

Project Title

Museum of Southwestern Biology Curation of Lower Colorado River Basin Larval Fish Collections and Digital Files

Bureau of Reclamation Agreement Number: R18AC00015

Reclamation Agreement Term 1 October 2021 to 30 September 2022

Oct. 1, 2018 – Sep. 30, 2022 – This award expires in FY2022 and must be renewed

Note: Recovery Program FY23 scopes of work are drafted in May 2022. 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 and changing hydrological conditions.

Lead Agency:

University of New Mexico (UNM)

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]

Relationship to LRP:

High Priority Task 4.1.1.3 Deposit, process, and secure fish specimens, tissues, samples, field notes, and associated data at an organized permanent repository. Start Date: 1987 – End Date: 2035.

Study Background/Rationale and Hypotheses:

Collections Curation and Data Archives – Since 1987, the MSB Division of Fishes has been the permanent repository for large numbers of voucher specimens and associated data collected by San Juan River Restoration Implementation Program (SJRRIP) researchers. The numbers of specimens and

field notes processed each year have varied depending on the availability of specimen/field data after the fieldseason, collecting techniques, and annual variability of sampling conditions.

Given the variability in number of fishes to process, the San Juan River Biology Committee has recommended that the annual budget for the San Juan River specimen curation and larval fish identification reflect an “average” year of sample processing. The SJRRIP Biology Committee recognizes that some years would require more effort from MSB staff than budgeted, while other years may not require the same high level of activity. A relatively stable budget would allow for uninterrupted processing of new collections and yet be sufficient to cover the ongoing work of processing backlogged SJRRIP collections.

As of March 2022, over 58,350 lots (over 2,450,000 fish specimens) have been collected (1987-2020) by San Juan River researchers and these specimens have been processed, cataloged, and archived at the Museum of Southwestern Biology, Division of Fishes. A total of 21,897 San Juan River collection sites have been entered into the MSB database and georeferenced; all locality and habitat information has been captured using original field notes and data sheets. Over 25,000 pages of original San Juan River field notes and data sheets have been digitally captured, cleaned, and saved in both TIFF and PDF formats for the MSB Division of Fishes electronic archives; the original field notes and data sheets are permanently stored in acid-free document boxes for long-term conservation.

Study Goals, Objectives, End Product(s):

The objective of this project is to process and organize specimens of fishes, tissues for genetic study, collection data, and field notes taken under the San Juan River Recovery Implementation Program (San Juan River and Upper Colorado River Basin) in accordance with LRP Task 4.1.1.3. Field data are captured in an electronic catalog and SJRRIP collections are organized in a phylogenetic system within the museum archives for easy access. All activities are conducted in the Division of Fishes, Museum of Southwestern Biology on the University of New Mexico campus in Albuquerque, NM. Synthesis, analysis, and integration of relevant elements of this large database is done in collaboration with the USFWS SJRRIP Program Office in Albuquerque and is presented at SJRRIP researchers’ meetings held in the Four Corners area, Colorado or New Mexico.

Measurable outcomes: SJRRIP and Upper Colorado River Basin fishes and associated data will be curated in the Division of Fishes, Museum of Southwestern Biology (MSB), at the University of New Mexico (UNM). Collection sites will be georeferenced and made available in the Arctos (<https://arctos.database.museum/>) database. Original field notes will be digitized and archived by the MSB Division of Fishes and collection data electronically stored in a permanent MSB database program. San Juan River digital files (data and field notes) are backed up in four distinct storage media: one server in MSB Division of Fishes, another server located in UNM Department of Biology, the Arctos database that resides at The Texas Advanced Computing Center (TACC) in Austin, TX, and one external hard drive. Species verifications, corrections, and digital copies (PDF) of field notes will be made available to SJRRIP principle investigators upon request.

Study Area:

The MSB Division of Fishes is centrally located at the University of New Mexico Main Campus in Albuquerque, New Mexico in the Center for Environmental Research, Informatics, & the Arts

(CERIA), building 83. The Division of Fishes has three offices with a total of six computer workstations for data entry, data management, and data analysis; a fully equipped laboratory for preparation of fish specimens, and approximately 1,858 linear meters of compacted shelving for storage of cataloged collections. On average, four UNM student positions and one staff position (three undergraduate, one graduate student, and Collections Manager) process, curate, and maintain SJRRIP collections.

Study Methods/Approach:

Tasks to be completed under this project are processing and curation of fish specimens and all data from the San Juan River Basin Recovery Implementation Program synthesized and integrated in the form of reports to the committee and peer review publications. Specimen collections are deposited with the MSB Division of Fishes by SJRRIP principal investigators.

Upon receipt of newly collected San Juan River specimens, MSB staff transfer collections from formalin fixative into stages of 35%, 50%, and 70% concentrations of ethanol. Exceptions to this protocol are made per request of PI, as in the case of using 95% ethanol for genetic and/or otolith studies. Some tissue archives include a dry-storage system that employs Whatman filter paper. Tissues taken in the field are attached to the filter paper and allowed to dry. Once deposited, Whatman tissue samples are placed in plastic sleeves with the air removed and catalogued into the permanent collections. Preservation histories for all incoming SJRRIP collections are recorded on accession coversheets and this information is stored in accession files.

Incoming specimen collections are removed from WhirlPaks®, cleaned of debris, placed in known concentrations of fixative (either 5% buffered formalin, 10% buffered formalin, or 95% ethanol), and organized on the accession shelves by MSB staff. Collections are later sorted and identified by principal SJRRIP investigators. Specimen collections are assigned an accession number (tracking number) and all associated documentation, like permits and field notes, are filed under that same number. Processing collections of fish specimens (adults and larvae) requires fluid transfers from formalin fixative to ethanol preservative (typically), sending out specimens for species verification as required, counting the number of individuals in each collection, recording the standard lengths for the largest and smallest specimen in each collection, entering all locality and specimen data into an electronic catalog, digital capture of field notes and data sheets, and labeling and filing vials and jars of cataloged San Juan River specimens into the permanent MSB collections. The basic principles for accessioning specimens of fishes in the MSB are standard for most museums of natural history (e.g., Smithsonian Institution, Carnegie Museum, and University of Michigan Museum of Zoology). Species identifications and locality/collection data are verified as necessary prior to incorporation into the MSB catalog. Verification is important to prevent incorrect or misleading information from incorporation into subsequent reports on San Juan River fish species. This is particularly important for studies of larval Colorado Pikeminnow (*Ptychocheilus lucius*) and Razorback Sucker (*Xyrauchen texanus*). For purposes of permitting, the MSB provides the Program with field and species data in museum report format. This information includes species identification, catalog number (MSB number), number of specimens and size range per lot.

Whole fish specimens are removed from field containers and cleaned (debris removed) and placed into museum quality jars during the fluid transfers. SJRRIP principle investigators sort, identify, count and measure each lot (discrete collection) once the collections are transferred to ethanol. MSB staff catalog, label, and file the specimens once the principle investigators have completed their work.

SJRRIP collections are organized in the permanent archives by drainage (San Juan River) and taxa. These archives are in a room that is controlled for temperature (18 C) and light (complete darkness to low lightlevels). All data associated with the specimens are georeferenced (GeoLocate Ver. 3). All original field notes and data sheets are digitally captured and archived in acid-free document boxes for permanent storage.

Task Description, Deliverables and Schedule:

Curation and Collections Care Tasks

1. Provide a secure and organized physical and digital repository for San Juan River fish collections, fieldnotes, and associated data thereby facilitating access to these resources bySJRRIP researchers.
2. Ensure that all SJRRIP species identifications and associated data are verified and correctlyrepresented in the MSB electronic catalog. Report discrepancies to SJRRIP principal investigators.
3. Georeference collection sites for SJRRIP collections, maintain a license for ArcView, and makecollection data available to SJRRIP researchers in georeferenced format as required.

Tasks 1 - 3 are conducted when materials are received from SJRRIP researchers and are ongoing throughout the year. SJRRIP and Upper Colorado River Basin fishes and associated data will be curated in the Division of Fishes, Museum of Southwestern Biology (MSB), at the University of New Mexico (UNM). Collection sites are georeferenced and made available in the Arctos (<https://arctos.database.museum/>) database. A draft report of the 2023 San Juan River and upper Colorado River Basin specimen curation, larval fish sampling and identification activities will be prepared and distributed by 31 March 2024 to the San Juan River Biology Committee for review. Uponreceipt of written comments, that report will be finalized and disseminated to members of the San Juan River Biology Committee by 1 June 2024.

Budget Summary:

FY Year	<i>UNM Museum SW Biol</i>
2023	\$56,720.94
2024	\$58,342.56
2025	\$60,011.24
2026	\$61,728.32
Total	\$300,298.32

Reviewers:

References: