RECOVERY PROGRAM Recovery Program Project Number: FR 165
FY 2016-2017 SCOPE OF WORK for:

Use of Stewart Lake Floodplain by Larval and Adult Endangered Fishes

Reclamation Agreement number: R14AP00007
Reclamation Agreement term: May 1, 2014 – September 30, 2018

Note: Recovery Program FY16-17 scopes of work are drafted in May 2015. 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: Use of Stewart Lake Floodplain by Larval and Adult Endangered Fishes

II. Relationship to RIPRAP:

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

II.A.1. Conduct inventory of flooded bottomlands habitat for potential restoration.
V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).

GREEN RIVER ACTION PLAN

I.A.3.d.1. Conduct real-time larval razorback and Colorado pikeminnow sampling to guide Flaming Gorge operations.
I.D.1. Develop study plan to evaluate flow recommendations.
I.D.1.a. Evaluate survival of young and movement of sub-adult razorback suckers from

floodplains into the mainstem in response to flows.

I.D.1.b.(4)(a) – Implement the Larval Trigger Study Plan

II.A.2. Acquire interest in high-priority flooded bottomland habitats between Ouray NWR and Jensen to benefit endangered fish.

II.A.2.a. Identify and evaluate sites.

V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).

V.A. Conduct research to acquire life history information and enhance scientific techniques required to complete recovery actions.

III. Study Background/Rationale and Hypotheses:

Floodplain wetlands are recognized as important habitats for early life-stages of razorback sucker (*Xyrauchen texanus*; Wydoski and Wick 1998; Muth et al. 1998; Lentsch et al. 1996; Modde 1996; Tyus and Karp 1990). Reproduction by razorback suckers occurs on the ascending limb of the spring hydrograph, allowing enough time between hatching and swim up for larvae to enter main channel drift when highly productive floodplain habitats are accessible (Muth et al. 1998). Seasonal timing of razorback sucker reproduction indicates possible adaptation for entrainment and use of floodplain habitats for rearing purposes (Muth et al. 1998). However, it is unclear how long young razorback sucker stay in floodplains before moving into riverine habitats. In addition, other endangered fishes have been documented using floodplain habitat (e.g. Breen 2011), but enumeration is limited.

The Green River Floodplain Management Plan identifies the Stewart Lake wetland as a priority habitat for endangered fishes. Stewart Lake is the third largest of 16 identified priority wetlands, thus providing greater area and depth for potential nursery habitat for larval razorback sucker (i.e., overwinter survival) and other native and endangered fishes (Valdez and Nelson 2004). Additionally, it is approximately 11 miles downstream of a known razorback sucker spawning bar, allowing for potential entrainment (Valdez and Nelson 2004). In comparison to other floodplains, Stewart Lake is an ideal study area given that the structural design provides flexibility in water management; this feature allows for: (1) entrainment capabilities during all flow conditions, even dry hydrologic years, (2) management of inlet and outlet structures to maximize entrainment during floodplain connectivity, (3) timing and control of outlet releases to monitor escapement, and (4) complete drawdown via a graded canal drainage system to control nonnative abundance and reset the system any given year. Moreover, previous findings show that entrainment greatly increases in this system when operated as a flow-through wetland (Hedrick et al. 2009). Stewart Lake has never been adequately sampled to determine its use as larval or adult native fish habitat. However, 42 bonytail (*Gila elegans*) and three Colorado pikeminnow (*Ptychocheilus lucius*) were documented leaving the floodplain in August 2009 when a stationary PIT-antenna was installed at the outlet canal (UDWR, unpublished data).

Recent findings by Bestgen et al. (2011) indicate that further investigations are needed regarding the timing of Flaming Gorge Dam releases and larval razorback sucker entrainment. Therefore, a Larval Trigger Study Plan (LTSP) has been designed to examine larval razorback sucker occurrence in the Green River as a trigger for Flaming Gorge operations (Larval Trigger

Study Plan Ad Hoc Committee 2012). In the LTSP, several wetlands were identified as having the greatest ability to entrain larval razorback sucker during a range of flow conditions, specifically three under low flow years and during all study years. Thus, we propose that the Stewart Lake wetland, one of the three floodplains that connects at low flows and has the ability to be managed with inlet and outlet control structures, is an ideal setting to conduct a comprehensive study of fishes that immigrate into the wetland habitat during floodplain connection, utilize the habitat post connection, and emigrate from the wetland during drawdown. Using various sampling techniques, during different stages of floodplain use (i.e. entrainment, retention, escapement) we will greatly increase our chances of characterizing use of floodplain wetlands by wild-spawned razorback sucker, other endangered fishes and nonnatives.

Stewart Lake was one of only two wetlands in the middle Green River to entrain flows in 2012 due to drought conditions. Wild-spawned razorback suckers were successfully entrained by adaptive management of wetland floodgate control structures. However, due to limited flows and high levels of nonnatives, water quality and habitat conditions deteriorated quickly preventing the survival of the 2012 cohort (Breen and Skorupski 2012). Therefore, additional techniques will be developed in the future to minimize the degradation of habitat by loss of water and the influence of nonnatives. Information from 2012 demonstrated the ability to entrain larvae under drought conditions and influenced management decisions to improve study design and potentially survival of larval razorback sucker. However, it demonstrates data compiled from a single sampling season may limit our ability to draw final conclusions due to confounding environmental factors (i.e., annual peak flows), thus a multi-year study will provide a more complete evaluation for guiding future floodplain management decisions. In addition, a comprehensive monitoring plan that identifies important research needs for various life stages of razorback sucker was recently completed (Bestgen et al. 2012). In relation to this monitoring plan, we have the unique opportunity to examine a variety of research questions in Stewart Lake, especially questions related to life-stage specific detection and capture efficiencies for razorback sucker.

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

Goal:

Characterize use of a controlled flow-through floodplain wetland by larval and adult endangered fishes, emphasizing razorback sucker.

Objectives:

1. Monitor entrainment of larval and adult endangered fishes during high-flow connection of riverine and wetland habitats.
2. Examine fish community composition and habitat characteristics in the Stewart Lake wetland following floodplain connection to assess summer survival of wild-spawned and stocked razorback sucker. As of 2014, stocking razorbacks on top of natural recruitment is no longer advised (see below).
3. Examine capture efficiencies of razorback sucker during wetland sampling.

4. Monitor escapement (fish moving out of the wetland) of native and nonnative fishes entrained in Stewart Lake during a controlled release, including a real-time survival estimate of stocked razorback sucker through physical capture using a fixed weir.
5. Determine the extent of nonnative fish colonization in wetland habitats.

End Products: An annual report describing how Stewart Lake functions as habitat for larval and adult endangered fishes. We will provide information on: (1) larval razorback sucker entrainment, (2) large-bodied native and nonnative fishes entering the floodplain during high-flow connection, (3) fish community composition, water quality parameters, and wetland habitat characteristics through time following the connection period, (4) species-specific information on fishes emigrating from the floodplain during the drawdown period, and (5) capture efficiencies of various size classes of razorback sucker, which will be verified through physical capture during the drawdown period. In addition, multiple captures/detections of the same fish from more than one component of our study will allow us to investigate overall use, survival and capture efficiency during the course of a single season of entrainment.

V. Study Area:

Stewart Lake, which is located in the middle Green River at river mile 300, begins flooding at 7,500 cfs and inundates approximately 570 acres (Valdez and Nelson 2004). Low flow connection relative to other wetland habitats allows for research opportunities across a range of flow conditions. Water enters the wetland through a single breach inlet and exits through a single outlet canal. Timing and extent of floodplain inundation and drawdown can be manipulated via floodgate operations which can be regulated to meet multiple research objectives. For example, the outlet control structure is two feet lower in elevation than the inlet structure and begins flooding at approximately 3,500–4,000 cfs (Schelly, personal observation—March, 2015), thus it can be used to entrain water under low flow scenarios.

VI. Study Methods/Approach:

Topics of interest in the LTSP to assess Flaming Gorge Dam releases will be addressed in accordance with our proposed Stewart Lake study, including razorback sucker larval entrainment and nonnative fish diversity and abundance in floodplain wetlands. In addition to LTSP topics, information on adult endangered species (immigration, entrainment and emigration) using floodplain habitat will be evaluated. Below we have outlined our proposed plans to systematically examine the Stewart Lake wetland and outlet from the point of floodplain connection to draw-down. However, the LTSP highlights that various floodplains could be of high value to razorback sucker under different hydrologic conditions. Thus, under a variety of hydrologic years this project may be modified to focus on other wetlands such as Bonanza Bridge and the Stirrup floodplains, depending on Recovery Program guidance. Given that multiple study wetlands are identified in the LTSP, this scope of work will serve a similar function as Project #164 and we will share the workload with the U.S. Fish and Wildlife Service, Vernal–CRFP to adequately accomplish LTSP sampling. We have not specifically identified additional funds in this budget for expansion of this work to other wetlands, but will do so upon further guidance from the Recovery Program in anticipation of higher flow years.

To monitor larval and adult fishes entering the Stewart Lake wetland we will sample with a picket weir that we will install at the outlet structure and light traps within the wetland. Through continuous operation (24 hours/day), the weir will monitor fish movement for the entire duration that the floodplain is breached. A directional weir will be checked hourly or less frequently depending on volume of fish entrained to reduce stress to native fishes. Pickets will be spaced by 0.25 inches, which will capture the majority of fish entering the wetland, but will allow larval razorback sucker and small-bodied fishes to move into the wetland freely. This will determine if adult endangered fish are immigrating into Stewart Lake or only utilizing the habitat for the duration of floodplain connection. It will also allow for monitoring and removal of large-bodied nonnatives during inundation, which will reduce competition and predation on larval razorback sucker within Stewart Lake. Native fishes will be allowed to move in the direction of choice (i.e., towards wetland or river), determined by capture in directional traps.

Twenty to 25 light traps will be positioned in the inlet and/or outlet canals and in the main body of the wetland at the point of floodplain connection. Daily sampling will initiate following larval detection in the Green River main channel (project #22f), and continue for the duration of larval drift (approximately 3-6 weeks) or conclude due to floodplain disconnection from the main channel. All larval fish present in light traps will be collected and preserved for later identification by the Larval Fish Lab (costs included in project #15 budget). Habitat parameters, mainly discharge measurements, will be recorded at the inlet and outlet structures during floodplain inundation (not feasible at extremely high flows).

We will utilize various sampling techniques to evaluate fish community composition. Two distinct size classes of razorback sucker (~3,000 of a 100-150 mm size class and ~2,000 of a 225 mm size class) will be stocked (FY 2014; early June) to monitor survival, sampling efficiencies and capture probabilities. Stocking two larger juvenile size classes of razorback suckers (known quantity) on top of wild-spawned razorback suckers will provide an excellent opportunity to examine how effectively we can sample various life stages of razorback suckers, which has been identified as an important research need (Bestgen et al. 2012). Size classes of stocked fish will be selected with the specific intention that we can easily distinguish different size classes from one another, as well as from wild-spawned entrained razorbacks. Prior to stocking in Stewart Lake, razorback suckers will be PIT-tagged, which will allow us to monitor survival and capture efficiencies of these fish while the wetland is inundated (see below) and upon recapture as they are leaving the wetland and processed through our fish traps during draw-down. We will also monitor water quality and habitat parameters in the Stewart Lake wetland following floodplain connection. Following floodplain inundation and disconnection, the wetland will be systematically sampled bi-weekly to evaluate fish community composition through time (until wetland is drained). Sampling will consist of seven sample periods in 2014 following the stocking of razorback sucker in order to maximize our effort to determine detection and capture efficiencies of different size classes of razorbacks in wetland habitats. However, only four sample periods will be conducted in 2015 and beyond, unless otherwise advised by the Recovery Program. Once the wetland is completely drained (see below), we will conduct a final sweep to determine fishes that did not escape during water release. During bi-weekly fish sampling, cross-sectional profiles and area estimates will be conducted using a hand-held GPS, depth finder and range finder. We will also monitor water quality parameters

(dissolved oxygen, pH, conductivity and temperature) during bi-weekly sampling.

The picket weir will monitor the escapement of native and nonnative fishes retained in the Stewart Lake wetland following high flow connection. Wetland drawdown will be coordinated with the UDWR habitat manager in conjunction with selenium management strategies (timing and duration of release), to monitor fishes leaving the wetland. This will allow us to effectively sample fish leaving the wetland (tagged and untagged) to determine survival and growth of wild and stocked razorback suckers and provide information on capture probabilities and sampling efficiencies of different gear types for razorback sucker within a floodplain.

The problem of high densities of adult carp causing water quality deterioration and mass mortality was successfully ameliorated in 2013 and 2014 by using picket weirs to exclude adult nonnatives during filling (Skorupski and Breen 2013; Schelly et al. 2014). A complete fill in 2014 allowed for three months of inundation, resulting in excellent growth of entrained razorbacks. However, the range of sizes after three months of growth was considerable (49-168 mm TL), suggesting that a range of intermediate sizes at drawdown would confound attempts to distinguish multiple cohorts of stocked juvenile razorbacks from wild-spawned fish based on size. Furthermore, when the wetland is completely inundated as in 2014, dilution effects across the vast expanse of available habitat make seining capture/recapture rates very low, so that the only feasible opportunity to recapture meaningful numbers of marked fish is during intermittent operation of the trap at draining. For these reasons, and in light of our recent successes, we suggest that no hatchery-raised juvenile razorbacks should be stocked in Stewart Lake during the remaining experimentation phase of the LTSP, preventing any complication of results pertaining to numbers and growth of wild-spawned fish.

During wet years, as demonstrated in 2014 (Schelly et al. 2014), continuous (24 hr) monitoring of traps and weir during an inundation period spanning more than two weeks poses a staffing challenge. Our experience suggests that the presence of a structure seems to act as a deterrent to adult native fishes (based on their absence in the in-trap), so an unstaffed exclusionary weir is the most feasible approach during inundation in other than dry years. Deployment of a stationary PIT antenna in the outlet channel will test whether tagged adult native fishes are exploring the channel and turning back after encountering the weir structure. Reducing the staffing commitment during the period of filling will give us greater flexibility to increase staffing during the multi-week period of drawdown, potentially reducing the duration of un-sampled free-release periods and maximizing the sampling of emigrating razorbacks.

In conjunction with our seining of the inundated wetland in 2014, to assist the Utah Division of Water Quality with their selenium monitoring, we took water samples from multiple localities in Stewart Lake, filtered them, and shipped them to the lab the next day. This required a day of work for one individual during each bi-weekly monitoring cycle. Given the extra time required to process these samples, we have requested UDWQ to provide supplemental funding to cover the personnel hours for this task in 2015.

VII. Task Description and Schedule:

Timeline is subject to change for tasks 1-2 based on the timing and duration of peak flows.

Task 1: Install, operate and maintain a picket weir in the Stewart Lake outlet

Task 2: Sample the fish community in the Stewart Lake wetland and monitor post-connection water quality and habitat parameters

Task 3: Sample fishes exiting the Stewart Lake outlet during drawdown with a picket weir

Task 4: Data entry, analysis and reporting

Task	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1				X	X	X						
2							X	X	X			
3								X	X	X		
4										X	X	X

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

FY 2016

Task 1: Install, operate and maintain a picket weir in the Stewart Lake outlet

	Rate	Hours/Units	Cost
Labor			
Project Leader	35.48	20	709.60
Biologist II	33.12	80	2649.60
Journey Maintenance/Construction Specialist	26.66	80	2132.80
Technician II (Field Supervisor)	23.80	20	476.00
Technician II (Assistant Crew Leader)	17.48	80	1398.40
Technician I	16.23	120	1947.60
		Subtotal	**$9,314**
Travel			
2 trucks @ 5% of annual use[a]	13600.00	0.05	680.00
Per diem (6 day trips and 2 overnights x 4 people)	19.50	32	624.00
		Subtotal	**$1,304**
Equipment			
Weir supplies[b]			1050.00
Misc. sampling equipment[c]			1167.00
		Subtotal	**$2,217**
		Task 1 Total	**$12,835**

[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.

[b] Weir supplies include, but are not limited to netting for cages (Memphis Net & Twine-$300), replacement aluminum rods for picket weir and angle & strap aluminum for cages ($500), misc. nuts, bolts, and small hardware ($250).

[c] Sampling supplies include, but are not limited to water quality meter (YSI-$800), batteries ($267), straps (NRS-$100).

[a,b,c] Estimated costs based on current prices procured from various sources and previous expenditures for items under each category; out years (FY2017 and beyond) include an annual 2% cost of living increase for all categories.

Task 2: Sample the fish community in the Stewart Lake wetland and monitor post-connection water quality and habitat parameters

	Rate	Hours/Units	Cost
Labor			
Project Leader	35.48	40	1419.20
Biologist II	33.12	120	3974.40
Technician II (Field Supervisor)	23.80	40	952.00
Technician II (Assistant Crew Leader)	17.48	120	2097.60
Technician I	16.23	200	3246.00
		Subtotal	**$11,689**
Travel			
2 trucks @ 10% of annual use[a]	13600.00	0.1	1360.00
Per diem (16 day trips x 3 people)	13.00	48	624.00
		Subtotal	**$1,984**
Equipment			
Replacement seines (Memphis Net & Twine)	150.00	1	150.00
Ethanol (20 L)	70.00	3	210.00
Sample vials	3.50	25	87.50
		Subtotal	**$448**
		Task 2 Total	**$14,121**

Task 3: Sample fishes exiting the Stewart Lake outlet during drawdown with a picket weir

	Rate	Hours/Units	Cost
Labor			
Project Leader	35.48	40	1419.20
Biologist II	33.12	120	3974.40
Journey Maintenance/Construction Specialist	26.66	80	2132.80
Technician II (Field Supervisor)	23.80	20	476.00
Technician II (Assistant Crew Leader)	17.48	120	2097.60
Technician I	16.23	160	2596.80
		Subtotal	**$12,697**
Travel			
2 trucks @ 10% of annual use[a]	13600.00	0.1	1360.00
Per diem (8 day trips x 3 people)	13.00	24	312.00
		Subtotal	**$1,672**
		Task 3 Total	**$14,369**

Task 4: Data entry, analysis and reporting

	Rate	Hours/Units	Cost
Labor			
Project Leader	35.48	20	709.60
Biologist II	33.12	80	2649.60
Technician II (Assistant Crew Leader)	17.48	80	1398.40
		Task 4 Total	**$4,758**
		FY 2016 Total	**$46,082**

FY 2017

Task 1: Install, operate and maintain a picket weir in the Stewart Lake outlet

	Rate	Hours/Units	Cost
Labor			
Project Leader	36.19	20	723.79
Biologist II	33.78	80	2702.59
Journey Maintenance/Construction Specialist	27.19	80	2175.46
Technician II (Field Supervisor)	24.28	20	485.52
Technician II (Assistant Crew Leader)	17.83	80	1426.37
Technician I	16.55	120	1986.55
		Subtotal	**$9,500**
Travel			
2 trucks @ 5% of annual use[a]	13872.00	0.05	693.60
Per diem (6 day trips and 2 overnights x 4 people)	19.89	32	636.48
		Subtotal	**$1,330**
Equipment			
Weir supplies[b]			1071.00
Misc. sampling equipment[c]			1190.34
		Subtotal	**$2,261**
		Task 1 Total	**$13,092**

Task 2: Sample the fish community in the Stewart Lake wetland and monitor post-connection water quality and habitat parameters

	Rate	Hours/Units	Cost
Labor			
Project Leader	36.19	40	1447.58
Biologist II	33.78	120	4053.89
Technician II (Field Supervisor)	24.28	40	971.04
Technician II (Assistant Crew Leader)	17.83	120	2139.55
Technician I	16.55	200	3310.92

	Subtotal		**$11,923**
Travel			
2 trucks @ 10% of annual use[a]	13872.00	0.1	1387.20
Per diem (16 day trips x 3 people)	13.00	48	624.00
	Subtotal		**$2,011**
Equipment			
Replacement seines (Memphis Net & Twine)	153.00	1	153.00
Ethanol (20 L)	71.40	3	214.20
Sample vials	3.57	25	89.25
	Subtotal		**$456**
	Task 2 Total		**$14,391**

Task 3: Sample fishes exiting the Stewart Lake outlet during draw down with a picket weir

	Rate	Hours/Units	Cost
Labor			
Project Leader	36.19	40	1447.58
Biologist II	33.78	120	4053.89
Journey Maintenance/Construction Specialist	27.19	80	2175.46
Technician II (Field Supervisor)	24.28	20	485.52
Technician II (Assistant Crew Leader)	17.83	120	2139.55
Technician I	16.55	160	2648.74
	Subtotal		**$12,951**
Travel			
2 trucks @ 10% of annual use[a]	13872.00	0.1	1387.20
Per diem (8 day trips x 3 people)	13.00	24	312.00
	Subtotal		**$1,699**
	Task 3 Total		**$14,650**

Task 4: Data entry, analysis and reporting

	Rate	Hours/Units	Cost
Labor			
Project Leader	36.19	20	723.79
Biologist II	33.78	80	2702.59
Technician II (Assistant Crew Leader)	17.83	80	1426.37
	Task 4 Total		**$4,853**
	FY 2017 Total		**$46,985**

FY 2018

Task 1: Install, operate and maintain a picket weir in the Stewart Lake outlet

	Rate	Hours/Units	Cost
Labor			
Project Leader	36.91	20	738.27
Biologist II	34.46	80	2756.64
Journey Maintenance/Construction Specialist	27.74	80	2218.97
Technician II (Field Supervisor)	24.76	20	495.23
Technician II (Assistant Crew Leader)	18.19	80	1454.90
Technician I	16.89	120	2026.28
		Subtotal	**$9,690**
Travel			
2 trucks @ 5% of annual use[a]	14149.44	0.05	707.47
Per diem (6 day trips and 2 overnights x 4 people)	20.29	32	649.21
		Subtotal	**$1,357**
Equipment			
Weir supplies[b]			1092.42
Misc. sampling equipment[c]			1214.15
		Subtotal	**$2,307**
		Task 1 Total	**$13,354**

Task 2: Sample the fish community in the Stewart Lake wetland and monitor post-connection

	Rate	Hours/Units	Cost
Labor			
Project Leader	36.91	40	1476.54
Biologist II	34.46	120	4134.97
Technician II (Field Supervisor)	24.76	40	990.46
Technician II (Assistant Crew Leader)	18.19	120	2182.34
Technician I	16.89	200	3377.14
		Subtotal	**$12,161**
Travel			
2 trucks @ 10% of annual use[a]	14149.44	0.1	1414.94
Per diem (16 day trips x 3 people)	13.26	48	636.48
		Subtotal	**$2,051**
Equipment			
Replacement seines (Memphis Net & Twine)	156.06	1	156.06
Ethanol (20 L)	72.83	3	218.48
Sample vials	3.64	25	91.04
		Subtotal	**$466**
		Task 2 Total	**$14,678**

Task 3: Sample fishes exiting the Stewart Lake outlet during draw down with a picket weir

	Rate	Hours/Units	Cost
Labor			
Project Leader	36.91	40	1476.54
Biologist II	34.46	120	4134.97
Journey Maintenance/Construction Specialist	27.74	80	2218.97
Technician II (Field Supervisor)	24.76	20	495.23
Technician II (Assistant Crew Leader)	18.19	120	2182.34
Technician I	16.89	160	2701.71
		Subtotal	**$13,210**
Travel			
2 trucks @ 10% of annual use[a]	14149.44	0.1	1414.94
Per diem (8 day trips x 3 people)	13.26	24	318.24
		Subtotal	**$1,733**
		Task 3 Total	**$14,943**

Task 4: Data entry, analysis and reporting

	Rate	Hours/Units	Cost
Labor			
Project Leader	36.91	20	738.27
Biologist II	34.46	80	2756.64
Technician II (Assistant Crew Leader)	18.19	80	1454.90
		Task 4 Total	**$4,950**
		FY 2018 Total	**$47,925**

FY 2019

Task 1: Install, operate and maintain a picket weir in the Stewart Lake outlet

	Rate	Hours/Units	Cost
Labor			
Project Leader	37.65	20	753.03
Biologist II	35.15	80	2811.78
Journey Maintenance/Construction Specialist	28.29	80	2263.34
Technician II (Field Supervisor)	25.26	20	505.14
Technician II (Assistant Crew Leader)	18.55	80	1483.99
Technician I	17.22	120	2066.81
		Subtotal	**$9,884**
Travel			
2 trucks @ 5% of annual use[a]	14432.43	0.05	721.62
Per diem (6 day trips and 2 overnights x 4 people)	20.69	32	662.19
		Subtotal	**$1,384**
Equipment			

Weir supplies[b]		1114.27
Misc. sampling equipment[c]		1238.43
	Subtotal	**$2,353**
	Task 1 Total	**$13,621**

Task 2: Sample the fish community in the Stewart Lake wetland and monitor post-connection

	Rate	Hours/Units	Cost
Labor			
Project Leader	37.65	40	1506.07
Biologist II	35.15	120	4217.67
Technician II (Field Supervisor)	25.26	40	1010.27
Technician II (Assistant Crew Leader)	18.55	120	2225.99
Technician I	17.22	200	3444.68
	Subtotal		**$12,405**
Travel			
2 trucks @ 10% of annual use[a]	14432.43	0.1	1443.24
Per diem (16 day trips x 3 people)	13.53	48	649.21
	Subtotal		**$2,092**
Equipment			
Replacement seines (Memphis Net & Twine)	159.18	1	159.18
Ethanol (20 L)	74.28	3	222.85
Sample vials	3.71	25	92.86
	Subtotal		**$475**
	Task 2 Total		**$14,972**

Task 3: Sample fishes exiting the Stewart Lake outlet during draw down with a picket weir

	Rate	Hours/Units	Cost
Labor			
Project Leader	37.65	40	1506.07
Biologist II	35.15	120	4217.67
Journey Maintenance/Construction Specialist	28.29	80	2263.34
Technician II (Field Supervisor)	25.26	20	505.14
Technician II (Assistant Crew Leader)	18.55	120	2225.99
Technician I	17.22	160	2755.74
	Subtotal		**$13,474**
Travel			
2 trucks @ 10% of annual use[a]	14432.43	0.1	1443.24
Per diem (8 day trips x 3 people)	13.53	24	324.60
	Subtotal		**$1,768**
	Task 3 Total		**$15,242**

Task 4: Data entry, analysis and reporting

	Rate	Hours/Units	Cost
Labor			
Project Leader	37.65	20	753.03
Biologist II	35.15	80	2811.78
Technician II (Assistant Crew Leader)	18.55	80	1483.99
		Task 4 Total	**$5,049**
		FY 2019 Total	**$48,883**

FY 2020

Task 1: Install, operate and maintain a picket weir in the Stewart Lake outlet

	Rate	Hours/Units	Cost
Labor			
Project Leader	38.40	20	768.09
Biologist II	35.85	80	2868.01
Journey Maintenance/Construction Specialist	28.86	80	2308.61
Technician II (Field Supervisor)	25.76	20	515.24
Technician II (Assistant Crew Leader)	18.92	80	1513.67
Technician I	17.57	120	2108.14
		Subtotal	**$10,082**
Travel			
2 trucks @ 5% of annual use[a]	14721.08	0.05	736.05
Per diem (6 day trips and 2 overnights x 4 people)	21.11	32	675.44
		Subtotal	**$1,411**
Equipment			
Weir supplies[b]			1136.55
Misc. sampling equipment[c]			1263.20
		Subtotal	**$2,400**
		Task 1 Total	**$13,893**

Task 2: Sample the fish community in the Stewart Lake wetland and monitor post-connection

	Rate	Hours/Units	Cost
Labor			
Project Leader	38.40	40	1536.19
Biologist II	35.85	120	4302.02
Technician II (Field Supervisor)	25.76	40	1030.48
Technician II (Assistant Crew Leader)	18.92	120	2270.51
Technician I	17.57	200	3513.57

	Subtotal		**$12,653**
Travel			
2 trucks @ 10% of annual use[a]	14721.08	0.1	1472.11
Per diem (16 day trips x 3 people)	13.80	48	662.19
	Subtotal		**$2,134**
Equipment			
Replacement seines (Memphis Net & Twine)	162.36	1	162.36
Ethanol (20 L)	75.77	3	227.31
Sample vials	3.79	25	94.71
	Subtotal		**$484**
	Task 2 Total		**$15,271**

Task 3: Sample fishes exiting the Stewart Lake outlet during draw down with a picket weir

	Rate	Hours/Units	Cost
Labor			
Project Leader	38.40	40	1536.19
Biologist II	35.85	120	4302.02
Journey Maintenance/Construction Specialist	28.86	80	2308.61
Technician II (Field Supervisor)	25.76	20	515.24
Technician II (Assistant Crew Leader)	18.92	120	2270.51
Technician I	17.57	160	2810.86
	Subtotal		**$13,743**
Travel			
2 trucks @ 10% of annual use[a]	14721.08	0.1	1472.11
Per diem (8 day trips x 3 people)	13.80	24	331.10
	Subtotal		**$1,803**
	Task 3 Total		**$15,547**

Task 4: Data entry, analysis and reporting

	Rate	Hours/Units	Cost
Labor			
Project Leader	38.40	20	768.09
Biologist II	35.85	80	2868.01
Technician II (Assistant Crew Leader)	18.92	80	1513.67
	Task 4 Total		**$5,150**
	FY 2020 Total		**$49,861**

IX. Budget Summary:

FY 2016	$46,082
FY 2017	$46,985
FY 2018	$47,925
FY 2019	$48,883
FY 2020	$49,861
TOTAL	**$239,736**

X. Reviewers:

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Valdez, R.A., and P. Nelson. 2004. Green River Subbasin Floodplain Management Plan. Upper Colorado River Endangered Fish Recovery Program, Project Number C-6, Denver, CO.