

**COLORADO RIVER RECOVERY PROGRAM
FY 2014-2018 SCOPE OF WORK for:**

Project Number: 15

Identification and Curation of Larval and Juvenile Fish

Reclamation Agreement number *[if applicable & known]*: _____
Reclamation Agreement term *[if applicable & known, e.g., Oct. 1, 2013 – Sep. 30, 2018]*: _____

Lead agency: Larval Fish Laboratory, Colorado State University

Submitted by: Kevin R. Bestgen, Project Manager

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Category:

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

Expected Funding Source:

- Annual funds
- Capital funds
- Other

I. Title of Proposal:

Identification and Curation of Larval and Juvenile Fish by Colorado State University Larval Fish Laboratory.

II. 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. Conduct research to acquire needed life history information.
- V.E. Provide for long-term care, cataloging, and accessibility of preserved specimens.

III. Study Background/Rationale and Hypotheses:

This project supports Larval Fish Laboratory (LFL) taxonomic and analytical services for specific Recovery Program projects (Task 1, Taxonomic Services). Incidental taxonomic

services and consultation on larval and juvenile fish taxonomy, sampling techniques, and collection handling are also provided, as needed and time allows, to Upper Colorado River Basin (UCRB) researchers.

The project also provides ongoing curation (maintenance and management) of the growing Upper Colorado River Basin (UCRB) portion of the LFL Collection. LFL currently maintains approximately 3,800,000 UCRB specimens in about 118,000 taxon-specific lots as voucher for Recovery Program and earlier and related UCRB investigations. These collections are an invaluable, long-term, historical resource for future reference and research. Some collections are over quarter century old, dating back to 1976. New collections are cataloged and added to the LFL Collection as they are received or processed by LFL. As the holdings of the LFL Collection become better known, we expect use of UCRB collections will increase substantially, both within and outside the Recovery Program.

As part of the curatorial effort, we continue to pursue arrangements to help ensure collection permanency. In part through the efforts of the principal investigator, preliminary plans continue to develop for administratively and physically consolidating most of the university's Natural History Research Collections (including the LFL Collection) to provide better long-term recognition, support, and facilities for those collections as a functional unit of Colorado State University.

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

Goal—

To provide taxonomic and curatorial services for various Recovery Program projects.

Objectives—

Support Recovery Program researchers by identifying, processing, cataloging, and curating preserved fish, or analyzing otoliths, in specifically designated sets of collections submitted to LFL under this project (Task 1), currently collections from:

- Project 22F, LFL—samples to assess Yampa and Middle-Green Colorado pikeminnow and razorback sucker larval abundance and samples collected in the White River.
- Project 158, Utah Division of Wildlife Resources and U. S. Fish and Wildlife Service, Vernal, Utah offices—samples associated with middle Green River drift and backwater sampling aimed at understanding factors contributing to the decline of age-0 Colorado pikeminnow (Task 1b) and ISMP samples collected at the same time. No money accepted due to study suspension.
- Project 160, Utah Division of Wildlife Resources, Moab, Utah—samples associated with increased light-trap sampling in the lower Green River for age-0 razorback sucker (Task 1c).
- Project 161, Larval Fish Laboratory—Analyze otoliths of age-0 smallmouth bass from the Colorado River (Task 1d). Request no money be sent in 2014, sample analysis not needed.
- Project 163, USFWS, Grand Junction, Colorado—Samples associated with Gunnison River fish community monitoring.
- Project FR-164, USFWS, Vernal, Utah—Samples associated with Green River Larval Trigger Study Plan monitoring in floodplain wetlands in the Green River Basin.
- Project FR-165, UDWR, Vernal, Utah—Samples associated with Green River Larval Trigger Study Plan monitoring in Stewart Lake floodplain wetland.

Provide, as needed and time allows, incidental taxonomic services and consultation on taxonomy, collecting techniques, and collection handling to other Recovery Program projects and researchers (Task 1).

Catalog and incorporate in the LFL Collection other preserved UCRB specimens deposited by Recovery Program projects and researchers (Task 2).

Continue curation (maintenance and management) of all cataloged UCRB specimens in the LFL Collection (Task 2).

End Products—

Annual project reports.

Collection or analysis data for Project 22F, 160, 163, FR-164, and FR-165 researchers.

Other determinations of specimen identity and data.

Cataloging and incorporation of taxonomic services project collections and other deposited UCRB fish collections in the LFL Collection.

Continued maintenance and management of, and access to, the cataloged collection of preserved fish which serve as voucher for Recovery Program investigations and provide a long-term resource for future Recovery Program and other public reference and research.

V. Study Area:

The Recovery Program collections identified, processed, and curated by LFL were or will be collected from cool to warm-water reaches of the UCRB, generally exclusive of the San Juan River subbasin.

VI. Study Methods/Approach:

Taxonomic Services—We will identify preserved specimens (mostly larvae) or analyze otoliths collected and submitted by other Recovery Program projects specified above and process, catalog, and curate the fish collections as part of the LFL Collection. Limited incidental taxonomic services and related consultation for other Recovery Program projects and researchers also will be provided as needed and time allows.

Ongoing Curation—The LFL Collection will continue to serve as the depository for larval and other small fish from preserved Recovery Program collections. Methods for receiving, accessioning, cataloging, maintaining, and managing use of these preserved specimens are provided in our draft "Larval Fish Laboratory Collection Policies and Procedures Manual" (Appendix II, Snyder 1996), as adapted for our SPECIFY Collection Management System. We will respond to internal and external requests for collection information and use of specimens; Recovery Program approval will be required for any destructive use or transfer of endangered or rare species. We will continue our effort to ensure collection permanency, in part through planned consolidation of Colorado State University Natural History Research Collections.

VII. Task Description and Schedule:

Task 1: Taxonomic Services—As soon as possible after receipt, collections for Recovery Program projects listed below will be identified and otherwise processed, and as time allows, other incidentally requested taxonomic services and consultations.

1a: Collection identification, processing, and curation for Project 22F, includes final identification of Yampa, middle Green, and White River light trap and drift net samples.

1b: Collection identification, processing, and curation for Project 158, UDWR and USFWS backwater study. Study suspended, no budget requested.

1c: Collection identification, processing, and curation for Project 160, lower Green River light trap and seine samples.

1d: Otolith analyses of age-0 smallmouth bass for Project 161. Study data collection not needed, no budget requested.

1e: Collection identification, processing, and curation for Project 163, Gunnison River monitoring, USFWS, Grand Junction.

1f: Collection identification, processing, and curation for Project FR-164, Larval Trigger Study Plan samples, USFWS, Vernal, Utah.

1g: Collection identification, processing, and curation for Project FR-165, Larval Trigger Study Plan samples, Stewart Lake, UDWR, Vernal, Utah.

Task 2: Ongoing Curation—As needed throughout each fiscal year.

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

FY 2014:

Deliverables and Due Dates:

LFL will record and submit collection data to Project 22F, 160, 163, FR-164, and FR-165 researchers as soon as the collections are processed.

Other taxonomic determinations and related information and suggestions will be conveyed to requesting researchers as time allows.

Annual report—November 2014 (each year).

Travel: Travel costs for up to two meetings include hotel, per diem, and mileage to travel to meetings. These include costs for two people.

Personnel: Salaries include 27% fringe rate, an estimate for 2014, plus overhead. Overhead is calculated on all items (including salary plus fringe rate) at 17.5%, per our agreement with BOR.

Supplies: Supplies are used in the conduct of lab analysis of specimens and otoliths. Containers and preservatives are to hold field specimens and to curate specimens in the lab, preservative are formalin and ethanol for preservation of samples. Estimated costs based on current prices procured from various online sources (e.g., Fischer Scientific for preservatives, sample jars, vials).

Budget notes: Costs were reduced to accommodate Program needs. This was accomplished by eliminating Colorado River smallmouth bass otolith analysis, eliminating funding for sample analysis under Project 158 (Green River backwater studies), building in only minimal raises for salary between 2013 and 2014, and decreasing costs for sample identification and other analyses; budget was static from

2011-2013. Increases in other years needed to support mandated raises for personnel; increased sample costs or new project additions may change budget.

Budget

FY-2014		Task 1a, project 22f sample identification and curation		
Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	45	495		\$22,275
Senior technician (d)	40	226		\$9,040
Technician (d)	35	145		\$5,075
			subtotal	\$36,390
Supplies				
jars and vials	4	100		\$400
preservative	12	11		\$132
			subtotal	\$532
Travel				
meetings	2	800		\$1,600
			subtotal	\$1,600
			Total	\$38,522

FY-2014		Project suspended Task 1b, project 158 sample identification and curation		
Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	0	495		\$0
Senior technician (d)	0	226		\$0
Technician (d)	0	145		\$0
	0			
	0		subtotal	\$0
Supplies				
jars and vials	0	100		\$0
preservative	0	11		\$0
			subtotal	\$0

Total \$0

FY-2014 Task 1c, project 160 sample identification and curation

Item	Units	Cost/unit	Cost
Labor			
Principal investigator (d)	35	495	\$17,325
Senior technician (d)	45	226	\$10,170
Technician (d)	35	145	\$5,075
		subtotal	\$32,570
Supplies			
jars and vials	3	100	\$300
preservative	8	11	\$88
		subtotal	\$388
		Total	\$32,958

FY-2014 Task 1d, project 161 SMB otolith work, no funding accepted

FY-2014 Task 1e, project 163 sample identification and curation

Item	Units	Cost/unit	Cost
Labor			
Principal investigator (d)	85	495	\$42,075
Senior technician (d)	130	226	\$29,380
Technician (d)	150	145	\$21,750
		subtotal	\$93,205
Supplies			
jars and vials	16	100	\$1,600
preservative	18	11	\$198
		subtotal	\$1,798
		Total	\$95,003

FY-2014		Task 1f, project FR 164 sample identification and curation		
Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	25	495		\$12,375
Senior technician (d)	30	226		\$6,780
Technician (d)	25	145		\$3,625
			subtotal	\$22,780
Supplies				
jars and vials	2	100		\$200
preservative	6	11		\$66
			subtotal	\$266
			Total	\$23,046

FY-2014		Task 1g, project FR 165 sample identification and curation		
Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	25	495		\$12,375
Senior technician (d)	35	226		\$7,910
Technician (d)	25	145		\$3,625
			subtotal	\$23,910
Supplies				
jars and vials	2	100		\$200
preservative	6	11		\$66
			subtotal	\$266
			Total	\$24,176

FY-2014		Task 2, ongoing curation and collection maintenance		
Item				Cost

Labor	Units	Cost/unit		
Principal investigator (d)	20	495		\$9,900
Senior technician (d)	25	226		\$5,650
Technician (d)	25	145		\$3,625
			subtotal	\$19,175
Supplies				
jars and vials	3	100		\$300
preservative	9	11		\$99
			subtotal	\$399
			Total	\$19,574

FY-2014 total \$233,279

FY-2015		Task 1a, project 22f sample identification and curation		
Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	45	510		\$22,943
Senior technician (d)	40	233		\$9,311
Technician (d)	35	149		\$5,227
			subtotal	\$37,482
Supplies				
jars and vials	4	100		\$400
preservative	12	11		\$132
			subtotal	\$532
Travel				
meetings	2	800		\$1,600
			subtotal	\$1,600
			Total	\$39,614

FY-2015		Task 1c, project 160 sample identification and curation		
Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	35	510		\$17,845
Senior technician (d)	45	233		\$10,475
Technician (d)	35	149		\$5,227
			subtotal	\$33,547
Supplies				
jars and vials	3	100		\$300
preservative	8	11		\$88
			subtotal	\$388
			Total	\$33,935

FY-2015		Task 1e, project 163 sample identification and curation		
Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	85	510		\$43,337
Senior technician (d)	130	233		\$30,261
Technician (d)	150	149		\$22,403
			subtotal	\$96,001
Supplies				
jars and vials	16	100		\$1,600
preservative	18	11		\$198
			subtotal	\$1,798
			Total	\$97,799

FY-2015		Task 1f, project FR 164 sample identification and curation		
Item				Cost
Labor	Units	Cost/unit		

Principal investigator (d)	25	510	\$12,746
Senior technician (d)	30	233	\$6,983
Technician (d)	25	149	\$3,734
			subtotal
			\$23,463
Supplies			
jars and vials	2	100	\$200
preservative	6	11	\$66
			subtotal
			\$266
			Total
			\$23,729

FY-2015 Task 1g, project FR 165 sample identification and curation

Item			Cost
Labor	Units	Cost/unit	
Principal investigator (d)	25	510	\$12,746
Senior technician (d)	35	233	\$8,147
Technician (d)	25	149	\$3,734
			subtotal
			\$24,627
Supplies			
jars and vials	2	100	\$200
preservative	6	11	\$66
			subtotal
			\$266
			Total
			\$24,893

FY-2015 Task 2, ongoing curation and collection maintenance

Item			Cost
Labor	Units	Cost/unit	
Principal investigator (d)	20	510	\$10,197
Senior technician (d)	25	233	\$5,820
Technician (d)	25	149	\$3,734

			subtotal	\$19,750
Supplies				
jars and vials	3	100		\$300
preservative	9	11		\$99
			subtotal	\$399
Total				\$20,149
FY-2015 total				\$240,120

FY-2016	Task 1a, project 22f sample identification and curation			
Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	45	525		\$23,632
Senior technician (d)	40	240		\$9,591
Technician (d)	35	154		\$5,384
subtotal				\$38,606
Supplies				
jars and vials	4	100		\$400
preservative	12	11		\$132
subtotal				\$532
Travel				
meetings	2	800		\$1,600
subtotal				\$1,600
Total				\$40,738

FY-2016	Task 1c, project 160 sample identification and curation			
Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	35	525		\$18,380

Senior technician (d)	45	240	\$10,789
Technician (d)	35	154	\$5,384
			subtotal
			\$34,554
Supplies			
jars and vials	3	100	\$300
preservative	8	11	\$88
			subtotal
			\$388
			Total
			\$34,942

FY-2016 Task 1e, project 163 sample identification and curation

Item			Cost
Labor	Units	Cost/unit	
Principal investigator (d)	85	525	\$44,637
Senior technician (d)	130	240	\$31,169
Technician (d)	150	154	\$23,075
			subtotal
			\$98,881
Supplies			
jars and vials	16	100	\$1,600
preservative	18	11	\$198
			subtotal
			\$1,798
			Total
			\$100,679

FY-2016 Task 1f, project FR 164 sample identification and curation

Item			Cost
Labor	Units	Cost/unit	
Principal investigator (d)	25	525	\$13,129
Senior technician (d)	30	240	\$7,193
Technician (d)	25	154	\$3,846
			subtotal
			\$24,167
Supplies			

jars and vials	2	100	\$200
preservative	6	11	\$66
			subtotal
			\$266
			Total
			\$24,433

FY-2016 Task 1g, project FR 165 sample identification and curation

Item	Units	Cost/unit	Cost
Labor			
Principal investigator (d)	25	525	\$13,129
Senior technician (d)	35	240	\$8,392
Technician (d)	25	154	\$3,846
			subtotal
			\$25,366
Supplies			
jars and vials	2	100	\$200
preservative	6	11	\$66
			subtotal
			\$266
			Total
			\$25,632

FY-2016 Task 2, ongoing curation and collection maintenance

Item	Units	Cost/unit	Cost
Labor			
Principal investigator (d)	20	525	\$10,503
Senior technician (d)	25	240	\$5,994
Technician (d)	25	154	\$3,846
			subtotal
			\$20,343
Supplies			
jars and vials	3	100	\$300
preservative	9	11	\$99
			subtotal
			\$399
			Total
			\$20,742

FY-2016 total \$247,166

FY-2017		Task 1a, project 22f sample identification and curation		
Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	45	541		\$24,340
Senior technician (d)	40	247		\$9,878
Technician (d)	35	158		\$5,546
			subtotal	\$39,764
Supplies				
jars and vials	4	100		\$400
preservative	12	11		\$132
			subtotal	\$532
Travel				
meetings	2	800		\$1,600
			subtotal	\$1,600
			Total	\$41,896

FY-2017		Task 1c, project 160 sample identification and curation		
Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	35	541		\$18,931
Senior technician (d)	45	247		\$11,113
Technician (d)	35	158		\$5,546
			subtotal	\$35,590
Supplies				
jars and vials	3	100		\$300
preservative	8	11		\$88

subtotal \$388

Total \$35,978

FY-2017 Task 1e, project 163 sample identification and curation

Item			Cost
Labor	Units	Cost/unit	
Principal investigator (d)	85	541	\$45,976
Senior technician (d)	130	247	\$32,104
Technician (d)	150	158	\$23,767
			subtotal \$101,848
Supplies			
jars and vials	16	100	\$1,600
preservative	18	11	\$198
			subtotal \$1,798
			Total \$103,646

FY-2017 Task 1f, project FR 164 sample identification and curation

Item			Cost
Labor	Units	Cost/unit	
Principal investigator (d)	25	541	\$13,522
Senior technician (d)	30	247	\$7,409
Technician (d)	25	158	\$3,961
			subtotal \$24,892
Supplies			
jars and vials	2	100	\$200
preservative	6	11	\$66
			subtotal \$266
			Total \$25,158

FY-2017		Task 1g, project FR 165 sample identification and curation		
Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	25	541		\$13,522
Senior technician (d)	35	247		\$8,643
Technician (d)	25	158		\$3,961
			subtotal	\$26,127
Supplies				
jars and vials	2	100		\$200
preservative	6	11		\$66
			subtotal	\$266
			Total	\$26,393

FY-2017		Task 2, ongoing curation and collection maintenance		
Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	20	541		\$10,818
Senior technician (d)	25	247		\$6,174
Technician (d)	25	158		\$3,961
			subtotal	\$20,953
Supplies				
jars and vials	3	100		\$300
preservative	9	11		\$99
			subtotal	\$399
			Total	\$21,352

FY-2017 total \$254,424

FY-2018		Task 1a, project 22f sample identification and curation		
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Item	Units	Cost/unit	Cost
Labor			
Principal investigator (d)	45	557	\$25,071
Senior technician (d)	40	254	\$10,175
Technician (d)	35	163	\$5,712
		subtotal	\$40,957
Supplies			
jars and vials	4	100	\$400
preservative	12	11	\$132
		subtotal	\$532
Travel			
meetings	2	800	\$1,600
		subtotal	\$1,600
		Total	\$43,089

FY-2018		Task 1c, project 160 sample identification and curation	
Item	Units	Cost/unit	Cost
Labor			
Principal investigator (d)	35	557	\$19,499
Senior technician (d)	45	254	\$11,446
Technician (d)	35	163	\$5,712
		subtotal	\$36,658
Supplies			
jars and vials	3	100	\$300
preservative	8	11	\$88
		subtotal	\$388
		Total	\$37,046

FY-2018		Task 1e, project 163 sample identification and curation		
Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	85	557		\$47,356
Senior technician (d)	130	254		\$33,067
Technician (d)	150	163		\$24,480
			subtotal	\$104,903
Supplies				
jars and vials	16	100		\$1,600
preservative	18	11		\$198
			subtotal	\$1,798
			Total	\$106,701

FY-2018		Task 1f, project FR 164 sample identification and curation		
Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	25	557		\$13,928
Senior technician (d)	30	254		\$7,631
Technician (d)	25	163		\$4,080
			subtotal	\$25,639
Supplies				
jars and vials	2	100		\$200
preservative	6	11		\$66
			subtotal	\$266
			Total	\$25,905

FY-2018		Task 1g, project FR 165 sample identification and curation		
Item				Cost
Labor	Units	Cost/unit		
Principal investigator (d)	25	557		\$13,928

Senior technician (d)	35	254	\$8,903
Technician (d)	25	163	\$4,080
			subtotal
			\$26,911
Supplies			
jars and vials	2	100	\$200
preservative	6	11	\$66
			subtotal
			\$266
			Total
			\$27,177

FY-2018		Task 2, ongoing curation and collection maintenance	
Item			Cost
Labor	Units	Cost/unit	
Principal investigator (d)	20	557	\$11,143
Senior technician (d)	25	254	\$6,359
Technician (d)	25	163	\$4,080
			subtotal
			\$21,582
Supplies			
jars and vials	3	100	\$300
preservative	9	11	\$99
			subtotal
			\$399
			Total
			\$21,981
			FY-2018 total
			\$261,899

IX. Budget Summary

Year	LFL
2014	\$233,279
2015	\$240,120
2016	\$247,166
2017	\$254,424
2018	\$261,899

X. Reviewers: (Not applicable—ongoing project)

XI. References:

Snyder, D. E. 1996. Preserved larval and small-fish collections of the Upper Colorado River Basin: maintenance and cataloging of a valuable historical database. Final Report of the Larval Fish Laboratory, Colorado State University, to the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin, U.S. Fish and Wildlife Service, Denver, Colorado. (24 April 1996).
