

I. Project Title: Identification and Curation of Larval and Juvenile Fish by Colorado State University Larval Fish Laboratory.

II. Bureau of Reclamation Agreement Number(s): R14AP00001

Project/Grant Period: Start date (Mo/Day/Yr): 10/01/14  
End date: (Mo/Day/Yr): 09/30/18  
Reporting period end date: 09/30/17  
Is this the final report? Yes \_\_\_\_\_ No X

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IV. Abstract: This ongoing project supports Larval Fish Laboratory (LFL) taxonomic, analytical, and curatorial services for specific Recovery Program projects, and as time allows, other incidentally requested taxonomic services and consultation (Task 1). It also provides for ongoing curation (maintenance and management) of the LFL Collection, including controlled access to and use of collection holdings and data by UCRB and other researchers (Task 2).

V. Study Schedule: Ongoing project since 1995. Collections from the following projects are identified, processed, and curated annually with the resultant data provided to the principal investigator as soon as logistically possible after the collections are received: Project 22F, LFL—preliminarily identified drift-net and light-trap samples from the lower Yampa, Middle-Green, and White Rivers to assess the larval abundance of Colorado Pikeminnow and Razorback Sucker (Task 1a); Project 138, Utah Division of Wildlife resources, Vernal and Moab offices—Interagency Standardized Monitoring Program sample identification/verification as needed; Project 158, Utah Division of Wildlife Resources (UDWR) and U. S. Fish and Wildlife Service (USFWS), Vernal offices—drift and backwater samples from the Middle-Green River to help assess factors contributing to the decline of age-0 Colorado Pikeminnow and simultaneously collected ISMP samples (Task 1b—backlog, study suspended in 2013); Project 160, UDWR, Moab—light-trap samples for age-0 razorback sucker and seine samples from the lower Green River (Task 1c); Project 163, USFWS, Grand Junction—samples associated with

Gunnison River fish community monitoring (Task 1e); Project FR-164, USFWS, Vernal—samples associated with Green River Larval Trigger Study Plan monitoring in floodplain wetlands (Task 1f); and Project FR-165, UDWR, Vernal— samples associated with Green River Larval Trigger Study Plan monitoring in Stewart Lake floodplain (Task 1g). This project also supports work for Project 161, LFL— analysis of otoliths from age-0 smallmouth bass taken in the Colorado River (Task 1d), but no analysis was needed or funded for 2014 or 2015. Incidental taxonomic services and consultation on early life-stage taxonomy, sampling techniques, and collection handling are addressed as needed and time allows (also Task 1). General collection maintenance activities (e.g., fluid level and container checks) are conducted annually; other maintenance and management concerns, including National Park Service inventory checks of cross-catalogued holdings are addressed as needed and newly deposited and backlog collections are cataloged as time permits (Task 2). Responses to requests for loans, collection use, or information on collection holdings are provided as needed (also Task 2).

VI. Relationship to RIPRAP: This project is related to General Recovery Program Support Action Plan V (monitor populations and habitat and conduct research to support recovery actions—research, monitoring, and data management). Identification and processing of collections for Projects 22F, 138, 158, 160, 163, FR-164, and FR-165 and otolith analyses for Project 161 contribute to Tasks V.A (measure and document population and habitat parameters to determine status and biological response to recovery actions) and V.B (conduct research to acquire needed life history information). An additional task added for 2018 was statistical analysis of data, mainly for Grand Junction FWS, and was grouped under this project to streamline the process for transferring and receiving funding. The remainder of this project specifically addresses Task V.E (provide for long-term care, cataloging, and accessibility of preserved specimens) and, in that preserved specimens are the ultimate natural history database, contributes to Task V.A.1 (conduct interagency data management program to compile, manage, and maintain all research and monitoring data collected by the Recovery Program).

VII. Accomplishments of FY 2017 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Task 1, Taxonomic Services—The following preserved collections were processed.

Task 1a (Project 22F): in 2016, 184 Yampa River drift net samples (662 lots-4,193 specimens) and 15 Green River drift net samples (15 lots-17 specimens). Also in 2016, 152 razorback sucker light-trap collections (394 lots-4,900 specimens) were taken from the middle Green River.

Project 138: in 2016, provided a single Green River sample (2 lots-7 specimens).

Task 1b (Project 158): no samples were received, suspended in 2013.

Task 1c (Project 160): in 2016, 99 light-trap (242 lots-8,279 specimens) and 13 seine (25 lots-82 specimen) collections were taken in the lower Green River. There were 78 Colorado River light-trap (231 lots-2,636 specimens) and 5 seine (6 lots-28 specimens) collections taken and processed. In addition, 6 light-trap (17 lots-48 specimens) and 2

seine (3 lots-4 specimens) collections were taken at the Scott Matheson Wetlands Preserve. A single light-trap or seine sample (1 lot-5 specimens) was taken at Range Creek, Green River, river mile 151.3 on 24 June 2016 (31.5 river miles above Green River, UT, sample number DesoB16-01), which contained 9-10 mm TL smallmouth bass. Task 1e (Project 163): in 2016, 110 Colorado River dip nets (250 lots-960 specimens and 174 Gunnison River dip nets (443 lots-1,937 specimens) were processed. Task 1g (Project FR-165): in 2016, 108 light-trap collections taken in Stewart Lake (227 lots-810 specimens). All processed specimens have been cataloged and shelved as part of the LFL Collection and the collection data forwarded to the responsible principal investigators (PIs) for analysis and reporting.

Task 2, Ongoing Collection Maintenance and Management—We: (1) added, as of 30 September, a total of 4,528 lots of fish (135,334 specimens) from UCRB collections or investigations to the cataloged collection (Appendix A), (2) submitted an updated *Access* database version of our catalog records through FY 2017 (selected fields, flat file) to the Interagency Database Management Program (IDMP) archive, (3) made collection holdings and selected data available to UCRB researchers and other interested parties, and inventory checks requested by the NPS, (4) responded to incidental requests from UCRB researchers for taxonomic assistance or consultation on larval-fish sampling and collection handling matters, (5) corrected incidentally found errors in our catalog database, (6) updated and tested the latest version of our collection database and management program, *Specify 6*, and (7) conducted an annual fluid level and condition check of our holdings. As of 30 September 2017, we maintain and manage 135,772 lots of cataloged fish (4,310,583 specimens) collected from the UCRB or used for UCRB Recovery Program investigations. These holdings represent almost 96% of all LFL cataloged lots (just over 97% of all cataloged specimens).

No significant progress was made in FY 2017 towards plans for housing the LFL Collection and other natural history collections on campus together as a university natural history museum. The museum facility awaits adequate development-grant funding.

Shortcomings—None.

- VIII. Additional noteworthy observations: Reports of such observations are appropriately deferred to the PI's to whom the processed collection data has been submitted.
- IX. Recommendations: We recommend continued annual support of Project 15 with sufficient funds for processing newly preserved collections covered by this project, incidental taxonomic services and consultation, and on-going maintenance and management (curation) of all UCRB specimens held by LFL.
- X. Project Status: On-track and ongoing.

XI. FY 2017 Budget Status

- A. Funds Provided: \$240,120
- B. Funds Expended: \$110,000 C. Difference: \$130,200  
Explanation: Additional work remains to accomplish 2017 tasks; see Section VII.
- D. Percent of FY 2017 work completed and projected costs to complete: about 40% of work completed; funds are sufficient to complete tasks. This is a larger amount than usual because we received samples and funding much later than we usually do (July 2017) because of Department of Interior reviews of Cooperative Agreements in Washington, DC.
- E. Recovery Program funds spent for publication charges: \$0

XII. Status of Data Submission: 2016 collection data for Project 22F (Task 1a) was internally submitted to Kevin Bestgen. 2016 collection data for Project 160 (Task 1c) was submitted to respective PI's. 2016 collection data for Project 163 (Task 1e) was submitted to respective PI's. 2016 collection data for Project FR-165 (Task 1g) was submitted to respective PI's. An updated *Access* database version of our LFL Collection catalog for UCRB holdings (selected fields, flat file) through FY 2017 was submitted to the IDMP archive.

- XIII. Signed: Darrel E. Snyder  
Principal Investigator                      Date:
- Signed: Sean C. Seal  
Principal Investigator                      Date:
- Signed: Kevin R. Bestgen  
Principal Investigator,                      Date: 10 Nov. 2017  
Project Manager

APPENDIX A:

Study-year sets of Upper Colorado River Basin collection-species lots cataloged as part of the Colorado State University Larval Fish Laboratory Collection from October 1, 2016 through September 30, 2017 (4,528 lots; 135,334 specimens).

Catalog No.	Field Numbers	Description of Sample Sets
137247-7906	LFL-16YA-6231 to 8163	16 Larvae, DR, Yampa R, Echo Pk,DNM, CO
137906-7921	LFL-16GR-7181 to 8132	16 Larvae, DR, Green R, Echo Pk,DNM, CO
137922-8678	LFL-15GR-LW001 to LW051	15 SN, Green R, Lodore-Whirlpool, CO, UT
138679-8681	(non-UCRB collection)	
138682-8683	UDWR-16GR-ISMP01	16 SN, Green R, UT
138684-9077	FWS/V-16RZ-001 to 226	16 Larvae, RZ LT, Green R, UT
139078-9319	UDWR-16LRZ-GL001 to GL112	16 Larvae, Lower RZ LT, Green R, UT
139320-9344	UDWR-16LRZ-GS001 to GS094	16 Larvae, Lower RZ SN, Green R, UT
139345-9575	UDWR-16LRZ-CL001 to CL092	16 Larvae, Lower RZ LT, Colorado R, UT
139576-9581	UDWR-16LRZ-CS022 to CS079	16 Larvae, Lower RZ SN, Colorado R, UT
139582-9598	UDWR-16LRZ-CML02 to CML11	16 Larvae, Lower RZ LT, Matheson Preserve, Colorado R, UT
139599-9601	UDWR-16LRZ-CMS01 to CMS02	16 Larvae, Lower RZ SN, Matheson Preserve, Colorado R, UT
139602	UDWR-16LRZ-GDB01	16 Larvae, Lower RZ LT, Desolation B16-01, Green R, UT, Range Creek (see text)
139603-9829	UDWR-16GR-SL001 to SL110	16 LT, Green R, Stewart Lake Eval, UT
139830-9831	LFL-16YA-6231 to 8163	16 Larvae, DR, Yampa R, Echo Pk,DNM, CO*
139832-40274	FWS/GJ-16GU-001 to 175	16 Larvae, DN, Gunnison R, CO
140275-0524	FWS/GJ-16CO-001 to 111	16 Larvae, DN, Colorado R, CO

Catalog No.	Field Numbers	Description of Sample Sets
140525-1062	LFL-97CO-119-F02 to F21, UNK	97 SN & EF, ISMP Evaluation, Colorado R, CO
141063-1778	LFL-98CO-119-S07 to S22, SLC, F01 to F24, UNK	98 SN & EF, ISMP Evaluation, Colorado R, CO

\* Specimens skipped during cataloging.