9,078**
Equipment			
(2 trucks/trip x 80 mi/truck x $0.33/mi x 10 days) Vernal to Ouray NWR, round trip			$528
GSA truck (rate/mo x # truck-months)	$325	1	$325
Seine	$65	1	$65
ethanol (25 gals. X $14/gal)	$14	25	$350
sample vials (200 x $0.51)	$0.51	200	$102
boat gas (12 gal/boat x 2 boats/day x $4/gal x 10 days)			$960
oil for boats (2 qts/day x 2 boats/day x $11/qt x 10 days)			$440
GS-8 Fish Tech maintenance work	$39.22	127	$4,981
Subtotal			**$7,751**
TASK 1 TOTAL			**$27,635**

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

	Rate	Hours/Units	Cost
Labor			
Project Leader	33.24	120	3988
Biologist II	34.02	100	3402
Journey Maintenance/Construction Specialist	26.97	100	2697
Technician I	16.55	80	1324
Shuttle Drivers	16.91	40	676
		Subtotal	**$12,088**
Travel[a]			
2 trucks @ 5% of annual use	13872.00	0.05	694
Per diem (8 day trips x 4 people)	13.26	32	424
		Subtotal	**$1,118**
Equipment			
Boat fuel (gallons)	4.08	48	196
Boat oil (quarts)	11.22	3	34
Block nets	918.00	2	1836
Seine	102.00	1	102
Ethanol (20 L)	71.40	2	143
Sample vials	3.57	50	179
Boat/motor repair and maintenance			805
Sampling equipment			510
		Subtotal	**$3,804**
		Task 2 Total	**$17,010**

[a] The State of Utah uses Automotive Resources Inc. for motor pool operations. Rental is approximately $6,800/year/vehicle (includes fleet rental, mileage, and gas), which is based on the average annual cost for all trucks used in our program.

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

	Rate	Hours/Units	Cost
Labor			
Project Leader	33.24	240	7977
Biologist II	34.02	240	8165
Journey Maintenance/Construction Specialist	26.97	300	8091
Shuttle Drivers	16.91	120	2029
		Subtotal	**$26,262**
Travel[a]			
2 trucks @ 10% of annual use	13872.00	0.1	1387
Per diem (24 day trips x 4 people)	13.26	96	1273
		Subtotal	**$2,660**
Equipment			
Boat fuel (gallons)	4.08	144	588
Ethanol (20 L)	71.40	2	143
Sample vials	3.57	50	179
Boat/motor repair and maintenance			510
Sampling equipment			510
		Subtotal	**$1,929**
		Task 3 Total	**$30,851**

[a] The State of Utah uses Automotive Resources Inc. for motor pool operations. Rental is approximately $6,800/year/vehicle (includes fleet rental, mileage, and gas), which is based on the average annual cost for all trucks used in our program.

Task 4. Data entry, analysis and reporting (UDWR–Vernal).

	Rate	Hours/Units	Cost
Labor			

Project Leader	33.24	100	3324
Biologist II	34.02	120	4082
Technician II	22.68	200	4537
		Task 4 Total	**$11,943**
		UDWR-FY16 Total	**$59,804**

Task 4- Data Analysis, Reporting, Administration-USFWS

Labor	Rate $/h	Hours	Cost
GS-12 Supervisory Fish Biologist	$54.43	80	$4,354
GS-9 Admin Assist.	$39.31	116	$4,560
TASK 4 TOTAL			**$8,914**

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

Task Activity	Rate $/h	Hours	Cost
Task 5.			
Labor			
WG-5 Boat Operator	$19.68	80	$1,574
WG-5 Boat Operator trip prep	$19.68	16	$315
GS-8 Fish Tech	$39.01	96	$3,745
Subtotal			**$5,634**
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)	$325	1	$325
GS-8 Fish Tech maintenance work	$39.01	40	$1,560
Subtotal			**$2,944**
TASK 5 TOTAL			**$8,578**

FY 2017

Task 1. USFWS - Determine abundance of larval CPM drifting into and arriving in middle Green River nursery habitat by drift net and seining backwaters.

2017

Task Activity	Rate $/h	Hours	Cost
Task 1a-Drift net sampling (25 days)			
Labor			
GS-12 Biologist	$55.52	80	$4,442
GS-05 Technician	$20.07	200	$4,014
Subtotal			**$8,456**

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)	$332	2	$664
drift net	$585	1	$585
flow meter	$400	1	$400
ethanol (25 gals. X $14/gal)	$14	25	$350
sample vials (200 x $0.51)	$0.51	200	$102
Subtotal			**$2,543**

Task 1b-seining backwaters (10 days)

Labor			
GS-12 Biologist	$55.52	80	$4,442
GS-05 Technician (x3)	$20.07	240	$4,817
Subtotal			**$9,258**

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)	$332	1	$332
Seine	$65	1	$65
ethanol (25 gals. X $14/gal)	$14	25	$350
sample vials (200 x $0.51)	$0.51	200	$102
boat gas (12 gal/boat x 2 boats/day x $4/gal x 10 days)			$960
oil for boats (2 qts/day x 2 boats/day x $11/qt x 10 days)			$440
GS-8 Fish Tech maintenance work	$40.00	127	$5,080
Subtotal			**$7,873**
TASK 1 TOTAL			**$28,130**

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

	Rate	Hours/Units	Cost
Labor			
Project Leader	33.90	120	4068
Biologist II	34.70	100	3470
Journey Maintenance/Construction Specialist	27.51	100	2751
Technician I	16.89	80	1351
Shuttle Drivers	17.25	40	690
		Subtotal	**$12,330**
Travel[a]			
2 trucks @ 5% of annual use	14149.44	0.05	707
Per diem (8 day trips x 4 people)	13.53	32	433
		Subtotal	**$1,140**
Equipment			
Boat fuel (gallons)	4.16	48	200
Boat oil (quarts)	11.44	3	34
Block nets	936.36	2	1873
Seine	104.04	1	104

Ethanol (20 L)	72.83	2	146
Sample vials	3.64	50	182
Boat/motor repair and maintenance			821
Sampling equipment			520
		Subtotal	**$3,880**
		Task 2 Total	**$17,350**

[a] The State of Utah uses Automotive Resources Inc. for motor pool operations. Rental is approximately $6,800/year/vehicle (includes fleet rental, mileage, and gas), which is based on the average annual cost for all trucks used in our program.

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

	Rate	Hours/Units	Cost
Labor			
Project Leader	33.90	240	8136
Biologist II	34.70	240	8328
Journey Maintenance/Construction Specialist	27.51	300	8253
Shuttle Drivers	17.25	120	2070
		Subtotal	**$26,787**
Travel[a]			
2 trucks @ 10% of annual use	14149.44	0.1	1415
Per diem (24 day trips x 4 people)	13.53	96	1298
		Subtotal	**$2,713**
Equipment			
Boat fuel (gallons)	4.16	144	599
Ethanol (20 L)	72.83	2	146
Sample vials	3.64	50	182
Boat/motor repair and maintenance			520
Sampling equipment			520
		Subtotal	**$1,967**
		Task 3 Total	**$31,468**

[a] The State of Utah uses Automotive Resources Inc. for motor pool operations. Rental is approximately $6,800/year/vehicle (includes fleet rental, mileage, and gas), which is based on the average annual cost for all trucks used in our program.

Task 4. Data entry, analysis and reporting (UDWR–Vernal).

	Rate	Hours/Units	Cost
Labor			
Project Leader	33.90	100	3390
Biologist II	34.70	120	4164
Technician II	23.14	200	4628
		Task 4 Total	**$12,182**
		UDWR-FY17 Total	**$61,000**

Task 4- Data Analysis, Reporting, Administration-USFWS

Labor	**Rate $/h**	**Hours**	**Cost**
GS-12 Supervisory Fish Biologist	$55.52	80	$4,442
GS-9 Admin Assist.	$40.10	116	$4,652
TASK 4 TOTAL			**$9,094**

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

Task Activity	**Rate $/h**	**Hours**	**Cost**
Task 5.			

Labor			
WG-5 Boat Operator	$20.07	80	$1,606
WG-5 Boat Operator trip prep	$20.07	16	$321
GS-8 Fish Tech	$39.79	96	$3,820
Subtotal			**$5,747**

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)	$332	1	$332
GS-8 Fish Tech maintenance work	$39.79	40	$1,592
Subtotal			**$2,991**
TASK 5 TOTAL			**$8,737**

FY 2018

Task 1. USFWS - Determine abundance of larval CPM drifting into and arriving in middle Green River nursery habitat by drift net and seining backwaters.

2018

Task Activity	Rate $/h	Hours	Cost
Task 1a-Drift net sampling (25 days)			
Labor			
GS-12 Biologist	$56.63	80	$4,530
GS-05 Technician	$20.47	200	$4,094
Subtotal			**$8,624**
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)	$339	2	$678
drift net	$585	1	$585
flow meter	$400	1	$400
ethanol (25 gals. X $14/gal)	$14	25	$350
sample vials (200 x $0.51)	$0.51	200	$102
Subtotal			**$2,570**
Task 1b-seining backwaters (10 days)			
Labor			
GS-12 Biologist	$56.63	80	$4,530
GS-05 Technician (x3)	$20.47	240	$4,913
Subtotal			**$9,443**

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)	$339	1	$339
Seine	$65	1	$65
ethanol (25 gals. X $14/gal)	$14	25	$350
sample vials (200 x $0.51)	$0.51	200	$102
boat gas (12 gal/boat x 2 boats/day x $4/gal x 10 days)			$960
oil for boats (2 qts/day x 2 boats/day x $11/qt x 10 days)			$440
GS-8 Fish Tech maintenance work	$40.80	127	$5,182
Subtotal			**$7,998**
TASK 1 TOTAL			**$28,635**

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

	Rate	Hours/Units	Cost
Labor			
Project Leader	34.58	120	4149
Biologist II	35.39	100	3539
Journey Maintenance/Construction Specialist	28.06	100	2806
Technician I	17.22	80	1378
Shuttle Drivers	17.59	40	704
		Subtotal	**$12,577**
Travel[a]			
2 trucks @ 5% of annual use	14432.43	0.05	722
Per diem (8 day trips x 4 people)	13.80	32	441
		Subtotal	**$1,163**
Equipment			
Boat fuel (gallons)	4.24	48	204
Boat oil (quarts)	11.67	3	35
Block nets	955.09	2	1910
Seine	106.12	1	106
Ethanol (20 L)	74.28	2	149
Sample vials	3.71	50	186
Boat/motor repair and maintenance			837
Sampling equipment			531
		Subtotal	**$3,957**
		Task 2 Total	**$17,697**

[a] The State of Utah uses Automotive Resources Inc. for motor pool operations. Rental is approximately $6,800/year/vehicle (includes fleet rental, mileage, and gas), which is based on the average annual cost for all trucks used in our program.

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

	Rate	Hours/Units	Cost
Labor			
Project Leader	34.58	240	8299
Biologist II	35.39	240	8494
Journey Maintenance/Construction Specialist	28.06	300	8418
Shuttle Drivers	17.59	120	2111
		Subtotal	**$27,323**
Travel[a]			
2 trucks @ 10% of annual use	14432.43	0.1	1443
Per diem (24 day trips x 4 people)	13.80	96	1324
		Subtotal	**$2,768**

Equipment			
Boat fuel (gallons)	4.24	144	611
Ethanol (20 L)	74.28	2	149
Sample vials	3.71	50	186
Boat/motor repair and maintenance			531
Sampling equipment			531
		Subtotal	**$2,007**
		Task 3 Total	**$32,097**

[a] The State of Utah uses Automotive Resources Inc. for motor pool operations. Rental is approximately $6,800/year/vehicle (includes fleet rental, mileage, and gas), which is based on the average annual cost for all trucks used in our program.

Task 4. Data entry, analysis and reporting (UDWR–Vernal).

	Rate	Hours/Units	Cost
Labor			
Project Leader	34.58	100	3458
Biologist II	35.39	120	4247
Technician II	23.60	200	4720
		Task 4 Total	**$12,425**
		UDWR-FY18 Total	**$62,220**

Task 4- Data Analysis, Reporting, Administration- USFWS

Labor			
	Rate $/hr	hrs	cost
GS-12 Supervisory Fish Biologist	$56.63	80	$4,530
GS-9 Admin Assist.	$40.90	116	$4,744
TASK 4 TOTAL			**$9,274**

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

Task Activity	Rate $/h	Hours	Cost
Task 5.			
Labor			
WG-5 Boat Operator	$20.47	80	$1,638
WG-5 Boat Operator trip prep	$20.47	16	$328
GS-8 Fish Tech	$40.58	96	$3,896
Subtotal			**$5,861**
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)	$332	1	$332
GS-8 Fish Tech maintenance work	$37.49	40	$1,500
Subtotal			**$2,908**
TASK 5 TOTAL			**$8,768**

IX. Budget Summary:

	UDWR - Vernal	CRFP - Vernal	Total
FY 2014	$11,042	$16,698	$27,740
FY 2015	$58,631	$44,309	$102,940
FY 2016	$59,804	$45,127	$104,931
FY 2017	$61,000	$45,960	$106,960
FY 2018	$62,220	$46,678	$108,898

X. Reviewers:

XI. References:

Bestgen, K.R., R.T. Muth, and M.A. Trammell. 1998. Downstream transport of Colorado squawfish larvae in the Green River drainage: temporal and spatial variation in abundance and relationships with juvenile recruitment. Colorado State University Larval Fish Laboratory, Final Report to the Recovery Implementation Program for Endangered Fishes in the Upper Colorado River Basin, U.S. Fish and Wildlife Service, Denver, CO.

Bestgen, K.R., D.W. Beyers, J.A. Rice, and G.B. Haines. 2006. Factors affecting recruitment of young Colorado pikeminnow: synthesis of predation experiments, field studies, and individual-based modeling. Transactions of the American Fisheries Society 135: 1722-1742.

Breen, M.J., M. Swasey, P. Badame, and K. Creighton. 2011. Upper Colorado River basin young of year Colorado pikeminnow (*Ptychocheilus lucius)* monitoring: summary report 1986-2009. Final report of Utah Division of Wildlife Resources to Upper Colorado River Endangered Fish Recovery Program, Denver CO.

Day, K.S., K.D. Christopherson, and C. Crosby. 1999. An assessment of young-of-the-year Colorado pikeminnow (Ptychocheilus lucius) use of backwater habitats in the Green River, Utah. *In*: Utah Division of Wildlife Resources. 1999. Flaming Gorge studies: assessment of Colorado pikeminnow nursery habitat in the Green River. Publication 99-30.

Skorupski, J.A., M.J. Breen and T. Jones. 2012. Assessment of larval Colorado pikeminnow presence and survival in low velocity habitats in the middle Green River. Annual Report submitted to the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin. U.S. Fish and Wildlife Service, Denver, CO.

Tyus, H.M. and G.B Haines. 1991. Distribution, habitat use, and growth of age-0 Colorado squawfish in the Green River basin, Colorado and Utah. Transactions of the American Fisheries Society 120: 79-89.