

**COLORADO RIVER RECOVERY PROGRAM
FY-2020-2021 SCOPE OF WORK**

Project No.: 127

Colorado pikeminnow population estimates - Colorado River

Reclamation Agreement number: TBD
Reclamation Agreement term: Oct. 1, 2019 – Sep. 30, 2024

Note: Recovery Program FY2020-2024 scopes of work are drafted in May 2019. 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.

Lead Agency: U.S. Fish and Wildlife Service
Grand Junction Fish and Wildlife Conservation Office
Submitted by: Darek Elverud, Fish Biologist
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Category:

- Ongoing
 Ongoing-revised project
 Requested new project
 Unsolicited proposal

Expected Funding Source:

- Annual funds
 Capital funds
 Other (explain)

- I. Title of Proposal: Monitoring the Colorado pikeminnow population in the mainstem Colorado River via periodic population estimates.
- II. Relationship to RIPRAP:
Colorado River Action Plan: Colorado River Mainstem,
V. Monitor populations and habitat and conduct research to support recovery actions.
V.D. Estimate Colorado pikeminnow and razorback sucker populations in the upper Colorado River (including Gunnison River).
- III. Study Background/Rationale and Hypotheses:

The currently accepted standard for monitoring populations of Colorado River endangered fishes is to periodically develop population estimates using closed-model capture-recapture methods. Such estimates provide information on population status (abundance), and when repeated periodically over an extended period can also provide information on population trends. Such estimates have been made for the Colorado River population of Colorado

pikeminnow for fifteen years: 1992-1994, 1998-2000, 2003-2005, 2008-2010, and 2013-2015 (see Osmundson and Burnham 1998, Osmundson 2002, Osmundson and White 2014). Recovery goals for Colorado pikeminnow require that three consecutive annual population estimates be conducted periodically (USFWS 2002), and the Recovery Program's Recovery Action Plan identified the current round of estimates to occur in 2018-2020. This timeframe was modified to 2019-2021 when the scheduled 2018 population estimates were unable to be performed due to logistical constraints within the USFWS at the regional level. During the first two 3-year efforts, time, manpower and funding limitations allowed only a minimal sampling regime in the Colorado River. This consisted of three passes, or capture efforts, through the upper reach (upstream of Westwater Canyon) and two through the lower reach (downstream of Westwater Canyon) each year. This was largely accomplished with one 2-person crew. In addition, data from annual ISMP electrofishing surveys were also included which provided part of one of the passes in each reach. Without this help, the two-person crew would not have been able to complete the sampling regime. Even with this assistance, estimates were considered generally inadequate based on wide confidence intervals, low probability of capture (p), and high coefficients of variation (CV). Pollock et al. (1982) suggests a good 'rule-of-thumb' is to achieve a CV of 20% or less. During 1991-1994 and 1998-2000, annual CV for pikeminnow >450 mm TL ranged from 15.4% to 45.5% in the upper study reach, and from 39.2% to 64.4% in the lower study reach. Annual ISMP electrofishing surveys have since been discontinued; hence, future field efforts will need to be much greater to make estimates more precise and make up for the shortfall left from discontinuing ISMP. To improve estimates, a target of four passes in the lower reach (Cisco, UT to the Colorado/Green River confluence) and five passes in the upper reach (upstream of Westwater Canyon to Government Highline Dam) was adopted for the Colorado River. In addition, increased effort per pass also improves precision of estimates. In the past, trammel-netting backwaters yielded many more pikeminnow per day of effort than did electrofishing shorelines. However, at any one time, there may be many pikeminnow that are not in the backwaters; hence, our current capture strategy includes a combination of electrofishing shorelines and trammel-netting backwaters. This expanded effort is intended to increase capture probabilities and decrease coefficients of variation, resulting in greater precision of the point estimates. This sampling regimen was employed during 2003-2005, 2008-2010, and 2013-2015. The overall mean CV of the twelve annual combined-reach estimates for fish > 450 mm TL was 16.8% (Osmundson and White 2014). During the most recent three-year effort (2008–2010), the mean CV was 13.2%, the best (lowest) of any of the four multi-year efforts (first three years: 25%; second three years, 14.3%; third three years, 15.2%). However, the best single year was 2005, with a CV of 9.4%. The current regimen of increased effort and number of annual passes is scheduled to be continued in 2019-2021 (2019 estimates are already underway, under a previously-funded SOW).

IV. Study Goals, Objectives, End Product:

Goal

Our goal is to provide three annual whole-river estimates of population abundance for Colorado pikeminnow ≥ 250 mm TL and for Colorado pikeminnow ≥ 450 mm TL in the Colorado River mainstem, with coefficients of variation of 20% or less.

Objectives

1. Capture and mark juvenile (< 400 mm TL), sub-adult (400-450 mm TL) and adult (> 450 mm TL) Colorado pikeminnow throughout the river for a three-year period, attempting to complete five passes through the upper reach (upstream of Westwater Canyon) and four through the lower reach (downstream of Westwater Canyon) each year.
2. Develop a population estimate from mark-recapture data.
3. Assess recruitment trends by analyzing length-frequency histograms and estimating abundance of individuals 400-450 mm TL.
4. Also, reduce centrarchid and walleye abundance in the study area by removing those encountered during field sampling so as to help meet objectives of Project 126 (bass removal).
5. Capture any razorback sucker and bonytail encountered for assessment of their populations. Development of abundance estimates for razorback sucker using mark-recapture data collected.

End Product

Provide a final report on study findings. A draft report for the 2019-2021 sampling period will be ready for peer review on August 30, 2022. A draft final report will be ready for approval consideration October 31, 2022. Report to be finalized December 31, 2022.

V. Study Area:

The Colorado River will be sampled from Government Highline Dam (RM 194.4) downstream to the confluence with the Green River (RM 0.0), excluding Westwater Canyon (12 miles: RM 112-124), from early-April to late-June, 2019-2021. In addition, the lower 2.3 miles of the Gunnison River downstream of Redlands Diversion Dam will also be sampled, as fish utilizing this reach are generally part of the Colorado River population. Hence, a total of 179 miles will be sampled. The rationale for omitting Westwater Canyon is that sampling there requires specialized whitewater expertise, is time consuming, and, based on past experience, will yield very few pikeminnow (captures have averaged about one per year over nine years despite intensive sampling associated with other studies [unpublished Recovery Program database data]).

VI. Study Methods/Approach:

Juvenile, sub-adult, and adult Colorado pikeminnow will be captured from throughout the Colorado River study area. In each of two sub-reaches (upstream and downstream of Westwater Canyon), there will be two crews working concurrently: one 2-person crew will electrofish shorelines while another two-person crew will trammel-net flooded backwaters. During low water periods, only electrofishing sampling will be deployed. There will therefore be a total of four 2-person crews working simultaneously at any one time (eight individuals). Additional individuals will be required to run shuttles, clean nets and maintain

equipment. An additional person will also be needed to pilot a baggage boat when sampling in Canyonlands National Park is conducted. In some reaches, where backwaters are scarce, both shorelines will be electrofished, either concurrently or on separate days. In reaches where shoreline electrofishing supplements backwater netting, the electrofishing crew will sample both shorelines, targeting what the researcher believes to be the best available habitats. No electrofishing will occur in backwaters; and electrofishing boats that get out ahead of netting crews will steer clear of backwater mouths to avoid scaring fish from these areas. Concurrent crews working in the same reach will embark at the same location but will be prepared to operate and work up fish independently. The technique, or combination of techniques, that most effectively samples the pikeminnow population varies by reach, and some flexibility will be required to modify sampling protocols as reach and flow conditions vary. All fish will be measured for total length (mm), weighed with an electronic balance (nearest gram) and checked for the presence of a PIT-tag. If a PIT tag is not present at the time of capture, one will be implanted prior to the fish being released.

For concurrent bass removal efforts, all centrarchids will be measured and removed from the river as well as other non-native predators that may be encountered such as northern pike and walleye. These will be frozen, and either transferred to Colorado Parks and Wildlife or deposited in the county landfill. Data will be turned over to the Principal Investigator for Project 126a (centrarchid removal) for inclusion in their analysis.

The Principal Investigator will train crew members, act as overall crew leader and actively participate in data collection efforts. One higher-grade technician, certified for electrofishing, will be present in each reach, and will function as a sub-reach crew leader. Although the duration of the annual data collection effort is anticipated to be 11-12 weeks, additional time will be required prior to field sampling to ready equipment and train new crew members in motor boat operation and field techniques specific to this project.

The Principal Investigator will work closely with a biostatistician familiar with running program MARK or other appropriate mark-recapture programs that develop estimates of population abundance and rates of survival. Size structure of the population will be analyzed and compared against earlier data (1991-1994, 1998-2000, 2003-2005, 2008-2010, 2013-2015) to determine recent trends in recruitment frequency, identification of strong year-classes, etc. Average body condition will also be monitored as a means to assess fish health.

VII. Task Description and Schedule

Description

- Task 1. Capture and PIT tag endangered fishes (early April-late June)
- Task 2. Input and analyze data
- Task 3. Write annual reports
- Task 4. Prepare final report

Schedule

- Task 1: 2020, 2021 and 2024

- Task 2: 2020, 2021 and 2024
- Task 3: 2020, 2021 and 2024
- Task 4: 2022 (for 2019-2021 population estimate sampling)

Note: No field sampling will occur in 2022 or 2023 (i.e., they are “off years”). Report writing will occur in 2022. No work will occur in 2023. A new 3-year population estimate sampling cycle is scheduled to begin again in 2024

VIII. Deliverables, Due Dates, and Budget by Fiscal Year: Budget Summary:
Annual reports will be submitted each year in November. Data will be submitted to the database manager by the following March. The draft final report will be submitted October 2022.

In addition to annual reports, the PI will submit a short article and photos for inclusion in the 2020 *Swimming Upstream* field report.

Please see Interagency Agreement Cost Estimating Tool Spreadsheet Budget Summary.

FY-2020
USFWS – Grand Junction FWCO (Grand Jct., CO) \$252,237.36
Bio-Statistician (CSU) – funded separately

FY-2021
USFWS – Grand Junction FWCO (Grand Jct., CO) \$257,333.27
Bio-Statistician (CSU) – funded separately

2020-2021 Total = \$509,570.63

Estimated Budget Summary for Fiscal Years 2022-2024:

FY-2022
USFWS – Grand Junction FWCO (Grand Jct., CO) \$ 73,621.07
Bio-Statistician (CSU) – funded separately

FY-2023
USFWS – Grand Junction FWCO (Grand Jct., CO) \$ 0.00
Bio-Statistician (CSU) – funded separately

FY-2024
USFWS – Grand Junction FWCO (Grand Jct., CO) \$274,116.71
Bio-Statistician (CSU) – funded separately

2022-2024 Total = \$347,737.78

5-Year Total = \$857,308.41

IX. Reviewers: Recovery Program Staff and Biology Committee

X. References

Osmundson, D. B. 2002. Population dynamics of Colorado pikeminnow in the upper Colorado River. Final Report. U. S. Fish and Wildlife Service, Grand Junction, Colorado.

Osmundson, D. B. 2009. Population status and trends of Colorado pikeminnow of the upper Colorado River, 1991-2005. Final Report. U. S. Fish and Wildlife Service, Grand Junction, Colorado.

Osmundson, D. B., and K. P. Burnham. 1998. Status and trends of the endangered Colorado squawfish in the upper Colorado River. Transactions of the American Fisheries Society 127:957-970.

Osmundson, D. B., and G. C. White. 2014. Population structure, abundance and recruitment of Colorado pikeminnow of the upper Colorado River, 1991–2010. Final Report. U. S. Fish and Wildlife Service, Grand Junction, Colorado.

Pollock, K. H., J. D. Nichols, C. Brownie, and J. E. Hines. 1990. Statistical inference for capture-recapture experiments. Wildlife Monographs 107.

U.S. Fish and Wildlife Service. 2002. Colorado pikeminnow (*Ptychocheilus lucius*) Recovery Goals: amendment and supplement to the Colorado Squawfish Recovery Plan. U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.

SUMMARY OF PROPOSED COSTS

Name of Servicing Agency:	U.S.F.W.S. Grand Junction Fish and Wildlife Conservation Office
Project Name:	127, Monitoring the Colorado pikeminnow population in the mainstem Colorado River via periodic population estimates.

	YEAR 1		YEAR 2		YEAR 3		YEAR 4		YEAR 5		TOTAL
	10/1/2019		9/30/2020		10/1/2021		10/1/2022		10/1/2023		
	Through		Through		Through		Through		Through		
Enter the BEGINNING dates for each year ----->	9/29/2020		9/30/2021		9/30/2022		9/30/2023		9/29/2024		
Enter the ENDING dates for each year ----->											
DIRECT LABOR AND FRINGE BENEFIT COSTS:	YEAR 1		YEAR 2		YEAR 3		YEAR 4		YEAR 5		TOTAL
Direct Labor - Hourly	\$ 136,921.40		\$ 139,659.83		\$ 46,834.23		\$ -		\$ 148,208.13		\$ 471,623.58
Fringe Benefits - Hourly	\$ 66,211.56		\$ 67,535.79		\$ 23,600.09		\$ -		\$ 71,669.52		\$ 229,016.97
Subtotal of Direct Labor & Fringe Benefits:	\$ 203,132.96		\$ 207,195.62		\$ 70,434.32		\$ -		\$ 219,877.65		\$ 700,640.55
OTHER DIRECT COSTS:	YEAR 1		YEAR 2		YEAR 3		YEAR 4		YEAR 5		TOTAL
Materials and Supplies	\$ 28,987.40		\$ 29,567.15		\$ 522.75		\$ -		\$ 32,308.06		\$ 91,385.36
Travel Costs	\$ 20,117.00		\$ 20,570.50		\$ 2,664.00		\$ -		\$ 21,931.00		\$ 65,282.50
Equipment	\$ -		\$ -		\$ -		\$ -		\$ -		\$ -
Contractors	\$ -		\$ -		\$ -		\$ -		\$ -		\$ -
Subtotal of Other Direct Costs:	\$ 49,104.40		\$ 50,137.65		\$ 3,186.75		\$ -		\$ 54,239.06		\$ 156,667.86
INDIRECT/OVERHEAD COSTS:	YEAR 1		YEAR 2		YEAR 3		YEAR 4		YEAR 5		TOTAL
Subtotal of Labor and Other Direct Costs:	\$ 252,237.36		\$ 257,333.27		\$ 73,621.07		\$ -		\$ 274,116.71		
Total dollars exempt from indirect/overhead base:											
U.S.F.W.S Overhead Rate	3.00%	\$ 7,567.12	3.00%	\$ 7,720.00	3.00%	\$ 2,208.63	3.00%	\$ -	3.00%	\$ 8,223.50	\$ 25,719.25
Total dollars exempt from indirect/overhead base:		\$ -		\$ -		\$ -		\$ -		\$ -	
<Enter Description of Indirect/OH Cost #2>		\$ -	0.00%	\$ -	0.00%	\$ -	0.00%	\$ -	0.00%	\$ -	\$ -
Subtotal of Indirect/Overhead Costs:	\$ 7,567.12		\$ 7,720.00		\$ 2,208.63		\$ -		\$ 8,223.50		\$ 25,719.25
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL					
GRAND TOTAL:	\$ 259,804.48	\$ 265,053.27	\$ 75,829.70	\$ -	\$ 282,340.21	\$ 883,027.67					

SUMMARY OF DIRECT LABOR & FRINGE BENEFITS

Enter Escalation Rates ----->	Yr 2 Escalation Rate	2.00%
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Task # or	Federal Employee Name	Position Title	GS/WG Grade	GS/WG Step	OPM Pay Location	Current Hourly Rate	YEAR 1					YEAR 2				
							10/1/2019		Through	9/29/2020		9/30/2020		Through	9/30/2021	
							# of Hours	Hourly Rate	Salary Cost	Fringe Rate	Fringe Cost	# of Hours	Hourly Rate	Salary Cost	Fringe Rate	Fringe Cost
1	1 through 4	Fish Biologist	11	8	Rest of US	\$ 36.18	1,060.0	\$ 36.18	\$ 38,350.80	51.50%	\$ 19,750.66	1,060.0	\$36.90	\$ 39,117.82	51.50%	\$ 20,145.68
2	1 through 4	Supervisory Biologist	14	8	Rest of US	\$ 60.93	100.0	\$ 60.93	\$ 6,093.00	42.80%	\$ 2,607.80	100.0	\$62.15	\$ 6,214.86	42.80%	\$ 2,659.96
3	1	Bio Technician (Crew Leader)	7	5	Rest of US	\$ 22.46	300.0	\$ 22.46	\$ 6,738.00	65.00%	\$ 4,379.70	300.0	\$22.91	\$ 6,872.76	65.00%	\$ 4,467.29
4	1	Bio Technician (Crew Leader)	6	4	Rest of US	\$ 19.62	340.0	\$ 19.62	\$ 6,670.80	49.80%	\$ 3,322.06	340.0	\$20.01	\$ 6,804.22	49.80%	\$ 3,388.50
5	1	Bio Technician (6 positions)	5	1	Rest of US	\$ 16.00	3,360.0	\$ 16.00	\$ 53,760.00	45.60%	\$ 24,514.56	3,360.0	\$16.32	\$ 54,835.20	45.60%	\$ 25,004.85
6	1 through 4	Administrative Officer	9	8	Rest of US	\$ 29.20	320.0	\$ 29.20	\$ 9,344.00	43.30%	\$ 4,045.95	320.0	\$29.78	\$ 9,530.88	43.30%	\$ 4,126.87
7	1 Overtime	Bio Technician (Crew Leader)	7	5	Rest of US	\$ 33.69	40.0	\$ 33.69	\$ 1,347.60	65.00%	\$ 875.94	40.0	\$34.36	\$ 1,374.55	65.00%	\$ 893.46
8	1 Overtime	Bio Technician (Crew Leader)	6	4	Rest of US	\$ 29.43	40.0	\$ 29.43	\$ 1,177.20	49.80%	\$ 586.25	40.0	\$30.02	\$ 1,200.74	49.80%	\$ 597.97
9	1 Overtime	Bio Technician	5	1	Rest of US	\$ 24.00	560.0	\$ 24.00	\$ 13,440.00	45.60%	\$ 6,128.64	560.0	\$24.48	\$ 13,708.80	45.60%	\$ 6,251.21
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							6,120.00		\$ 136,921.40		\$ 66,211.56	6,120.00		\$ 139,659.83		\$ 67,535.79

SUMMARY OF DIRECT LABOR & FRINGE BENEFITS

Yr 3 Escalation Rate 2.00%

Yr 4 Escalation Rate 2.00%

Task # or	Federal Employee Name	Position Title	GS/WG Grade	GS/WG Step	OPM Pay Location	Current Hourly Rate	YEAR 3					YEAR 4				
							10/1/2021		Through	9/30/2022		10/1/2022		Through	9/30/2023	
							# of Hours	Hourly Rate	Salary Cost	Fringe Rate	Fringe Cost	# of Hours	Hourly Rate	Salary Cost	Fringe Rate	Fringe Cost
1	1 through 4	Fish Biologist	11	8	Rest of US	\$ 36.18	1,080.0	\$ 37.64	\$ 40,653.01	51.50%	\$ 20,936.30		\$ 38.39	\$ -	51.50%	\$ -
2	1 through 4	Supervisory Biologist	14	8	Rest of US	\$ 60.93	40.0	\$ 63.39	\$ 2,535.66	42.80%	\$ 1,085.26		\$ 64.66	\$ -	42.80%	\$ -
3	1	Bio Technician (Crew Leader)	7	5	Rest of US	\$ 22.46		\$ 23.37	\$ -	65.00%	\$ -		\$ 23.83	\$ -	65.00%	\$ -
4	1	Bio Technician (Crew Leader)	6	4	Rest of US	\$ 19.62		\$ 20.41	\$ -	49.80%	\$ -		\$ 20.82	\$ -	49.80%	\$ -
5	1	Bio Technician (6 positions)	5	1	Rest of US	\$ 16.00		\$ 16.65	\$ -	45.60%	\$ -		\$ 16.98	\$ -	45.60%	\$ -
6	1 through 4	Administrative Officer	9	8	Rest of US	\$ 29.20	120.0	\$ 30.38	\$ 3,645.56	43.30%	\$ 1,578.53		\$ 30.99	\$ -	43.30%	\$ -
7	1 Overtime	Bio Technician (Crew Leader)	7	5	Rest of US	\$ 33.69		\$ 35.05	\$ -	65.00%	\$ -		\$ 35.75	\$ -	65.00%	\$ -
8	1 Overtime	Bio Technician (Crew Leader)	6	4	Rest of US	\$ 29.43		\$ 30.62	\$ -	49.80%	\$ -		\$ 31.23	\$ -	49.80%	\$ -
9	1 Overtime	Bio Technician	5	1	Rest of US	\$ 24.00		\$ 24.97	\$ -	45.60%	\$ -		\$ 25.47	\$ -	45.60%	\$ -
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SUMMARY OF DIRECT LABOR & FRINGE BENEFITS

Yr 5 Escalation Rate	2.00%
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							YEAR 5							
							10/1/2023		Through	9/29/2024				
Tas k # or	Federal Employee Name	Position Title	GS/WG Grade	GS/WG Step	OPM Pay Location	Current Hourly Rate	# of Hours	Hourly Rate	Salary Cost	Fringe Rate	Fringe Cost	Total Salary Cost	Total Fringe Cost	Total Labor Cost
1	1 through 4	Fish Biologist	11	8	Rest of US	\$ 36.18	1,060.0	\$ 39.16	\$ 41,512.14	51.50%	\$ 21,378.75	\$ 159,633.76	\$ 82,211.39	\$ 241,845.15
2	1 through 4	Supervisory Biologist	14	8	Rest of US	\$ 60.93	100.0	\$ 65.95	\$ 6,595.26	42.80%	\$ 2,822.77	\$ 21,438.78	\$ 9,175.80	\$ 30,614.58
3	1	Bio Technician (Crew Leader)	7	5	Rest of US	\$ 22.46	300.0	\$ 24.31	\$ 7,293.43	65.00%	\$ 4,740.73	\$ 20,904.19	\$ 13,587.72	\$ 34,491.91
4	1	Bio Technician (Crew Leader)	6	4	Rest of US	\$ 19.62	340.0	\$ 21.24	\$ 7,220.69	49.80%	\$ 3,595.90	\$ 20,695.70	\$ 10,306.46	\$ 31,002.17
5	1	Bio Technician (6 positions)	5	1	Rest of US	\$ 16.00	3,360.0	\$ 17.32	\$ 58,191.55	45.60%	\$ 26,535.35	\$ 166,786.75	\$ 76,054.76	\$ 242,841.51
6	1 through 4	Administrative Officer	9	8	Rest of US	\$ 29.20	320.0	\$ 31.61	\$ 10,114.25	43.30%	\$ 4,379.47	\$ 32,634.69	\$ 14,130.82	\$ 46,765.51
7	1 Overtime	Bio Technician (Crew Leader)	7	5	Rest of US	\$ 33.69	40.0	\$ 36.47	\$ 1,458.69	65.00%	\$ 948.15	\$ 4,180.84	\$ 2,717.54	\$ 6,898.38
8	1 Overtime	Bio Technician (Crew Leader)	6	4	Rest of US	\$ 29.43	40.0	\$ 31.86	\$ 1,274.24	49.80%	\$ 634.57	\$ 3,652.18	\$ 1,818.79	\$ 5,470.97
9	1 Overtime	Bio Technician	5	1	Rest of US	\$ 24.00	560.0	\$ 25.98	\$ 14,547.89	45.60%	\$ 6,633.84	\$ 41,696.69	\$ 19,013.69	\$ 60,710.38
10						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
11						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
12						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
13						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
14						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
15						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
16						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
17						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
18						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
19						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
20						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
21						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
22						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
23						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
24						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
25						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
26						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
27						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
28						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
29						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
30						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
31						\$ -	-	\$ -	\$ -	0.00%	\$ -	\$ -	\$ -	\$ -
							6,120.00		\$ 148,208.13		\$ 71,669.52	\$ 471,623.58	\$ 229,016.97	\$ 700,640.55

SUMMARY OF MATERIALS AND SUPPLIES

SUMMARY OF MATERIALS, SUPPLIES, AND SERVICES

Yr 2 Escalation Rate	2.00%
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	Task #	Item Description	Rationale for Proposed Cost	Year 1			Year 2		
				Unit Price	Quantity	Subtotal	Unit Price	Quantity	Subtotal
1	1 through	Miscellaneous Office Supplies	Refer to previous agreement number R17PG	\$ 1,000.00	1	\$ 1,000.00	\$ 1,020.00	1	\$ 1,020.00
2	1	Miscellaneous Field Supplies	Refer to previous agreement number R17PG	\$ 2,000.00	1	\$ 2,000.00	\$ 2,040.00	1	\$ 2,040.00
3	1	Maintenance	Refer to previous agreement number R17PG	\$ 2,450.00	1	\$ 2,450.00	\$ 2,499.00	1	\$ 2,499.00
4	1	Boat Gas 91 Octane	Refer to previous agreement number R17PG	\$ 3.00	500	\$ 1,500.00	\$ 3.06	500	\$ 1,530.00
5	1	GSA Lease of Equip Code 6359 (monthly lease--7 trucks)	http://www.gsa.gov/portal/category/21852	\$ 453.00	21	\$ 9,513.00	\$ 462.06	21	\$ 9,703.26
6	1	GSA Lease of Equip Code 6359 (mileage rate)	http://www.gsa.gov/portal/category/21852	\$ 0.42	29820	\$ 12,524.40	\$ 0.43	29820	\$ 12,774.89
7				\$ -	0	\$ -	\$ -	0	\$ -
8				\$ -	0	\$ -	\$ -	0	\$ -
9				\$ -	0	\$ -	\$ -	0	\$ -
10				\$ -	0	\$ -	\$ -	0	\$ -
11				\$ -	0	\$ -	\$ -	0	\$ -
12				\$ -	0	\$ -	\$ -	0	\$ -
13				\$ -	0	\$ -	\$ -	0	\$ -
14				\$ -	0	\$ -	\$ -	0	\$ -
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	\$ -
TOTAL:						\$ 28,987.40			\$ 29,567.15

SUMMARY OF MATERIALS AND SUPPLIES

SUMMARY OF MATERIALS, SUP	Yr 3 Escalation Rate	2.50%	Yr 4 Escalation Rate	3.00%
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	Task #	Item Description	Year 3			Year 4		
			Unit Price	Unit Quantity	Subtotal	Unit Price	Unit Quantity	Subtotal
1	1 through	Miscellaneous Office Supplies	\$ 1,045.50	1	\$ 522.75	\$ 1,076.87	0	\$ -
2	1	Miscellaneous Field Supplies	\$ 2,091.00	0	\$ -	\$ 2,153.73	0	\$ -
3	1	Maintenance	\$ 2,561.48	0	\$ -	\$ 2,638.32	0	\$ -
4	1	Boat Gas 91 Octane	\$ 3.14	0	\$ -	\$ 3.23	0	\$ -
5	1	GSA Lease of Equip Code 6359 (monthly lease--7 trucks)	\$ 473.61	0	\$ -	\$ 487.82	0	\$ -
6	1	GSA Lease of Equip Code 6359 (mileage rate)	\$ 0.44	0	\$ -	\$ 0.45	0	\$ -
7			\$ -	0	\$ -	\$ -	0	\$ -
8			\$ -	0	\$ -	\$ -	0	\$ -
9			\$ -	0	\$ -	\$ -	0	\$ -
10			\$ -	0	\$ -	\$ -	0	\$ -
11			\$ -	0	\$ -	\$ -	0	\$ -
12			\$ -	0	\$ -	\$ -	0	\$ -
13			\$ -	0	\$ -	\$ -	0	\$ -
14			\$ -	0	\$ -	\$ -	0	\$ -
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	\$ -
					\$ 522.75			
								\$ -

SUMMARY OF MATERIALS AND SUPPLIES

SUMMARY OF MATERIALS, SUP	Yr 5 Escalation Rate	3.50%
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			Year 5			
Task #	Item Description	Unit Price	Unit Quantity	Subtotal	TOTAL	
1	1 through Miscellaneous Office Supplies	\$ 1,114.56	1	\$ 1,114.56	\$ 3,657.31	
2	1 Miscellaneous Field Supplies	\$ 2,229.11	1	\$ 2,229.11	\$ 6,269.11	
3	1 Maintenance	\$ 2,730.66	1	\$ 2,730.66	\$ 7,679.66	
4	1 Boat Gas 91 Octane	\$ 3.34	500	\$ 1,671.83	\$ 4,701.83	
5	1 GSA Lease of Equip Code 6359 (monthly lease--7 trucks)	\$ 504.89	21	\$ 10,602.76	\$ 29,819.02	
6	1 GSA Lease of Equip Code 6359 (mileage rate)	\$ 0.47	29820	\$ 13,959.14	\$ 39,258.43	
7		\$ -	0	\$ -	\$ -	
8		\$ -	0	\$ -	\$ -	
9		\$ -	0	\$ -	\$ -	
10		\$ -	0	\$ -	\$ -	
11		\$ -	0	\$ -	\$ -	
12		\$ -	0	\$ -	\$ -	
13		\$ -	0	\$ -	\$ -	
14		\$ -	0	\$ -	\$ -	
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	\$ -	\$ -	
				\$ 32,308.06	\$ 91,385.36	

SUMMARY OF TRAVEL COSTS

Cost Element	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Trip #	1	1	1	1	1	
From-To	Grand Junction to Black Rocks	Grand Junction to Black Rocks			Grand Junction to Black Rocks	
Reason	Camping/Field Work	Camping/Field Work			Camping/Field Work	
# of Days (include travel days)	2	2			2	
Airfare		\$ -			\$ -	
Lodging (Per Night)		\$ -			\$ -	
MI&E Per Day	\$ 46.00	\$ 47.00			\$ 50.00	
Auto Rental Per Day		\$ -			\$ -	
Total Per Trip	\$ 69.00	\$ 70.50	\$ -	\$ -	\$ 75.00	
No. of persons	5	5			5	
No. of trips	5	5			5	
SUBTOTAL =	\$ 1,725.00	\$ 1,762.50	\$ -	\$ -	\$ 1,875.00	\$ 5,362.50

Cost Element	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Trip #	2	2	2	2	2	
From-To	Grand Junction to Cisco	Grand Junction to Cisco			Grand Junction to Cisco	
Reason	Camping/Field Work	Camping/Field Work			Camping/Field Work	
# of Days (include travel days)	2	2			2	
Airfare	\$ -	\$ -			\$ -	
Lodging (Per Night)	\$ -	\$ -			\$ -	
MI&E Per Day	\$ 46.00	\$ 47.00			\$ 50.00	
Auto Rental Per Day	\$ -	\$ -			\$ -	
Total Per Trip	\$ 69.00	\$ 70.50			\$ 75.00	
No. of persons	5	5			5	
No. of trips	4	4			4	
SUBTOTAL =	\$ 1,380.00	\$ 1,410.00	\$ -	\$ -	\$ 1,500.00	\$ 4,290.00

Cost Element	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Trip #	3	3	3	3	3	
From-To	Grand Junction to Professor Valley	Grand Junction to Professor Valley			Grand Junction to Professor Valley	
Reason	Camping/Field Work	Camping/Field Work			Camping/Field Work	
# of Days (include travel days)	2	2			2	
Airfare	\$ -	\$ -			\$ -	
Lodging (Per Night)	\$ -	\$ -			\$ -	
MI&E Per Day	\$ 46.00	\$ 47.00			\$ 50.00	
Auto Rental Per Day	\$ -	\$ -			\$ -	
Total Per Trip	\$ 69.00	\$ 70.50			\$ 75.00	

No. of persons	4	4		4	4	
No. of trips	4	4		4	4	
SUBTOTAL =	\$ 1,104.00	\$ 1,128.00	\$ -	\$ -	\$ 1,200.00	\$ 3,432.00

Cost Element	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Trip #	4	4	4	4	4	
From-To	Grand Junction to Moab	Grand Junction to Moab			Grand Junction to Moab	
Reason	Hotel/Field Work	Hotel/Field Work			Hotel/Field Work	
# of Days (include travel days)	3	3			3	
Airfare	\$ -	\$ -			\$ -	
Lodging (Per Night)	\$ 181.00	\$ 185.00			\$ 197.00	
MI&E Per Day	\$ 77.00	\$ 79.00			\$ 85.00	
Auto Rental Per Day	\$ -	\$ -			\$ -	
Total Per Trip	\$ 735.50	\$ 752.50			\$ 803.50	
No. of persons	4	4			4	
No. of trips	4	4			4	
SUBTOTAL =	\$ 11,768.00	\$ 12,040.00	\$ -	\$ -	\$ 12,856.00	\$ 36,664.00

Cost Element	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Trip #	5	5	5	5	5	
From-To	Potash to Confluence of Green River	Potash to Confluence of Green River			Potash to Confluence of Green River	
Reason	Camping/Field Work	Camping/Field Work			Camping/Field Work	
# of Days (include travel days)	5	5			5	
Airfare	\$ -	\$ -			\$ -	
Lodging (Per Night)	\$ -	\$ -			\$ -	
MI&E Per Day	\$ 46.00	\$ 47.00			\$ 50.00	
Auto Rental Per Day	\$ -	\$ -			\$ -	
Total Per Trip	\$ 207.00	\$ 211.50			\$ 225.00	
No. of persons	5	5			5	
No. of trips	4	4		4	4	
SUBTOTAL =	\$ 4,140.00	\$ 4,230.00	\$ -	\$ -	\$ 4,500.00	\$ 12,870.00

Task 2	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Trip #	6	6	6	6	6	
From-To			Grand Junction to Lakewood			
Reason			Working Group Mtg, Researchers Meeting, etc			
# of Days (include travel days)			5			
Airfare			\$ -			
Lodging (Per Night)			\$ 189.00			

MI&E Per Day			\$ 86.00			
Auto Rental Per Day			\$ -			
Total Per Trip			\$ 1,332.00			
No. of persons			2			
No. of trips			1			
SUBTOTAL =	\$ -	\$ -	\$ 2,664.00	\$ -	\$ -	\$ 2,664.00
	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
TOTAL COST BY PERIOD =	\$ 20,117.00	\$ 20,570.50	\$ 2,664.00	\$ -	\$ 21,931.00	\$ 65,282.50