

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

FY 2022-23 SCOPE OF WORK

PROJECT: 160

**Project Title**

Assessment of Stocked Razorback Sucker Reproduction in the Lower Green and Colorado Rivers

**Bureau of Reclamation Agreement Number:**

R19AP00059

**Reclamation Agreement Term:**

Oct. 1, 2019 – Sep. 30, 2024

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*Note: Recovery Program FY22-23 scopes of work are drafted in May 2021. 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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**Lead Agency:**

Utah Division of Wildlife Resources

**Principal Investigator:**

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Category:

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

Expected Funding Source:

- Annual funds
- Capital funds
- Other *[explain]*

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### **Relationship to RIPRAP:**

#### GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

- V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).
- V.A. Measure and document population and habitat parameters to determine status and biological response to recovery actions.
- V.B.2. Conduct appropriate studies to provide needed life history information.

#### GREEN RIVER ACTION PLAN: MAINSTEM

- V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).
- V.D.1. Implement razorback sucker monitoring plan.

#### COLORADO RIVER ACTION PLAN: MAINSTEM

- V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).
- V.E. Implement razorback sucker monitoring plan.

### **Study Background/Rationale and Hypotheses:**

This project will detect the presence of early life stage endangered razorback sucker *Xyrauchen texanus* in the lower Green River and lower Colorado River. By the mid 1990's most wild riverine adult razorbacks in the Upper Colorado River basin were limited to one population in the middle Green River with an estimated size of about 500 adults (Modde et al. 1996). Green River sampling from 1993-1999 verified the presence of larval razorback sucker in both the middle and lower Green River, however, it was believed that mortality rates of those larvae were very high and did not provide significant recruitment into the wild population (Muth et al. 1998). Stocking of hatchery reared razorback sucker in the Green River basin began in 1995 as a means to augment the population and continues through the present (US Fish and Wildlife Service 2002). By 2000, wild adult razorback sucker in the Green River Basin were very rare, and the few remaining likely have perished (Bestgen et al. 2002). In the Colorado River, razorback sucker populations suffered a similar fate as those in the Green River with the last wild razorback sucker captured near Grand Junction, Colorado in 1998 (Osmundson and Seal 2009). Stocking of hatchery-reared razorback sucker in the upper Colorado River has occurred continuously since 1999 (Osmundson and Seal 2009).

In the Green River from 2006 to 2013 adult razorback sucker abundance has increased greatly; likely due to stocking (Zelasko et al. 2018). Congregations of ripe razorbacks displaying spawning behavior have been observed, and many ripe individuals have been captured during sampling for other projects. In 2008, three age-1+ razorbacks were captured, and in 2012 project 138 sampling resulted in the capture of three young-of-year (YOY) razorback sucker within the lower Green River (Creighton et al. 2012). From 2017 through 2019, YOY razorback sucker have been captured in low numbers but consistently on the lower Green River during seine sampling for this project. Age-1+ razorbacks, however, have not been captured on the lower Green River during this project. Light trap sampling from 2009 to 2019 for this project on the lower Green River has shown a continued presence of razorback larvae and an increase in abundance of larvae beginning in 2012. The increase in adult razorback abundance, the continued presence of larvae, and the capture of YOY fish suggests that stocked adult razorback are successfully spawning in the lower Green River. However, relatively low

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numbers of YOY fish captured and lack of any age-1+ captures while sampling for this project on the lower Green River suggests that larval razorbacks may be rarely surviving to juvenile stages.

In the upper Colorado River, during Colorado pikeminnow sampling from 2005 and 2008, ripe female razorback were captured in the Colorado River between Loma, Colorado (RM 154) and Moab, Utah (RM 64) (Osmundson and Seal 2009). Similar sampling during 2009-2010 resulted in ripe females identified in areas between Moab, Utah (RM 66) downstream to Kane Springs Canyon (RM 58) (Travis Francis per. comm.), and sampling during 2013 resulted in a ripe male razorback captured at Goose Island downstream of Grandstaff Canyon (RM 67.2) where previously ripe adult females were captured (Doug Osmundson per. comm.). Larval seining from 2004 through 2007 identified razorback sucker larvae in the Colorado River from just above Westwater Canyon (RM 124.8) upstream to the Price Stubb Diversion dam (RM 185.1) (Osmundson and Seal 2009). Larval sampling in 2012 occurred between Goose Island (RM 65) and Mill Creek (RM 61.5). Osmundson and Seal (2009) results showed that although larval razorback abundance was low and widespread throughout the reach, there was an increase in the abundance of larvae from approximately 2% of fish sampled in 2004 to approximately 13% of fish sampled in 2007. More recently, light trap sampling for larvae from 2014 through 2019 for this project has captured larval razorbacks every year. Variations in abundance of larvae captured has occurred and may be attributed to timing of sampling or water levels. There were no YOY or age-1+ fish captured during sampling for this project in 2014 through 2016. However, from 2017 through 2019 YOY razorbacks were consistently captured in low numbers during seining efforts on the Colorado River. In 2019, a rare, wild age-1+ juvenile razorback was captured for the first time during seining efforts for project 160. Increase in the number of YOY fish captured may indicate that larval razorbacks are more successfully surviving into the juvenile life stage. Relatively low numbers of YOY and age-1+ captures while sampling for this project on the Colorado River, however, suggests that larval razorbacks may be rarely surviving to juvenile stages.

Spawning by stocked razorback sucker is an important component for recovery of the species. Monitoring the timing, location, and extent of larval occurrence in the system provides valuable information about the success of razorback spawning. Additionally, monitoring YOY and age-1+ razorbacks provides valuable information about recruitment of larvae to the juvenile life stage. Furthermore, detecting trends in abundance and location of YOY and age-1+ razorbacks may aid in understanding what environmental conditions support young razorback survival.

### **Study Goals, Objectives, End Product(s):**

*Goals:* The goals of this project are to document presence of larvae, young-of-the-year, and age-1+ razorback sucker in the lower Green River and Colorado River systems.

#### *Objectives:*

1. Sampling fish larvae with light traps in appropriate habitats. (May-June)
2. Sample small bodied fish to target young-of-the-year, and age-1+ razorback sucker in inundated washes, side canyons, and other appropriate habitats. (June-September)

*End Products:* Data collected for the duration of the study will be crucial for implementation of a basin-wide razorback monitoring plan. Annual reports will be submitted in November following sampling and revised upon completion of larval fish identification by the CSU Larval Fish Lab.

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### **Study Area:**

The study area for all sampling on the lower Green River extends from the confluence with the Colorado River (RM 0) upstream to Green River State Park, Utah (RM 120). Priority monitoring sites for larval light trapping have been established near the Green River Valley (RM 109 to 120), the San Rafael River confluence (RM 94-99), Millard Canyon (RM 25-34), and the Keg Spring/Tennile canyon area (RM 78-81). These sites are off-channel habitats such as the mouths of flooded tributary streams, flooded washes, or backwaters.

The study area for all sampling on the Colorado River extends from the confluence with the Green River (RM 0) upstream to the landing at Cisco, UT (RM 110.5). Priority monitoring sites for larval light trapping have been established near the town of Moab (RM 50 to 67), near the Potash boat ramp (RM 38 to 44), and near Lathrop Canyon (RM 21 to 24). These sites are off-channel habitats such as tributary streams, flooded washes, or backwaters.

### **Study Methods/Approach:**

Larval razorback sucker will be sampled from mid-May through early June. The sampling period may be adjusted based on timing and duration of spring discharge, onset of main channel water temperatures of 14°C, and temporal occurrence of larvae. Priority monitoring sites will be the primary sampling locations for larval sampling. However, access to sites varies substantially depending on hydrologic conditions. Thus, field crews will have flexibility to change sites or sample additional sites based on discharge, accessibility, and habitat conditions at each location. Larval razorback sucker will be sampled with light traps (de Vlaming and Bestgen 2020; Muth et al. 1998). The light traps will be a floating, quadrafoil design. During a sampling occasion, each site will be sampled with up to three light traps. Light traps will be set at dusk and retrieved before sunrise allowing for at least 8-hr sampling durations. If three light traps cannot be set in an accessible habitat, between one and three larval seine samples may be taken in the habitat.

Suitable low-velocity habitats throughout the Colorado River and Green River study areas will be sampled for YOY and age-1+ razorback. Suitable habitats include ephemeral shorelines, ponded lower portions of flooded tributary streams, side canyons, backwaters, and washes. Availability and location of these habitats varies substantially depending on hydrologic conditions. Fish will be sampled with seines (15' by 4' with 1/8" to 3/16" mesh) or other small-bodied fish sampling methods. The number of collections per habitat will be determined by the size and complexity of the habitat. Sampling will occur approximately monthly from July through September. September sampling effort may be combined with annual sampling for YOY pikeminnow (Project #138) if appropriate. Additionally, a Gerken Siamese trawl will be used experimentally to sample YOY and age-1+ razorbacks.

Larger fish that are identifiable in the field will be counted and measured on site and released. Fish not identifiable in the field will be euthanized, preserved in 100% ethanol, and sent to the CSU Larval Fish Lab for identification. UDWR will be responsible for sample processing and drafting the annual report. Upon receiving fish identification data from the CSU Larval Fish Lab, UDWR will revise the annual report to include this data.

### **Task Description, Deliverables and Schedule:**

*Task 1:* Sample larval fish in the lower Green and Colorado Rivers. (May-June)

*Task 2:* Sample for young-of-year to age-1+ razorback sucker (June-September)

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*Task 3: Preliminary Sample Identification, Data Entry, Analysis, Reporting –Annual report completed and submitted to PDO by November and revised pending sample identification from CSU Larval Fish Lab. (November)*

**Task Schedule:**

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

**Budget Summary:**

FY Year	UDWR-Moab
2022	\$53,534
2023	\$53,534
2024	\$54,604
2025	\$55,697
2026	\$56,810
Total	\$274,179

**Reviewers:**

**References:**

Bestgen, K. R., G. B. Haines, R. Brunson, T. Chart, M. Trammell, G. Birchell, and K. Christopherson. 2002. Decline of the razorback sucker in the Green River Basin, Utah and Colorado. Report submitted to the Recovery Implementation Program for Endangered Fishes in the Upper Colorado River Basin. Larval Fish Laboratory Contribution 126.

Bestgen, K.R., K.A. Zalasko and G.C. White. 2012. Monitoring Reproduction, Recruitment, and Population Status of Razorback Suckers in the Upper Colorado River Basin. Report submitted to the Recovery Implementation Program for Endangered Fishes in the Upper Colorado River Basin. Larval Fish Laboratory Contribution 170.

Creighton, K., J.A. Scorupski, M.J. Breen, B. P. Kiefer. 2012. Young-of-year Colorado pikeminnow monitoring, Annual Report. Upper Colorado River Endangered Fish Recovery Program Project 138.

de Vlaming, C.M., and K.R. Bestgen 2020. Factors Influencing Capture and Retention of Razorback Sucker in Light Traps. North American Journal of Fisheries Management 40:1055-1076.

Howard, J. 2012. Lower Green River razorback sucker larval and young-of-year monitoring pilot study, Annual Report. Upper Colorado River Endangered Fish Recovery Program Project 160.

Moode, T., K.P. Burnham, and E.J. Wick. 1996. Population status of the razorback sucker in the middle Green River. Conservation Biology 10:110-119.

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- Muth, R.T., L.W. Crist, K.E. LaGory, J.W. Hayse, K.R. Bestgen, J.K. Lyons, T.P. Ryan, and R.A. Valdez. 2000. Flow Recommendations for Endangered Fishes in the Green River Downstream of Flaming Gorge Dam, Final Report, Upper Colorado River Endangered Fish Recovery Program Project FG-53.
- Muth, R. T., G. B. Haines, S. M. Meismer, E. J. Wick, T. E. Chart, D. E. Snyder, and J. M. Bundy. 1998. Reproduction and early life history of razorback sucker in the Green River, Utah and Colorado, 1992–1996. Final Report of Colorado State University Larval Fish Laboratory to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado. 62 pp.
- Osmundson, D. B. and S. C. Seal. 2009. Successful spawning by stocked razorback suckers in the Gunnison and Colorado rivers, as evidenced by larval fish collections, 2002-2007. Final Report. Upper Colorado River Endangered Fish Recovery Program Project 121.
- US Fish and Wildlife Service. 2002. Razorback sucker (*Xyrauchen texanus*) Recovery Goals: amendment and supplement to the Razorback Sucker Recovery Plan. US Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.
- Zelasko, K.A., K.R. Bestgen, and G.C. White. 2018. Abundance and survival rates of razorback suckers *Xyrauchen texanus* in the Green River, Utah, 2011-2013. Final Report of Larval Fish Laboratory, Colorado State University to Upper Colorado Endangered Fish Recovery Program, Denver, Colorado.

**SUMMARY OF PROPOSED COSTS**

<b>Name of Servicing Agency:</b>	Utah Division of Wildlife Resources
<b>Project Name:</b>	Project 160 larval and YOY Razorback Monitoring Green and Colorado R.

	YEAR 1		YEAR 2		YEAR 3		YEAR 4		YEAR 5		TOTAL	
	10/1/2021		10/1/2022		10/2/2023		10/1/2024		10/1/2025			
	Through		Through		Through		Through		Through			
Enter the BEGINNING dates for each year ----->	9/30/2022		10/1/2023		9/30/2024		9/30/2025		9/30/2026			
Enter the ENDING dates for each year ----->	YEAR 1		YEAR 2		YEAR 3		YEAR 4		YEAR 5		TOTAL	
<b>DIRECT LABOR AND FRINGE BENEFIT COSTS:</b>												
Direct Labor - Hourly	\$	27,532.61	\$	27,532.61	\$	28,083.26	\$	28,644.93	\$	29,217.83	\$	141,011.25
Fringe Benefits - Hourly	\$	8,600.98	\$	8,600.98	\$	8,773.00	\$	8,948.46	\$	9,127.43	\$	44,050.83
Subtotal of Direct Labor & Fringe Benefits:	\$	36,133.59	\$	36,133.59	\$	36,856.26	\$	37,593.39	\$	38,345.25	\$	185,062.08
<b>OTHER DIRECT COSTS:</b>												
Materials and Supplies	\$	12,360.20	\$	12,360.20	\$	12,607.40	\$	12,859.55	\$	13,116.73	\$	63,304.08
Travel Costs	\$	5,040.00	\$	5,040.00	\$	5,140.80	\$	5,243.62	\$	5,348.49	\$	25,812.90
Equipment	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Contractors	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Subtotal of Other Direct Costs:	\$	17,400.20	\$	17,400.20	\$	17,748.20	\$	18,103.17	\$	18,465.22	\$	89,116.98
<b>INDIRECT/OVERHEAD COSTS:</b>												
Subtotal of Labor and Other Direct Costs:	\$	53,533.79	\$	53,533.79	\$	54,604.46	\$	55,696.55	\$	56,810.47		
Total dollars exempt from indirect/overhead base:	\$	53,533.79	\$	53,533.79	\$	54,604.46	\$	55,696.55	\$	56,810.47		
<Enter Description of Indirect/OH Cost #1>	0.00%	\$ -	0.00%	\$ -	0.00%	\$ -	0.00%	\$ -	0.00%	\$ -	\$	-
Total dollars exempt from indirect/overhead base:	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
<Enter Description of Indirect/OH Cost #2>	0.00%	\$ -	0.00%	\$ -	0.00%	\$ -	0.00%	\$ -	0.00%	\$ -	\$	-
Subtotal of Indirect/Overhead Costs:	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
<b>GRAND TOTAL:</b>	\$	53,533.79	\$	53,533.79	\$	54,604.46	\$	55,696.55	\$	56,810.47	\$	274,179.06

**SUMMARY OF DIRECT LABOR & FRINGE BENEFITS**

Enter Escalation Rates ----->	Yr 2 Escalation Rate	0.00%
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	Task # or Description	Position Title	OPM Pay Location	Current Hourly Rate	YEAR 1					YEAR 2				
					10/1/2021		Through	9/30/2022		10/1/2022		Through	10/1/2023	
					# of Hours	Hourly Rate	Salary Cost	Fringe Rate	Fringe Cost	# of Hours	Hourly Rate	Salary Cost	Fringe Rate	Fringe Cost
1	1	Project Leader(1)	Rest of US	\$ 27.66	40.0	\$ 27.66	\$ 1,106.22	48.00%	\$ 530.99	40.0	\$ 27.66	\$ 1,106.22	48.00%	\$ 530.99
2	1	Biologist(4)	Rest of US	\$ 22.91	120.0	\$ 22.91	\$ 2,748.86	68.00%	\$ 1,869.23	120.0	\$ 22.91	\$ 2,748.86	68.00%	\$ 1,869.23
3	1	Technician(s)(12)	Rest of US	\$ 16.36	440.0	\$ 16.36	\$ 7,198.40	8.77%	\$ 631.30	440.0	\$ 16.36	\$ 7,198.40	8.77%	\$ 631.30
4	2	Project Leader(1)		\$ 27.66	40.0	\$ 27.66	\$ 1,106.22	48.00%	\$ 530.99	40.0	\$ 27.66	\$ 1,106.22	48.00%	\$ 530.99
5	2	Biologist(4)		\$ 22.91	120.0	\$ 22.91	\$ 2,748.86	68.00%	\$ 1,869.23	120.0	\$ 22.91	\$ 2,748.86	68.00%	\$ 1,869.23
6	2	Technician(s)(12)		\$ 16.36	440.0	\$ 16.36	\$ 7,198.40	8.77%	\$ 631.30	440.0	\$ 16.36	\$ 7,198.40	8.77%	\$ 631.30
7	3	Project Leader(1)		\$ 27.66	40.0	\$ 27.66	\$ 1,106.22	48.00%	\$ 530.99	40.0	\$ 27.66	\$ 1,106.22	48.00%	\$ 530.99
8	3	Biologist(4)		\$ 22.91	120.0	\$ 22.91	\$ 2,748.86	68.00%	\$ 1,869.23	120.0	\$ 22.91	\$ 2,748.86	68.00%	\$ 1,869.23
9	3	Technician(s)(12)		\$ 16.36	96.0	\$ 16.36	\$ 1,570.56	8.77%	\$ 137.74	96.0	\$ 16.36	\$ 1,570.56	8.77%	\$ 137.74
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**SUMMARY OF DIRECT LABOR & FRINGE BENI**

Yr 3 Escalation Rate	2.00%
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Yr 4 Escalation Rate	2.00%
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					YEAR 3					YEAR 4				
					10/2/2023		Through	9/30/2024		10/1/2024		Through	9/30/2025	
Task # or Description	Position Title	OPM Pay Location	Current Hourly Rate		# of Hours	Hourly Rate	Salary Cost	Fringe Rate	Fringe Cost	# of Hours	Hourly Rate	Salary Cost	Fringe Rate	Fringe Cost
1	1	Project Leader(1)	Rest of US	\$ 27.66	40.0	\$ 28.21	\$ 1,128.34	48.00%	\$ 541.61	40.0	\$ 28.77	\$ 1,150.91	48.00%	\$ 552.44
2	1	Biologist(4)	Rest of US	\$ 22.91	120.0	\$ 23.37	\$ 2,803.84	68.00%	\$ 1,906.61	120.0	\$ 23.83	\$ 2,859.92	68.00%	\$ 1,944.74
3	1	Technician(s)(12)	Rest of US	\$ 16.36	440.0	\$ 16.69	\$ 7,342.37	8.77%	\$ 643.93	440.0	\$ 17.02	\$ 7,489.22	8.77%	\$ 656.80
4	2	Project Leader(1)		\$ 27.66	40.0	\$ 28.21	\$ 1,128.34	48.00%	\$ 541.61	40.0	\$ 28.77	\$ 1,150.91	48.00%	\$ 552.44
5	2	Biologist(4)		\$ 22.91	120.0	\$ 23.37	\$ 2,803.84	68.00%	\$ 1,906.61	120.0	\$ 23.83	\$ 2,859.92	68.00%	\$ 1,944.74
6	2	Technician(s)(12)		\$ 16.36	440.0	\$ 16.69	\$ 7,342.37	8.77%	\$ 643.93	440.0	\$ 17.02	\$ 7,489.22	8.77%	\$ 656.80
7	3	Project Leader(1)		\$ 27.66	40.0	\$ 28.21	\$ 1,128.34	48.00%	\$ 541.61	40.0	\$ 28.77	\$ 1,150.91	48.00%	\$ 552.44
8	3	Biologist(4)		\$ 22.91	120.0	\$ 23.37	\$ 2,803.84	68.00%	\$ 1,906.61	120.0	\$ 23.83	\$ 2,859.92	68.00%	\$ 1,944.74
9	3	Technician(s)(12)		\$ 16.36	96.0	\$ 16.69	\$ 1,601.97	8.77%	\$ 140.49	96.0	\$ 17.02	\$ 1,634.01	8.77%	\$ 143.30
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#				\$ -	-	\$ -	\$ -	0.00%	\$ -		\$ -	\$ -	0.00%	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -		\$ -	\$ -	0.00%	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -		\$ -	\$ -	0.00%	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -		\$ -	\$ -	0.00%	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -		\$ -	\$ -	0.00%	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -		\$ -	\$ -	0.00%	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -		\$ -	\$ -	0.00%	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -		\$ -	\$ -	0.00%	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -		\$ -	\$ -	0.00%	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -		\$ -	\$ -	0.00%	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -		\$ -	\$ -	0.00%	\$ -

**SUMMARY OF DIRECT LABOR & FRINGE BEN**

Yr 5 Escalation Rate	2.00%
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					<b>YEAR 5</b>					<b>Total Salary Cost</b>	<b>Total Fringe Cost</b>	<b>Total Labor Cost</b>
					<b>10/1/2025</b>		<b>Through</b>	<b>9/30/2026</b>				
<b>Task # or Description</b>	<b>Position Title</b>	<b>OPM Pay Location</b>	<b>Current Hourly Rate</b>		<b># of Hours</b>	<b>Hourly Rate</b>	<b>Salary Cost</b>	<b>Fringe Rate</b>	<b>Fringe Cost</b>			
1	1	Project Leader(1)	Rest of US	\$ 27.66	40.0	\$ 29.35	\$ 1,173.93	48.00%	\$ 563.49	\$ 5,665.63	\$ 2,719.50	\$ 8,385.13
2	1	Biologist(4)	Rest of US	\$ 22.91	120.0	\$ 24.31	\$ 2,917.12	68.00%	\$ 1,983.64	\$ 14,078.60	\$ 9,573.45	\$ 23,652.05
3	1	Technician(s)(12)	Rest of US	\$ 16.36	440.0	\$ 17.36	\$ 7,639.00	8.77%	\$ 669.94	\$ 36,867.38	\$ 3,233.27	\$ 40,100.65
4	2	Project Leader(1)		\$ 27.66	40.0	\$ 29.35	\$ 1,173.93	48.00%	\$ 563.49	\$ 5,665.63	\$ 2,719.50	\$ 8,385.13
5	2	Biologist(4)		\$ 22.91	120.0	\$ 24.31	\$ 2,917.12	68.00%	\$ 1,983.64	\$ 14,078.60	\$ 9,573.45	\$ 23,652.05
6	2	Technician(s)(12)		\$ 16.36	440.0	\$ 17.36	\$ 7,639.00	8.77%	\$ 669.94	\$ 36,867.38	\$ 3,233.27	\$ 40,100.65
7	3	Project Leader(1)		\$ 27.66	40.0	\$ 29.35	\$ 1,173.93	48.00%	\$ 563.49	\$ 5,665.63	\$ 2,719.50	\$ 8,385.13
8	3	Biologist(4)		\$ 22.91	120.0	\$ 24.31	\$ 2,917.12	68.00%	\$ 1,983.64	\$ 14,078.60	\$ 9,573.45	\$ 23,652.05
9	3	Technician(s)(12)		\$ 16.36	96.0	\$ 17.36	\$ 1,666.69	8.77%	\$ 146.17	\$ 8,043.79	\$ 705.44	\$ 8,749.23
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
#				\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -

# SUMMARY OF MATERIALS AND SUPPLIES

<b>SUMMARY OF MATERIALS, SUPPLIES, AND SERVICES</b>
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Yr 2 Escalation Rate	0.00%
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	Task # or Description	Item Description	Rationale for Proposed Cost	Year 1			Year 2		
				Unit Price	Unit Quantity	Subtotal	Unit Price	Unit Quantity	Subtotal
1	1	Montly fleet rental (2 trucks, 2 months)	Based on previous experience & SOWs	\$ 500.00	4.00	\$ 2,000.00	\$ 500.00	4.00	\$ 2,000.00
2	1	Mileage costs (1200 miles)	Based on previous experience & SOWs	\$ 0.40	1200.00	\$ 480.00	\$ 0.40	1200.00	\$ 480.00
3	1	Shuttle costs (6)	Based on previous experience & SOWs	\$ 200.00	3.00	\$ 600.00	\$ 200.00	3.00	\$ 600.00
4	1	Camping materials and gear	Based on previous experience & SOWs	\$ 1,000.00	0.50	\$ 500.00	\$ 1,000.00	0.50	\$ 500.00
5	1	Sampling materials and gear	Based on previous experience & SOWs	\$ 1,000.00	1.50	\$ 1,500.00	\$ 1,000.00	1.50	\$ 1,500.00
6	1	Boating matierials, gear and fuel	Based on previous experience & SOWs	\$ 1,000.00	1.00	\$ 1,000.00	\$ 1,000.00	1.00	\$ 1,000.00
7	2	Montly fleet rental (2 trucks, 2 months)	Based on previous experience & SOWs	\$ 500.00	4.00	\$ 2,000.00	\$ 500.00	4.00	\$ 2,000.00
8	2	Mileage costs (1200 miles)	Based on previous experience & SOWs	\$ 0.40	1200.00	\$ 480.00	\$ 0.40	1200.00	\$ 480.00
9	2	Shuttle costs (6)	Based on previous experience & SOWs	\$ 200.00	3.00	\$ 600.00	\$ 200.00	3.00	\$ 600.00
10	2	Camping materials and gear	Based on previous experience & SOWs	\$ 0.40	0.50	\$ 0.20	\$ 0.40	0.50	\$ 0.20
11	2	Sampling materials and gear	Based on previous experience & SOWs	\$ 1,000.00	1.50	\$ 1,500.00	\$ 1,000.00	1.50	\$ 1,500.00
12	2	Boating matierials, gear and fuel	Based on previous experience & SOWs	\$ 1,000.00	1.00	\$ 1,000.00	\$ 1,000.00	1.00	\$ 1,000.00
13	3	Montly fleet rental (1 trucks, 1 month)	Based on previous experience & SOWs	\$ 500.00	1.00	\$ 500.00	\$ 500.00	1.00	\$ 500.00
14	3	Mileage costs (500 miles)	Based on previous experience & SOWs	\$ 0.40	500.00	\$ 200.00	\$ 0.40	500.00	\$ 200.00
15				\$ -	0	\$ -	\$ -	0	\$ -
16				\$ -	0	\$ -	\$ -	0	\$ -
17				\$ -	0	\$ -	\$ -	0	\$ -
18				\$ -	0	\$ -	\$ -	0	\$ -
19				\$ -	0	\$ -	\$ -	0	\$ -
20				\$ -	0	\$ -	\$ -	0	\$ -
21				\$ -	0	\$ -	\$ -	0	\$ -
22				\$ -	0	\$ -	\$ -	0	\$ -
23				\$ -	0	\$ -	\$ -	0	\$ -
24				\$ -	0	\$ -	\$ -	0	\$ -
25				\$ -	0	\$ -	\$ -	0	\$ -
26				\$ -	0	\$ -	\$ -	0	\$ -
27				\$ -	0	\$ -	\$ -	0	\$ -
28				\$ -	0	\$ -	\$ -	0	\$ -
29				\$ -	0	\$ -	\$ -	0	\$ -
30				\$ -	0	\$ -	\$ -	0	\$ -
<b>TOTAL:</b>						<b>\$ 12,360.20</b>			<b>\$ 12,360.20</b>

# SUMMARY OF MATERIALS AND SUPPLIES

<b>SUMMARY OF MATERIALS, SUPPLIES</b>	Yr 3 Escalation Rate	2.00%	Yr 4 Escalation Rate	2.00%
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	Task # or Description	Item Description	Year 3			Year 4		
			Unit Price	Unit Quantity	Subtotal	Unit Price	Unit Quantity	Subtotal
1	1	Montly fleet rental (2 trucks, 2 months)	\$ 510.00	4.00	\$ 2,040.00	\$ 520.20	4.00	\$ 2,080.80
2	1	Mileage costs (1200 miles)	\$ 0.41	1200.00	\$ 489.60	\$ 0.42	1200.00	\$ 499.39
3	1	Shuttle costs (6)	\$ 204.00	3.00	\$ 612.00	\$ 208.08	3.00	\$ 624.24
4	1	Camping materials and gear	\$ 1,020.00	0.50	\$ 510.00	\$ 1,040.40	0.50	\$ 520.20
5	1	Sampling materials and gear	\$ 1,020.00	1.50	\$ 1,530.00	\$ 1,040.40	1.50	\$ 1,560.60
6	1	Boating matierials, gear and fuel	\$ 1,020.00	1.00	\$ 1,020.00	\$ 1,040.40	1.00	\$ 1,040.40
7	2	Montly fleet rental (2 trucks, 2 months)	\$ 510.00	4.00	\$ 2,040.00	\$ 520.20	4.00	\$ 2,080.80
8	2	Mileage costs (1200 miles)	\$ 0.41	1200.00	\$ 489.60	\$ 0.42	1200.00	\$ 499.39
9	2	Shuttle costs (6)	\$ 204.00	3.00	\$ 612.00	\$ 208.08	3.00	\$ 624.24
10	2	Camping materials and gear	\$ 0.41	0.50	\$ 0.20	\$ 0.42	0.50	\$ 0.21
11	2	Sampling materials and gear	\$ 1,020.00	1.50	\$ 1,530.00	\$ 1,040.40	1.50	\$ 1,560.60
12	2	Boating matierials, gear and fuel	\$ 1,020.00	1.00	\$ 1,020.00	\$ 1,040.40	1.00	\$ 1,040.40
13	3	Montly fleet rental (1 trucks, 1 month)	\$ 510.00	1.00	\$ 510.00	\$ 520.20	1.00	\$ 520.20
14	3	Mileage costs (500 miles)	\$ 0.41	500.00	\$ 204.00	\$ 0.42	500.00	\$ 208.08
15			\$ -		\$ -	\$ -		\$ -
16			\$ -	0	\$ -	\$ -	0	\$ -
17			\$ -	0	\$ -	\$ -	0	\$ -
18			\$ -	0	\$ -	\$ -	0	\$ -
19			\$ -	0	\$ -	\$ -	0	\$ -
20			\$ -	0	\$ -	\$ -	0	\$ -
21			\$ -	0	\$ -	\$ -	0	\$ -
22			\$ -	0	\$ -	\$ -	0	\$ -
23			\$ -	0	\$ -	\$ -	0	\$ -
24			\$ -	0	\$ -	\$ -	0	\$ -
25			\$ -	0	\$ -	\$ -	0	\$ -
26			\$ -	0	\$ -	\$ -	0	\$ -
27			\$ -	0	\$ -	\$ -	0	\$ -
28			\$ -	0	\$ -	\$ -	0	\$ -
29			\$ -	0	\$ -	\$ -	0	\$ -
30			\$ -	0	\$ -	\$ -	0	\$ -
					<b>\$ 12,607.40</b>			<b>\$ 12,859.55</b>

# SUMMARY OF MATERIALS AND SUPPLIES

<b>SUMMARY OF MATERIALS, SUPPLIES</b>	Yr 5 Escalation Rate	2.00%
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			Year 5			
Task # or Description	Item Description	Unit Price	Unit Quantity	Subtotal	TOTAL	
1	1	Monthly fleet rental (2 trucks, 2 months)	\$ 530.60	4.00	\$ 2,122.42	\$ 10,243.22
2	1	Mileage costs (1200 miles)	\$ 0.42	1200.00	\$ 509.38	\$ 2,458.37
3	1	Shuttle costs (6)	\$ 212.24	3.00	\$ 636.72	\$ 3,072.96
4	1	Camping materials and gear	\$ 1,061.21	0.50	\$ 530.60	\$ 2,560.80
5	1	Sampling materials and gear	\$ 1,061.21	1.50	\$ 1,591.81	\$ 7,682.41
6	1	Boating materials, gear and fuel	\$ 1,061.21	1.00	\$ 1,061.21	\$ 5,121.61
7	2	Monthly fleet rental (2 trucks, 2 months)	\$ 530.60	4.00	\$ 2,122.42	\$ 10,243.22
8	2	Mileage costs (1200 miles)	\$ 0.42	1200.00	\$ 509.38	\$ 2,458.37
9	2	Shuttle costs (6)	\$ 212.24	3.00	\$ 636.72	\$ 3,072.96
10	2	Camping materials and gear	\$ 0.42	0.50	\$ 0.21	\$ 1.02
11	2	Sampling materials and gear	\$ 1,061.21	1.50	\$ 1,591.81	\$ 7,682.41
12	2	Boating materials, gear and fuel	\$ 1,061.21	1.00	\$ 1,061.21	\$ 5,121.61
13	3	Monthly fleet rental (1 trucks, 1 month)	\$ 530.60	1.00	\$ 530.60	\$ 2,560.80
14	3	Mileage costs (500 miles)	\$ 0.42	500.00	\$ 212.24	\$ 1,024.32
15			\$ -	0	\$ -	\$ -
16			\$ -	0	\$ -	\$ -
17			\$ -	0	\$ -	\$ -
18			\$ -	0	\$ -	\$ -
19			\$ -	0	\$ -	\$ -
20			\$ -	0	\$ -	\$ -
21			\$ -	0	\$ -	\$ -
22			\$ -	0	\$ -	\$ -
23			\$ -	0	\$ -	\$ -
24			\$ -	0	\$ -	\$ -
25			\$ -	0	\$ -	\$ -
26			\$ -	0	\$ -	\$ -
27			\$ -	0	\$ -	\$ -
28			\$ -	0	\$ -	\$ -
29			\$ -	0	\$ -	\$ -
30			\$ -	0	\$ -	\$ -
				<b>\$ 13,116.73</b>	<b>\$ 63,304.08</b>	

## SUMMARY OF TRAVEL COSTS

Cost Element	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
<b>Trip #</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	
<b>From-To</b>	Task 1- Larval Sampling	Task 1- Larval Sampling	Task 1- Larval Sampling	Task 1- Larval Sampling	Task 1- Larval Sampling	
<b>Reason</b>	Field Work	Field Work	Field Work	Field Work	Field Work	
<b># of Days (include travel days)</b>	4	4	4	4	4	
<b>Airfare</b>	\$ -	\$ -	\$ -	\$ -	\$ -	
<b>Lodging (Per Night)</b>	\$ -	\$ -	\$ -	\$ -	\$ -	
<b>MI&amp;E Per Day</b>	\$ 35.00	\$ 35.00	\$ 35.70	\$ 36.41	\$ 37.14	
<b>Auto Rental Per Day</b>	\$ -	\$ -	\$ -	\$ -	\$ -	
<b>Misc Costs/Adjustments/Trip</b>	\$ -	\$ -	\$ -	\$ -	\$ -	
<b>Total Per Trip</b>	<b>\$ 140.00</b>	<b>\$ 140.00</b>	<b>\$ 142.80</b>	<b>\$ 145.66</b>	<b>\$ 148.57</b>	
<b>No. of persons</b>	3	3	3	3	3	
<b>No. of trips</b>	6	6	6	6	6	
<b>SUBTOTAL =</b>	<b>\$ 2,520.00</b>	<b>\$ 2,520.00</b>	<b>\$ 2,570.40</b>	<b>\$ 2,621.81</b>	<b>\$ 2,674.24</b>	<b>\$ 12,906.45</b>
Cost Element	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
<b>Trip #</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	
<b>From-To</b>	Task 2 - YOY/Juv Sampling	Task 2 - YOY/Juv Sampling	Task 2 - YOY/Juv Sampling	Task 2 - YOY/Juv Sampling	Task 2 - YOY/Juv Sampling	
<b>Reason</b>	Field Work	Field Work	Field Work	Field Work	Field Work	
<b># of Days (include travel days)</b>	4	4	4	4	4	
<b>Airfare</b>	\$ -	\$ -	\$ -	\$ -	\$ -	
<b>Lodging (Per Night)</b>	\$ -	\$ -	\$ -	\$ -	\$ -	
<b>MI&amp;E Per Day</b>	\$ 35.00	\$ 35.00	\$ 35.70	\$ 36.41	\$ 37.14	
<b>Auto Rental Per Day</b>	\$ -	\$ -	\$ -	\$ -	\$ -	
<b>Misc Costs/Adjustments/Trip</b>	\$ -	\$ -	\$ -	\$ -	\$ -	
<b>Total Per Trip</b>	<b>\$ 140.00</b>	<b>\$ 140.00</b>	<b>\$ 142.80</b>	<b>\$ 145.66</b>	<b>\$ 148.57</b>	
<b>No. of persons</b>	3	3	3	3	3	
<b>No. of trips</b>	6	6	6	6	6	
<b>Total miles</b>						
<b>SUBTOTAL =</b>	<b>\$ 2,520.00</b>	<b>\$ 2,520.00</b>	<b>\$ 2,570.40</b>	<b>\$ 2,621.81</b>	<b>\$ 2,674.24</b>	<b>\$ 12,906.45</b>
<b>TOTAL COST BY PERIOD =</b>	<b>\$5,040.00</b>	<b>\$5,040.00</b>	<b>\$5,140.80</b>	<b>\$5,243.62</b>	<b>\$5,348.49</b>	<b>\$25,812.90</b>