RECOVERY PROGRAM Recovery Program Project Number: 123b
FY 2018-2019 SCOPE OF WORK for:

Nonnative Fish Control in the Middle Green River

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

Lead agency: Utah Division of Wildlife Resources

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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: Nonnative Fish Control 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.	Evaluate the effectiveness (e.g., nonnative and native fish response) and develop and implement and integrated, viable active control program.

GREEN RIVER ACTION PLAN: MAINSTEM

III.	Reduce impacts of nonnative fishes and sportfish management activities (nonnative and sportfish management).
III.A.	Reduce negative impacts to endangered fishes from sportfish management activities.
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. Each

control activity will be evaluated for effectiveness, and then continued as needed.

III.A.4.a. Northern pike in the middle Green River.

III.A.4.b. (3) Smallmouth bass in the middle and lower Green River.

III. Study Background/Rationale and Hypotheses:

The Upper Colorado River Endangered Fish Recovery Program has determined that control of nonnative fish in the upper Colorado River basin is essential to the recovery of the four endangered fish species: Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), humpback chub (*Gila cypha*), and bonytail (*Gila elegans*). This determination has been documented specifically for Colorado pikeminnow, razorback sucker, and bonytail in nursery habitats and in the mainstem middle Green River in Section 4.3.2 of each species' Recovery Goals document (USFWS 2002).

Smallmouth bass (*Micropterus dolomieu*) abundance has dramatically increased in the Green River since 2000. This increase resulted in a recommendation from the December 2003 Nonnative Fish Control Workshop (Grand Junction, CO) to attempt control of this species in the Green River. Three years of removal, from 2004-2006 and annual Nonnative Fish Control Workshops have added to the knowledge base of the effort required to successfully remove smallmouth bass from the Green River. During the December 2006 workshop, participants discussed the importance of increasing this removal effort and discussed the need for a significant increase to adequately suppress the middle Green River smallmouth bass population. The increased removal effort began in 2007 and will continue through subsequent years. Several adjustments were made in 2012 to increase our effectiveness and efficiency (Skorupski and Breen 2012). During the second full pass, it was apparent that multiple smallmouth bass concentration areas were present, due to a high spawning success under low flow conditions. Thus, we used an adaptive fisheries management strategy to target "hot spots" maximizing our catches with the funds and time available; "hot spots" vary season to season. Our adjustments were extremely successful, producing high catch rates (>100 fish/hr) and removing 15,624 smallmouth bass in 2012. In the future, full passes will identify concentration areas and remaining effort will be allocated as necessary to maximize removal efficiency within a 16-week period.

Northern pike (*Esox lucius*) are a significant predatory and competitive threat to the endangered fishes and were rated as one of the six nonnative species of greatest concern by experts on the Colorado River native fish assemblage (Hawkins and Nesler 1991). Northern pike became established in the Yampa River in the early 1980's. Originally introduced as game fish in Elkhead Reservoir in 1977, the species escaped and invaded the upper Yampa River and have expanded their number and range within the Yampa and Green rivers (Tyus and Beard 1990). In previous years, there has been evidence of successful spawning in Stewart Lake near Jensen, Utah and in Old Charlie Wash on the Ouray National Wildlife Refuge (K. Christopherson, Division of Wildlife Northeastern Regional Supervisor, pers. comm.; T. Modde, U.S. Fish and Wildlife Service, Project Leader, pers. comm.). A control program for northern pike in the Yampa River was initiated in 1999 and removal of northern pike in the middle Green River was initiated in 2001. Based on trends in catch rates over subsequent

years, removal efforts have been successful at reducing the number of northern pike and maintaining this reduced level in the middle Green River. However, in 2012 more than three times as many northern pike were captured than in 2011 (Skorupski and Breen 2011) and most were in a smaller size class, likely representing age-1 fish. This large age class likely represents a high level of spawning success in 2011. High flows created additional habitat during the spring in the middle Green River, which allowed for a more successful spawning year for northern pike. Future effort will be adaptive to target northern pike in concentration areas during the spring to maximize efficiency, including exploratory removal efforts in areas where northern pike are being reported.

White sucker (*Catostomus commersoni*) are present in the middle Green River, and their successful reproduction seems less flow-dependent than that of native suckers. For example, in years when native sucker abundance is low, white sucker seem to be just as prevalent. The species is problematic due to its ability to hybridize with native suckers (McDonald et al. 2008) and compete with native suckers for limited resources. In southwestern Missouri, white suckers become mature around 275 mm (Wakefield and Beckman 2005). Because of this, our goal for removing white suckers is to keep the average total length of the white sucker population less than 275 mm. Although 275 mm is the target benchmark, we will evaluate this value in fish collected in subsequent years by dissection. This may not address their ability to compete with native suckers; however, it should limit their ability to hybridize with native catostomids. The Duck Lakes in Brown's Park were identified in 2014 as a potential source population for White Sucker (Schelly et al. 2014), and follow up sampling took place in the fall of 2015 to better understand the scope of the problem (Schelly et al. 2015). Based on 2015 sampling, additional surveys were not necessary in 2016. However, we have moved forward with engineer consultation for wetland renovations to eliminate fish escapement in the future, and we have moved forward with funding requests (Watershed Restoration Initiative). Treatment of these ponds will be required prior to renovation (hopeful for 2018).

At the 2013 Nonnative Fish Workshop, walleye (*Sander vitreus*) were identified as a substantial threat to the recovery of endangered fishes in the upper Colorado River basin, due to increasing densities and the predatory and competitive pressure this species imposes. However, there was not a removal program in place that focuses on walleye when they are most vulnerable to capture. Recent observations of increasing densities have mainly come from ancillary captures during Colorado pikeminnow population estimates (project #128), which typically occur earlier in the spring than smallmouth bass removal and in only three out of every five years. Therefore, our future efforts will apply adaptive strategies to target walleye when other projects are not in place for adequate removal efforts. For example, future walleye removal efforts will focus on key spawning temperatures and fluctuations in flow that may allow for maximum effectiveness, as well as targeting concentration areas for walleye (i.e., spawning bars in Dinosaur National Monument, and below the White River confluence to Sandwash).

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

Goal: Sufficiently reduce the abundance of adult smallmouth bass, northern pike, white sucker, and walleye in the middle Green River such that their potential to spawn and their predatory

and competitive impacts on the growth, recruitment, and survival of endangered and other native fishes is minimized.

Objectives:

1. Conduct two smallmouth bass removal passes in the middle Green River from Split Mountain boat ramp to Tabyago Riffle. Full passes will identify concentration areas that will be focused on for the remainder of the field work. Smallmouth bass will be specifically targeted through boat electrofishing (approximately 16 weeks of effort; incidental captures occurring during other projects will also be recorded).

2. Conduct northern pike removal in the middle Green River in concentration areas to maximize efficiency. Northern pike will be targeted specifically in tributary habitats via netting and electrofishing during fluctuating spring flows (~8-10 weeks of effort; incidental captures occurring during other projects will also be recorded).

3. Conduct white sucker removal in the middle Green River to minimize the threat of hybridization with native fishes. White sucker will be targeted specifically in tributary habitats via netting and electrofishing during fluctuating spring flows (~8-10 weeks of effort; incidental captures occurring during other projects will also be recorded).

4. Conduct walleye removal in the mainstem middle Green River using adaptive strategies to target this species when other projects are not in place for adequate removal efforts. Walleye will be targeted in main channel habitats during early spring (~6-8 weeks of effort during off years for project #128, ~2 weeks during on years; incidental captures occurring during other projects will also be recorded).

Revisions from previous SOW: Total budget for the SOW increased because of salary increases and increased cost of equipment.

V. Study Area:

The study area encompasses the middle Green River from Split Mountain boat ramp (RM 319.3) to Tabyago Riffle (RM 206.8). Effort will focus on concentration areas identified during full passes. We will also sample off channel habitats for northern pike and white sucker just prior to and immediately after ice-off to document spawning and remove ripe adults.

VI. Study Methods/Approach:

Temporarily reducing riverine smallmouth bass and northern pike populations appears viable under certain environmental conditions but both species can easily reverse these reductions in population abundance and return to pre-removal abundances under favorable environmental conditions (Breton et al. 2014; Zelasko et al. 2015). Therefore, mechanical removal efforts will attempt to reach eradication of nonnative fish populations in the river. However, recent synthesis reports investigating effectiveness of in-river removal efforts for northern pike and smallmouth bass determined that reducing in-river populations of these two species would not

be successful unless in-river reproduction and reservoir escapement were controlled (Breton et al. 2014; Zelasko et al. 2015). Therefore, mechanical removal efforts will continue to temporarily suppress riverine populations, and will focus on reducing in-river reproduction when feasible. Simultaneously, Program partners will work on other means to reduce in-river reproduction and reservoir escapement (i.e., barriers at Red Fleet and Starvation reservoirs), in order to make mechanical removal more effective and to attempt to reach complete eradication of riverine populations.

Smallmouth bass will be removed primarily by electrofishing. Sampling crews will conduct removal activities in a manner that minimizes potential negative impacts to endangered fish. This includes discontinuing electrofishing when elevated numbers of endangered fish are known to be present. Situations when this is likely to occur will be when Colorado pikeminnow are staging in tributary mouths or backwater habitats prior to spawning, when razorback sucker are on or near spawning bars, and following recent stocking of endangered fish. Two electrofishing boats will simultaneously electrofish each shoreline of the river. Electrofishing passes will be conducted when spring peak flows recede below 10,000 cfs. Effort will be focused on shoreline habitat that is likely to contain smallmouth bass. Two full passes will extend from Split Mountain boat ramp to Tabyago Riffle. Effort for the remaining 12 weeks will be allocated to concentration areas identified during complete passes (such as Split Mountain, Ouray National Wildlife Refuge, and below the White River). Fish lengths and weights will be recorded on each pass. All smallmouth bass will be disposed of on site. All northern pike, white sucker, and walleye collected during smallmouth bass removal will be removed and disposed of as well.

Initial bass removal efforts (i.e., June electrofishing) may serve to identify concentrations of spawning fish. These areas will receive additional electrofishing effort in subsequent passes. If ripe fish or nesting males are encountered, additional effort will be spent at that time to capture other potential spawning or nesting fish in that area. Two methods will be used in an attempt to identify bass spawning periods and locations. First, crews will examine shoreline areas for nests and destroy any found; crews will also examine all bass captured in the first few passes for spawning condition. Further effort may also give an indication as to the presence of young-of-year (YOY) bass. Locations of congregations of YOY bass will be noted and these areas will receive additional electrofishing effort as well in an effort to displace YOY bass.

In addition, smallmouth bass will be removed from Island Park to Rainbow Park in Dinosaur National Monument. In collaboration with GRBFWCO and UDWR—Moab, 2014 served as an initial experiment to conduct a “surge” effort in this reach to maximize nest disturbance during the active spawning period. Three passes per week were conducted in this reach over a three week period (combined efforts of UDWR and Vernal—CRFP). This surge effort has proven to be effective in removing concentrations of spawning adult smallmouth bass and will be continued.

Known concentration areas for northern pike and white sucker in the middle Green River during spring include: the mouth of Brush Creek (RM 304.5), Cliff Creek (RM 302.9), Stewart Lake Drain (RM 300.0) and Ashley Creek (RM 299.0). These areas and additional backwater/low-velocity habitats as needed will be targeted for removal of northern pike and

white sucker. Removal will primarily be completed with the use of fyke nets and boat electrofishing. Sampling methods will be adjusted depending on whether difficulties arise (i.e., otters in the fyke nets, high flows, etc.). We will also evaluate white sucker reproductive maturity because of the limited information on these fish specific to the upper Colorado River basin. All white suckers over 250 mm will be dissected to observe their reproductive organs. We will determine the sex of each fish and whether they are reproductively mature and ripe at the time of sampling.

Walleye removal efforts will be an adaptive process using past capture locations to identify concentration areas. Given what we know from past captures, removal efforts will focus on the time period from March until May, with consideration for specific temperatures and flow conditions, as well as for locations where potential spawning bars are located (i.e., Split Mountain reach). Effort will be added in years that do not have Colorado pikeminnow population estimate work ongoing (project 128).

Nonnative removal and evaluation efforts, which includes tagging and marking of endangered and target nonnative fishes, are also being conducted by other researchers and agencies in other reaches of the Green and Yampa Rivers. Therefore, sampling crews will examine all captured endangered and target nonnative fish for tags or marks and record pertinent information. This information will then be reported to pertinent principal investigators and included in annual reporting, and will also be provided to the Recovery Program for submission to the STReaMS database.

Besides targeted smallmouth bass, northern pike, white sucker, and walleye, all nonnative fish encountered during sampling will be removed except for common carp (*Cyprinus carpio*), channel catfish (*Ictalurus punctatus*), and small-bodied cyprinids. Nonnative fishes that will be removed include, but are not limited to green sunfish (*Lepomis cyanellus*), black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), gizzard shad (*Dorosoma cepedianum*), and potentially burbot (*Lota lota*). Otolith structures will be collected from specific nonnative species (burbot, walleye, etc.) upon Upper Colorado River Recovery Program request.

All endangered fishes captured during nonnative removal projects will be scanned for a PIT tag, tagged if needed, weighed (g), measured TL (mm), and released alive.

VII. Task Description and Schedule:

Task 1. Northern pike, white sucker, and walleye removal
Task 2. Smallmouth bass removal
Task 3. 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	X	X		
3										X	X	X

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

FY 2018

Task 1. Northern pike, white sucker, and walleye removal.

	Rate	Hours/Units	Cost
Labor			
Project Leader	36.95	140	5173.00
Biologist II	33.77	300	10131.00
Journey Maintenance/Construction Specialist	34.34	250	8585.00
Biologist I	32.70	480	15696.00
Technician II	18.19	500	9093.10
Technician I	16.89	400	6754.28
Shuttle Drivers	17.25	150	2587.47
		Subtotal	**$58,020**
Travel			
3 trucks @ 10% of annual use[a]	24000.00	0.1	2400.00
Per diem (18 day trips x 3 people; 3 overnights x 4 people) (20 day trips x 4 people for walleye removal)	16.22	146	2368.12
		Subtotal	**$4,768**
Equipment			
Boat fuel (gallons)	4.00	366	1464.00
Boat oil (quarts)	11.00	24	264.00
Replacement props	150.00	30	4500.00
Fyke nets (Memphis Net & Twine)	900.00	1	900.00
Gillnets/trammel nets (Memphis Net & Twine)	600.00	1	600.00
Electrofishing repair supplies[b]			1000.00
Boat/motor repair and maintenance[c]			1150.00
Sampling equipment[d]			2705.00
Camping supplies[e]			1110.00
		Subtotal	**$13,693**
		Task 1 Total	**$76,481**

Task 2. Smallmouth bass removal.

	Rate	Hours/Units	Cost
Labor			
Project Leader	36.95	100	3695.00
Biologist II	33.77	100	3377.00
Journey Maintenance/Construction Specialist	34.34	1000	34340.00
Biologist I	32.70	640	20928.00
Technician II	18.19	320	5819.58
Technician I	16.89	2000	33771.38
Shuttle Drivers	17.25	640	11039.89
		Subtotal	**$112,971**

Travel			
3 trucks @ 60% of annual use[a]	24000.00	0.6	14400.00
Per diem (32 day trips; 24 overnights x 4 people)	25.57	224	5727.68
	Subtotal		**$20,128**
Equipment			
Boat fuel (gallons)	4.00	1536	6144.00
Boat oil (quarts)	11.00	72	792.00
Replacement water pump/impeller kit	125.00	15	1875.00
Replacement fuel pumps	75.00	2	150.00
Fuel stabilizer	30.00	15	450.00
Oxygen sensor	280.00	2	560.00
Fuel injector	125.00	2	250.00
Steering helm assembly	250.00	2	500.00
Replacement lower units	1200.00	2	2400.00
Replacement gear box/remote assembly	475.00	2	950.00
Lower unit oil (5 gallons)	160.00	1	160.00
Electrofishing control box (ETS Electrofishing)	5945.00	1	5945.00
ETS converter box for EU7000IS generator	750.00	1	750.00
Honda generator EU7000IS	4000.00	2	8000.00
Honda 50-hp outboard motor	6600.00	1	6600.00
Seasonal housing (monthly rent)	1200.00	9	10800.00
Electrofishing repair supplies[b]			1350.00
Boat/motor repair and maintenance[c]			3150.00
Sampling equipment[d]			3445.00
Camping supplies[e]			2374.00
	Subtotal		**$56,645**
	Task 2 Total		**$189,744**

Task 3. Data entry, analysis, and reporting.

	Rate	Hours/Units	Cost
Labor			
Project Leader	36.95	40	1478.00
Biologist II	33.77	80	2701.60
Biologist I	32.70	80	2616.00
Computer fees/year[f]	1800.00	5	9000.00
Phone fees/year[f]	800.00	4	3200.00
	Task 3 Total		**$18,996**
	FY 2018 TOTAL		**$285,220**

(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) Electrofishing repair supplies include, but are not limited to anode/boom repairs & replacement ($750), electrofishing safety mats (Tapeswitch-2 @ $300/each), electrofishing plugs/connectors ($500), annual electrofisher service ($500).

(c) Boat/motor repair and maintenance includes, but is not limited to oil filters (15 @ $20/each), miscellaneous small motor parts/repair ($1000), shop supplies/tools/safety gear ($1000), miscellaneous trailer repairs & wiring ($2000).
(d) Sampling equipment includes, but is not limited to batteries ($500), waders (Simms-2 @ $400/each), nets (Cummins-24 @ $50/each), vials/envelopes/paper/notebooks (Forestry suppliers-$250), data logger service (Juniper Systems-$500), sunscreen/bugspray ($500), first-aid supplies ($300), water quality meter (YSI-$800), scale ($400), GPS unit (Garmin-$400), livewell/buckets/measuring boards/PIT reader service ($500)
(e) Camping supplies include, but are not limited to a cooler (NRS-$450), tents (REI-3@$150/each), sleeping pads (Aire-2 @$150), stove ($200), rolla table ($100), dry bags (2 @$80 & 2 @$30), chairs (3@$20/each), cooking utensils & general supplies/propane/toilet supplies ($500), straps (NRS-$100), satellite phone charges (2 @ $46/month=$1,104).

(f) Computer and phone fees are the average costs for each permanent employee.

FY 2019

Task 1. Northern pike, white sucker, and walleye removal.

	Rate	Hours/Units	Cost
Labor			
Project Leader	37.69	140	5276.46
Biologist II	34.45	300	10333.62
Journey Maintenance/Construction Specialist	35.03	250	8756.70
Biologist I	33.35	480	16009.92
Technician II	18.55	500	9274.96
Technician I	17.22	400	6889.36
Shuttle Drivers	17.59	150	2639.22
		Subtotal	**$59,180**
Travel			
3 trucks @ 10% of annual use[a]	24480.00	0.1	2448.00
Per diem (18 day trips x 3 people; 3 overnights x 4 people) (20 day trips x 4 people for walleye removal)	20.81	146	3038.26
		Subtotal	**$5,486**
Equipment			
Boat fuel (gallons)	4.08	366	1493.28
Boat oil (quarts)	11.22	24	269.28
Replacement props	153.00	30	4590.00
Fyke nets (Memphis Net & Twine)	918.00	1	918.00
Gillnets/trammel nets (Memphis Net & Twine)	612.00	2	1224.00
Electrofishing repair supplies[b]			1020.00
Boat/motor repair and maintenance[c]			1173.00
Sampling equipment[d]			2759.10
Camping supplies[e]			1132.20
		Subtotal	**$14,579**
		Task 1 Total	**$79,245**

Task 2. Smallmouth bass removal.

	Rate	Hours/Units	Cost
Labor			
Project Leader	37.69	100	3768.90
Biologist II	34.45	100	3444.54
Journey Maintenance/Construction Specialist	35.03	1000	35026.80
Biologist I	33.35	640	21346.56
Technician II	18.55	320	5935.97
Technician I	17.22	2000	34446.81
Shuttle Drivers	17.59	640	11260.69
		Subtotal	**$115,230**
Travel			
3 trucks @ 60% of annual use[a]	24480.00	0.6	14688.00
Per diem (32 day trips; 24 overnights x 4 people)	26.08	224	5842.23
		Subtotal	**$20,530**
Equipment			
Boat fuel (gallons)	4.08	1536	6266.88
Boat oil (quarts)	11.22	72	807.84
Replacement water pump/impeller kit	127.50	15	1912.50
Replacement fuel pumps	76.50	2	153.00
Fuel stabilizer	30.60	15	459.00
Oxygen sensor	285.60	2	571.20
Fuel injector	127.50	2	255.00
Steering helm assembly	255.00	2	510.00
Replacement lower units	1224.00	2	2448.00
Replacement gear box/remote assembly	484.50	2	969.00
Lower unit oil (5 gallons)	163.20	1	163.20
Electrofishing control box (ETS Electrofishing)	6063.90	0	0.00
ETS converter box for EU7000IS generator	765.00	0	0.00
Honda generator EU7000IS	4080.00	1	4080.00
Honda 50-hp outboard motor	6732.00	1	6732.00
Seasonal housing (monthly rent)	1224.00	9	11016.00
Electrofishing repair supplies[b]			1000.00
Boat/motor repair and maintenance[c]			3213.00
Sampling equipment[d]			2711.00
Camping supplies[e]			2421.48
		Subtotal	**$45,689**
		Task 2 Total	**$181,450**

Task 3. Data entry, analysis, and reporting.			
	Rate	Hours/Units	Cost
Labor			
Project Leader	37.69	40	1507.56
Biologist II	34.45	80	2755.63
Biologist I	33.35	80	2668.32
Computer fees/year[f]	1836.00	5	9180.00
Phone fees/year[f]	816.00	4	3264.00
		Task 3 Total	**$19,376**
		FY 2019 TOTAL	**$280,070**

FY 2020

Task 1. Northern pike, white sucker, and walleye removal.			
	Rate	Hours/Units	Cost
Labor			
Project Leader	38.44	140	5381.99
Biologist II	35.13	300	10540.29
Journey Maintenance/Construction Specialist	35.73	250	8931.83
Biologist I	34.02	480	16330.12
Technician II	18.92	500	9460.46
Technician I	17.57	400	7027.15
Shuttle Drivers	17.95	150	2692.01
		Subtotal	**$60,364**
Travel			
3 trucks @ 10% of annual use[a]	24969.60	0.1	2496.96
Per diem (18 day trips x 3 people; 3 overnights x 4 people)	21.23	146	3099.03
(20 day trips x 4 people for walleye removal)		**Subtotal**	**$5,596**
Equipment			
Boat fuel (gallons)	4.16	366	1523.15
Boat oil (quarts)	11.44	24	274.67
Replacement props	156.06	30	4681.80
Fyke nets (Memphis Net & Twine)	936.36	0	0.00
Gillnets/trammel nets (Memphis Net & Twine)	624.24	1	624.24
Electrofishing repair supplies[b]			1040.40
Boat/motor repair and maintenance[c]			1196.46
Sampling equipment[d]			2814.28
Camping supplies[e]			1154.84
		Subtotal	**$13,310**
		Task 1 Total	**$79,270**

Task 2. Smallmouth bass removal.

	Rate	Hours/Units	Cost
Labor			
Project Leader	38.44	100	3844.28
Biologist II	35.13	100	3513.43
Journey Maintenance/Construction Specialist	35.73	1000	35727.34
Biologist I	34.02	640	21773.49
Technician II	18.92	320	6054.69
Technician I	17.57	2000	35135.75
Shuttle Drivers	17.95	640	11485.90
		Subtotal	**$117,535**
Travel			
3 trucks @ 60% of annual use[a]	24969.60	0.6	14981.76
Per diem (32 day trips; 24 overnights x 4 people)	26.60	224	5959.08
		Subtotal	**$20,941**
Equipment			
Boat fuel (gallons)	4.16	1536	6392.22
Boat oil (quarts)	11.44	72	824.00
Replacement water pump/impeller kit	130.05	15	1950.75
Replacement fuel pumps	78.03	2	156.06
Fuel stabilizer	31.21	15	468.18
Oxygen sensor	291.31	2	582.62
Fuel injector	130.05	2	260.10
Steering helm assembly	260.10	2	520.20
Replacement lower units	1248.48	2	2496.96
Replacement gear box/remote assembly	494.19	2	988.38
Lower unit oil (5 gallons)	166.46	1	166.46
Electrofishing control box (ETS Electrofishing)	6185.18	1	6185.18
ETS converter box for EU7000IS generator	780.30	1	780.30
Honda generator EU7000IS	4161.60	0	0.00
Honda 50-hp outboard motor	6866.64	1	6866.64
Seasonal housing (monthly rent)	1248.48	9	11236.32
Electrofishing repair supplies[b]			1020.00
Boat/motor repair and maintenance[c]			3277.26
Sampling equipment[d]			2973.00
Camping supplies[e]			2469.91
		Subtotal	**$49,615**
		Task 2 Total	**$188,090**

Task 3. Data entry, analysis, and reporting.			
	Rate	Hours/Units	Cost
Labor			
Project Leader	38.44	40	1537.71
Biologist II	35.13	80	2810.74
Biologist I	34.02	80	2721.69
Computer fees/year[f]	1872.72	5	9363.60
Phone fees/year[f]	832.32	4	3329.28
		Task 3 Total	**$19,763**
		FY 2020 TOTAL	**$287,123**

FY 2021

Task 1. Northern pike, white sucker, and walleye removal.			
	Rate	Hours/Units	Cost
Labor			
Project Leader	39.21	140	5489.63
Biologist II	35.84	300	10751.10
Journey Maintenance/Construction Specialist	36.44	250	9110.47
Biologist I	34.70	480	16656.72
Technician II	19.30	500	9649.67
Technician I	17.92	400	7167.69
Shuttle Drivers	18.31	150	2745.85
		Subtotal	**$61,571**
Travel			
3 trucks @ 10% of annual use[a]	25468.99	0.1	2546.90
Per diem (18 day trips x 3 people; 3 overnights x 4 people)	21.65	146	3161.01
(20 day trips x 4 people for walleye removal)		**Subtotal**	**$5,708**
Equipment			
Boat fuel (gallons)	4.24	366	1553.61
Boat oil (quarts)	11.67	24	280.16
Replacement props	159.18	30	4775.44
Fyke nets (Memphis Net & Twine)	955.09	1	955.09
Gillnets/trammel nets (Memphis Net & Twine)	636.72	2	1273.45
Electrofishing repair supplies[b]			1061.21
Boat/motor repair and maintenance[c]			1220.39
Sampling equipment[d]			2987.00
Camping supplies[e]			1177.94
		Subtotal	**$15,284**
		Task 1 Total	**$82,563**

Task 2. Smallmouth bass removal.

	Rate	Hours/Units	Cost
Labor			
Project Leader	39.21	100	3921.16
Biologist II	35.84	100	3583.70
Journey Maintenance/Construction Specialist	36.44	1000	36441.88
Biologist I	34.70	640	22208.96
Technician II	19.30	320	6175.79
Technician I	17.92	2000	35838.46
Shuttle Drivers	18.31	640	11715.62
		Subtotal	**$119,886**
Travel			
3 trucks @ 60% of annual use[a]	25468.99	0.6	15281.40
Per diem (32 day trips; 24 overnights x 4 people)	27.14	224	6078.26
		Subtotal	**$21,360**
Equipment			
Boat fuel (gallons)	4.24	1536	6520.06
Boat oil (quarts)	11.67	72	840.48
Replacement water pump/impeller kit	132.65	15	1989.77
Replacement fuel pumps	79.59	2	159.18
Fuel stabilizer	31.84	15	477.54
Oxygen sensor	297.14	2	594.28
Fuel injector	132.65	2	265.30
Steering helm assembly	265.30	2	530.60
Replacement lower units	1273.45	2	2546.90
Replacement gear box/remote assembly	504.07	2	1008.15
Lower unit oil (5 gallons)	169.79	1	169.79
Electrofishing control box (ETS Electrofishing)	6308.88	0	0.00
ETS converter box for EU7000IS generator	795.91	0	0.00
Honda generator EU7000IS	4244.83	1	4244.83
Honda 50-hp outboard motor	7003.97	1	7003.97
Seasonal housing (monthly rent)	1273.45	9	11461.05
Electrofishing repair supplies[b]			1040.40
Boat/motor repair and maintenance[c]			3342.81
Sampling equipment[d]			2704.00
Camping supplies[e]			2519.31
		Subtotal	**$47,418**
		Task 2 Total	**$188,664**

Task 3. Data entry, analysis, and reporting.			
	Rate	Hours/Units	Cost
Labor			
Project Leader	39.21	40	1568.47
Biologist II	35.84	80	2866.96
Biologist I	34.70	80	2776.12
Computer fees/year[f]	1910.17	5	9550.87
Phone fees/year[f]	848.97	4	3395.87
		Task 3 Total	**$20,158**
		FY 2021 TOTAL	**$291,385**

FY 2022

Task 1. Northern pike, white sucker, and walleye removal.			
	Rate	Hours/Units	Cost
Labor			
Project Leader	40.00	140	5599.42
Biologist II	36.55	300	10966.12
Journey Maintenance/Construction Specialist	37.17	250	9292.68
Biologist I	35.40	480	16989.86
Technician II	19.69	500	9842.66
Technician I	18.28	400	7311.05
Shuttle Drivers	18.67	150	2800.77
		Subtotal	**$62,803**
Travel			
3 trucks @ 10% of annual use[a]	25978.37	0.1	2597.84
Per diem (18 day trips x 3 people; 3 overnights x 4 people)	22.08	146	3224.23
(20 day trips x 4 people for walleye removal)		**Subtotal**	**$5,822**
Equipment			
Boat fuel (gallons)	4.33	366	1584.68
Boat oil (quarts)	11.91	24	285.76
Replacement props	162.36	30	4870.94
Fyke nets (Memphis Net & Twine)	974.19	1	974.19
Gillnets/trammel nets (Memphis Net & Twine)	649.46	0	0.00
Electrofishing repair supplies[b]			1082.43
Boat/motor repair and maintenance[c]			1244.80
Sampling equipment[d]			3046.74
Camping supplies[e]			1201.50
		Subtotal	**$14,291**
		Task 1 Total	**$82,916**

Task 2. Smallmouth bass removal.

	Rate	Hours/Units	Cost
Labor			
Project Leader	40.00	100	3999.59
Biologist II	36.55	100	3655.37
Journey Maintenance/Construction Specialist	37.17	1000	37170.72
Biologist I	35.40	640	22653.14
Technician II	19.69	320	6299.30
Technician I	18.28	2000	36555.23
Shuttle Drivers	18.67	640	11949.93
		Subtotal	**$122,283**
Travel			
3 trucks @ 60% of annual use[a]	25978.37	0.6	15587.02
Per diem (32 day trips; 24 overnights x 4 people)	27.68	224	6199.83
		Subtotal	**$21,787**
Equipment			
Boat fuel (gallons)	4.33	1536	6650.46
Boat oil (quarts)	11.91	72	857.29
Replacement water pump/impeller kit	135.30	15	2029.56
Replacement fuel pumps	81.18	2	162.36
Fuel stabilizer	32.47	15	487.09
Oxygen sensor	303.08	2	606.16
Fuel injector	135.30	2	270.61
Steering helm assembly	270.61	2	541.22
Replacement lower units	1298.92	2	2597.84
Replacement gear box/remote assembly	514.16	2	1028.31
Lower unit oil (5 gallons)	173.19	1	173.19
Electrofishing control box (ETS Electrofishing)	6435.06	1	6435.06
ETS converter box for EU7000IS generator	811.82	1	811.82
Honda generator EU7000IS	4329.73	0	0.00
Honda 50-hp outboard motor	7144.05	1	7144.05
Seasonal housing (monthly rent)	1298.92	9	11690.27
Electrofishing repair supplies[b]			1061.21
Boat/motor repair and maintenance[c]			3409.66
Sampling equipment[d]			2650.00
Camping supplies[e]			2569.69
		Subtotal	**$51,176**
		Task 2 Total	**$195,246**

Task 3. Data entry, analysis, and reporting.			
	Rate	Hours/Units	Cost
Labor			
Project Leader	40.00	40	1599.83
Biologist II	36.55	80	2924.30
Biologist I	35.40	80	2831.64
Computer fees/year[f]	1948.38	5	9741.89
Phone fees/year[f]	865.95	4	3463.78
		Task 3 Total	**$20,561**
		FY 2022 TOTAL	**$298,723**

IX. Budget Summary:

FY 2018	$285,220
FY 2019	$280,070
FY 2020	$287,123
FY 2021	$291,385
FY 2022	$298,723
TOTAL	**$1,442,522**

X. Reviewers: Recovery Program Director's Office – May 2017; Biology Committee – July 2017

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