

# UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

## FY 2024-25 SCOPE OF WORK

### Title

Larval Fish Laboratory Implementation of Recovery Activities

### Bureau of Reclamation Agreement Number

R19AP00058-06

### Reclamation Agreement Term

10/01/2018-09/30/2023

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*Note: Recovery Program scopes of work are drafted in May and often are revised before final Program approval and may subsequently be revised again in response to changing Program needs. Program participants recognize the need and allow for flexibility in scopes of work to accommodate new information and changing hydrological conditions.*

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### Lead Agency

Larval Fish Laboratory

### Principal Investigator

Kevin R. Bestgen, Senior Research Scientist

Larval Fish Laboratory

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### Category:

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

### Expected Funding Source:

- Annual funds
- Capital funds
- Other [explain]

### Station Abstract

The Larval Fish Laboratory will implement recovery activities to support listed fishes, including monitoring listed fish populations, removing nonnative species, managing wetland habitats, and conducting outreach. Permanent staff will participate in all covered recovery activities as well as non-project specific tasks such as managing seasonal employees, administering budgets, completing trainings, and aiding other offices as needs arise.

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### Activities to be Implemented

The Larval Fish Laboratory will assist with or directly implement the following activities which are outlined in the Recovery Program 2023 RIPRAP and 2024-25 workplan.

- A. Plan, manage, and implement projects through permanent staff and fixed costs;
- B. Coordinate, plan and implement outreach activities;
- C. Monitor adult Colorado Pikeminnow abundance in the Green River subbasin;
- D. Mechanically remove Smallmouth Bass in the Yampa River;
- E. Mechanically remove Northern Pike in the Yampa River;
- F. Monitor fish community response to Flaming Gorge Dam releases;
- G. Monitor native fish response to invasive species control in the Yampa River;
- H. Identify larval fish in field-collected in the lab and curate those specimens (reduced in FY 24);
- I. Detect larval Razorback Sucker and Colorado Pikeminnow emergence and drift in the middle Green and Yampa Rivers; and
- J. Statistically analyze tag-recapture data (deleted in FY 24).

### Staffing

The Larval Fish Laboratory operates with a staff of 6 permanent employees to effectively oversee, plan, perform, and report the activities listed above. In addition, the Larval Fish Laboratory requires approximately 12 technicians (some full-time) and part-time staff each year to perform field work for the Recovery Program. Typical technician and seasonal staff are needed at various levels throughout the year but especially from March to October; one lab tech and a statistical modeling expert are also used as needed throughout the year. We usually also hire about five work-study students to perform laboratory work throughout the year but especially from August-May.

#### *Permanent Staff*

The following permanent staff will oversee, plan, perform, and report on the activities described above.

Kevin R. Bestgen – Oversees the CSU Larval Fish Laboratory. Principal Investigator for all projects.

Responsible for submission of annual reports for all projects. This position is 75% funded by the Recovery Program. Contribution reduced to accommodate budget considerations.

Donald Tuttle, Biologist – Co-Principal Investigator for Activities C, D, E, and G. Co-responsible for submission of annual reports for Activities D and E. This position is 100% funded by the Recovery Program.

Edward Kluender, Biologist – Co-Principal Investigator for Activities F and I. Co-responsible for submission of annual reports for Activities D and E. This position is 100 % funded by the Recovery Program.

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Catherine Adams, Biologist – Co-Principal Investigator for Activities C, E, G, and H. Co-Responsible for submission of annual reports for Activities of E, G and H. This position was 100 % funded by the Recovery Program but was reduced by 50% in FY24 to accommodate budget considerations.

Matthew Haworth, Biologist – Co-Principal Investigator for Activities E, F, G, and H. Co-Responsible for submission of annual reports for Activities of E, F, G, and H. This position is 50 % funded by the Recovery Program but was reduced to 0% in FY24 to accommodate budget considerations.

Ryan Friebertshauer, Biologist – Co-Principal Investigator for Activity C, E, F, G, and H. Co-Responsible for submission of annual reports for Activities of E, F, G, and H. This position is 50 % funded by the Recovery Program but was reduced to 0% in FY24 to accommodate budget considerations.

*Other Staff; includes full time technicians*

Darrel Snyder, Biologist – Co-Principal Investigator for Activity H. Co-Responsible for submission of annual reports for Activity H. This position is 20 % funded by the Recovery Program.

To Be Named, Biologist – Co-Principal Investigator for Activity C, E, and H. Co-Responsible for submission of annual reports for Activities of C, E, and H; position replaces K. Zelasko and will be responsible for database maintenance, data analysis, and report writing. This position is not yet hired but is needed to replace the resignation. Not funded by the Recovery Program at this time.

Gary White, Data Analyst – Investigator for Activities C and E. Assists with submission of annual reports for Activities C and E. This position was 16.7% funded by the Recovery Program but was reduced to 0% in FY24 to accommodate budget considerations.

Benjamin Applegate, Bio-Technician – Assist in field studies, sampling, specimen identification, otolith analyses, data entry and database maintenance, equipment maintenance. This position is 100% funded by the Recovery Program.

Michael Williams, Bio-Technician – Assist in field studies, specimen sampling, specimen identification, otolith analyses, data entry and database maintenance, equipment maintenance. This position is 50% funded by the Recovery Program.

Jed Perkins, Bio-Technician – Assist in field studies, sampling, specimen identification, otolith analyses, data entry and database maintenance, equipment maintenance. This position is 100% funded by the Recovery Program.

Lindsey Roberts, Bio-Technician – Assist in field studies, sampling, specimen identification, otolith analyses, data entry and database maintenance, equipment maintenance. This position is 0% funded by the Recovery Program; on leave since October 2022.

Trent Moore, Bio-Technician – Assist in field studies, sampling, specimen identification, otolith analyses, data entry and database maintenance, equipment maintenance. This position is 100% funded by the Recovery Program.

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C. Lynn Bjork, Research Technician – Assist in specimen identification and data entry; illustrator when needed. This position is 30% funded by the Recovery Program.

### *Seasonal Staff*

The following seasonal staff will perform the activities described above, including operating watercraft, handling fish, and collecting data.

Seasonal Field Technicians (6) – Primary duty is to sample during field studies and identify and curate specimens, assist with otolith analyses, and associated collection data in the laboratory. Three to six field technicians are needed annually.

Seasonal Lab Work-Study/Technicians (5) – Primary duty is to identify and curate specimens and associated collection data, and assist with otolith analyses in the laboratory. Four to six laboratory technicians are needed annually.

Staff Hours: Note that “Bio\_Techs” TM, JP, BA, and MW are full time technicians.

<b>Row Labels</b>	<b>YR 1 Hours</b>	<b>YR 2 Hours</b>
<b>Permanent</b>	<b>6,760</b>	<b>9,186</b>
Principal Investigator	1,560	1,560
PI - Stats Analysis	0	346
Biologist-Adams	1,040	1,040
Biologist-Friebertshauser	0	1,040
Biologist_Haworth	0	1,040
Biologist-Kluender	2,080	2,080
Biologist-TBN	0	0
Biologist - Tuttle	2,080	2,080
<b>Seasonal</b>	<b>15,157</b>	<b>15,157</b>
Technician B	692	692
BioTech - TM	2,080	2,080
BioTech - JP	2,080	2,080
BioTech - BA	2,080	2,080
BioTech - MW	1,040	1,040
Technician A	7,185	7,185
<b>Grand Total</b>	<b>21,917</b>	<b>24,343</b>

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### **ACTIVITY A – Permanent Staff and Fixed Costs Associated with Implementation of All Station Activities. (Previously imbedded in Project scopes 15, 22f, 128, 115, 140, and 125)**

#### **Goal**

To ensure timely and effective planning, implementation, coordination, and administrative support of Recovery Program activities and adaptive management processes.

#### **Tasks**

1. Coordinate, plan, and implement recovery activities;
2. Collect, process, and submit data;
3. Analyze, evaluate, and report on recovery activities;
4. Manage budget;
5. Maintain and replace station equipment and fleet; and
6. Attend and provide expertise at Program meetings.

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

##### *Task 1. Coordinate, plan, and implement recovery activities.*

- Planning and preparing field activities, including scope of work development and modification.
- Acquiring permits from both federal and state agencies and acquiring landowner access for specific locations.
- Hiring and training permanent and seasonal staff that are properly equipped to safely engage in activities in remote areas in potentially adverse weather conditions.
- Planning activities to ensure each trip has the required number of people and boats, often with multiple trips needing to occur at the same time.
- Inspecting, repairing, and replacing boats and equipment before each trip so that equipment is packed and ready for deployment.

Adequate planning and preparation ensure that work can be safely accomplished in a manner that protects both staff and equipment throughout the field season.

##### *Task 2. Collect, process, and submit data*

Collecting and reporting accurate data is one of the primary products of any field sampling event. Data should be collected and stored in a manner that allows for minimal error inclusion and is managed in accordance with the standard procedures outlined in the appropriate data management plan. The Program recommends using digital data collection tools with customized applications for Program work. Data will be submitted to the Data Manager as soon as possible at the end of each trip or in conjunction

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with deadlines noted under each Activity below. Staff will work with the Data Manager to resolve any errors before the data is submitted to STReaMS for analysis and reporting.

### *Task 3. Analyze, evaluate, and report on recovery activities*

Each activity requires reporting to document completion of tasks, biological effects and conditions, and recommendations for adjustments in future years. All specific reports due are outlined in the specific activity sections below, but the funds needed for reporting are addressed here in Activity A.

### *Task 4. Manage budget*

The Larval Fish Laboratory budget is managed to ensure all projects funded by scopes of work are completed with the funding provided. This includes purchasing all necessary materials and equipment in conjunction with the organization's guidance and policy. Task includes developing and administering Interagency Agreements, Cooperative Agreements, and contracts necessary to implement activities for the Recovery Program.

### *Task 5. Maintain and replace station equipment and fleet*

The Larval Fish Laboratory uses four rafts, four Honda generators, six electrofishing units, four 9.9 hp Yamaha outboard motors, 6 Juniper Allegro 3 field computers, several large boats, motors and trailers, and a fleet of four trucks to implement all station activities. This task describes the replacement schedule and cost of equipment used for all field activities, as well as the fixed monthly fees associated with our fleet of four trucks. Mileage fees for station fleet are accounted for in the individual activities in which they are accrued.

- Replace (4) generators, and (4) electrofishing units on a 5-year rotation
- Replace rafts, cataraft tubes, frames, and hard bottom boats as needed
- Replace outboard boat motors on a 3-year schedule
- Replace Allegro field computers as needed
- Fixed monthly fees or purchase outright, (4) station trucks

### *Task 6. Attend and provide expertise at Program meetings*

The Recovery Program relies on the expertise of field crews to share pertinent information and offer guidance outside of written reports. This includes providing expertise at the Recovery Program's technical and Management [committees](#) as requested or appropriate. Station staff also should attend and participate in adaptive management meetings and workshops (e.g. planning workshops, NNF workgroup, STReaMS or data meetings) to acquire needed training and to share knowledge.

The Recovery Program also relies on partners and stakeholders to review and recommend updates to the RIPRAP and other Program documents as appropriate. Scientific expertise of field crews also provides

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peer review to ensure technical and scientific integrity of Recovery Program activities (study proposals, project reports, etc.) as requested.

### Activity A Budget

<b>A</b>	<b>FY 2024</b>	<b>FY 2025</b>
Permanent	\$347,734	\$435,056
Seasonal		
Materials	\$463	\$472
Equipment	\$0	\$71,910
Travel	\$4,590	\$4,682
Contracts		
<b>A Total</b>	<b>\$352,787</b>	<b>\$512,120</b>

### Generalized Work Schedule

A typical field season for the Larval Fish Laboratory begins with field work in April, although some hydrologic conditions may warrant work being performed in late March. Early season work, before spring runoff, includes field monitoring adult Colorado Pikeminnow (3 out of every 5 years), gill-netting and electrofishing removal of Northern Pike to reduce spawning success in the Yampa River, sampling Smallmouth Bass including marking for abundance estimation and their subsequent removal. Other spring work involves sampling the Green River in Browns Park to remove nonnative fishes, and to document fish community composition and structure, and antenna deployment to detect marked fish, especially in Vermillion Creek. During spring runoff, the above tasks continue, adding monitoring for larval Razorback Sucker emergence. Beginning with the descending limb of the hydrograph, work shifts primarily to Smallmouth Bass removal in the White, Green, and Yampa rivers. This work typically lasts through the summer months into autumn. Throughout the summer, personnel will also measure timing and abundance of larvae drifting from the Yampa River into the Green River. Sampling Yampa River nearshore habitat estimates response of the fish community to predator removal that occurred earlier in the year. We also complete trips in Lodore and Whirlpool canyons of the Green River to monitor fish community change over time to changes in flow and temperature regimes from Flaming Gorge Dam, and to measure success of flow spike experiments completed earlier in the year. Through all this, we participate in numerous planning activities for flow experiments. Field season typically ends near the end of October. Laboratory activities continue through the year but are especially intensive from October to April. Technicians and Biologists identify samples collected by us, as well as those from collaborating agencies. Samples are cataloged and curated into the collection and maintained in good condition with annual checks of fluid levels. Biologists and Technicians also conduct analyses of Smallmouth Bass otoliths to evaluate flow spike effects and to monitor variation in spawning timing over years to better understand those relationships with flows and water temperatures. The Principal Investigator, Biologists, and a Data Analyst also conduct analyses of tag-recapture data collected by fish recaptures and antenna detections during the sampling year and from years past. This analysis work includes data for Humpback Chub, Colorado Pikeminnow, Razorback Sucker, and invasive Smallmouth Bass and Northern Pike.

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Upon completion of field work, principal investigators will ensure data is submitted to the STReaMS database for QA/QC and data sharing with other Recovery Program partners. Principal Investigators will then retrieve data from STReaMS and will complete annual reports, generally presenting this data at the Recovery Program Researcher's Meeting each winter. During the winter, permanent Biological Technicians will ensure equipment and gear is maintained, repaired, and replaced for the next field season. Also, over the winter, permanent staff will complete the hiring process for seasonal staff, rectify budgets, and coordinate with any pertinent landowners for access.



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*Generalized Larval Fish Laboratory schedule for implementation of all Activities.*

Target species	Activity	Legacy Project(s)	Locations	Staff Permanent Seasonal	J	F	M	A	M	J	J	A	S	O	N	D
All	B – Outreach	NA	All	3-permanent 2-seasonal			X	X	X	X	X	X	X			
CPM, RZ	C – CPM Estimates	128	Yampa	5-permanent 4-seasonal	X	X	X	X	X	X	X	X	X	X	X	X
SM	D – Mechanical Removal	125	Yampa	5-permanent 4-seasonal					X	X	X	X	X	X		
NP	E – Mechanical Removal	125	Yampa	5-permanent 4-seasonal				X	X	X	X	X	X			
SM	F – FGD Response Monitoring	115	Green	3-permanent 5-seasonal				X	X	X	X	X	X	X		
Native & NNF's	G – NNC Response Monitoring	140	Upr-Yampa	4-permanent 4-seasonal				X		X	X	X	X			
CPM	H – LFL Identification	15		3-permanent 8-seasonal	X	X	X	X	X	X	X	X	X	X	X	X
CPM, RZ	I – Larval Monitoring	22F	MGR, YA	3-permanent 5-seasonal				X	X	X	X	X				
CPM, RZ, HBC	J-Statistical Analysis	15	All	2-Permenent 3-Seasonal	X	X	X	X	X	X	X	X	X	X	X	X

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### **ACTIVITY B - Coordinate, plan, and implement outreach activities.**

#### **Study Principal Investigator**

Shannon Nelson, Outreach Coordinator  
UCREFRP Program Directors Office  
Email: [shannon\\_nelson@fws.gov](mailto:shannon_nelson@fws.gov)

#### **Activity Principal Investigator**

Kevin Bestgen and Larval Fish Laboratory staff

#### **Study Goals**

Providing information and engaging with people about the Recovery Program and the four listed fish species are an essential part of building and maintaining public support to help achieve program recovery goals.

#### **Study Area**

The areas routinely sampled by this office, in addition to publics in northeastern Utah and western Colorado and the surrounding municipalities in the Colorado and Green River subbasins.

#### **Task Descriptions**

##### *Task 1. Interact with members of the public*

These efforts often occur organically with anglers, boaters, and other groups while conducting sampling and consist of providing information about the Recovery Program, as well as sharing a variety of materials that can make a lasting positive impression, such as fish-themed stickers and tattoos. This outreach is especially valuable because it provides direct experiences for people who may be curious or deeply interested in river ecology and efforts to recover threatened and endangered fishes. We also interact heavily with private landowners in the Yampa River basin, whom we have developed deep and trusting relationships with. This allows us to access their properties for sampling. River interactions include river rescues as well as visits with boaters about special events such as flow spikes.

##### *Task 2. Participate in community events, festivals, school visits, conferences, or guest speaker forums*

Larval Fish Laboratory will provide information and education about the Recovery Program and threatened and endangered fish recovery efforts at public events, as coordinated with the Outreach Coordinator.

#### **Deliverables**

Provide a summary to the PDO Outreach Coordinator documenting community events, festivals, conferences, school visits, guest speaker forums and other outreach activities conducted by field office staff including:

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- A list of outreach activities, type (e.g. school visit, community event) date, and the estimated number of people contacted during each occasion, including informal encounters\* with anglers, boaters, and other groups

\*Please note that for informal outreach encounters the goal is to identify trends to guide future outreach efforts and it is not necessary to document every interaction. Instead, it would be helpful to learn the approximate number of boats and/or people encountered, significant locations/river reaches where interactions occurred, and if they were positive, negative, or otherwise remarkable in terms of recommending future outreach actions.

- A brief narrative about current field office outreach efforts including general observations, successes, and challenges to help inform recommendations
- A list of recommendations to guide future outreach efforts based on an assessment of current gaps, needs, and opportunities to further program recovery goals, such as:
  - Creating educational materials to address site-specific needs
  - Participating in additional conferences or events
  - Developing K-12 classroom curricula
  - Removing barriers that hinder broader public involvement (e.g. developing bilingual materials or providing increased access to events)
  - Increasing field office staff capacity to conduct outreach activities
- Photos and videos of interesting field activities to assist the PDO in sharing accomplishments in formal publications and digital media. In addition, photos needed for scientific verification will be acquired. Guidance for submission will be distributed prior to the field season.

### Activity B Budget

B	FY 2024	FY 2025
Permanent	\$0	\$0
Seasonal	\$0	\$0
Materials	\$0	\$0
Equipment	\$0	\$0
Travel	\$0	\$0
Contracts	\$0	\$0
<b>B Total</b>	<b>\$0</b>	<b>\$0</b>

### ACTIVITY C - Colorado Pikeminnow abundance estimation in the Green River subbasin (Project 128)

#### Study Principal Investigator

Kevin Bestgen  
Larval Fish Laboratory

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## Activity Principal Investigator

Kevin Bestgen  
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## Study Goals

Obtain accurate (unbiased) and reliable (precise) estimates of adult population abundance and survival of Colorado Pikeminnow and Razorback Sucker that occupy the Green River study area. The addition of Razorback Sucker is a relatively new item explicitly recognized in this scope of work; analyses for such are not yet determined.

1. Complete a minimum of three sampling passes through the five Green River Basin reaches listed to capture sub-adult and adult Colorado Pikeminnow and Razorback Sucker:
  - a) Green River between near the confluence of the White River (Snider Bottom) upstream to the lower end of Whirlpool Canyon (i.e., upper Island Park), excluding Split Mountain Canyon (Utah Division of Wildlife Resources, Vernal; RM's 334 – 326, 319 - 230.8).
  - b) White River between the confluence of the Green River upstream to Taylor Draw Dam (U. S. Fish and Wildlife Service, Vernal; RM's 104-0),
  - c) Yampa River between Deerlodge Park and Craig, excluding Cross Mountain Canyon (Larval Fish Laboratory and Colorado Parks and Wildlife),
  - d) Green River from near the White River confluence (Snider Bottom) downstream to near Green River, Utah (U. S. Fish and Wildlife Service, Vernal; RM's 230.8 - 120), and,
  - e) Green River from downstream of Green River, Utah, to the confluence with the Colorado River (Utah Division of Wildlife Resources, Moab; RM's 120-0).

The LFL and Colorado Parks and Wildlife will attempt 3-8 sampling passes in the Yampa River, in part associated with bass and Northern Pike removal projects, in order to obtain a more precise and accurate Colorado Pikeminnow abundance estimate.

2. Obtain highest possible rates of capture of Colorado Pikeminnow and Razorback Sucker within concentration habitats and maximize number of individuals marked and captured on each sampling occasion.
3. Obtain estimates of probability of capture and abundance for Colorado Pikeminnow in each of the five reaches and for the entire study area.
4. Obtain estimates of parameters of interest for Razorback Sucker in each of the five reaches and for the entire study area, which will vary depending on levels of data collected. An experimental approach is now being used in three Green River reaches, where subsampling for Razorback Sucker occurs every

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one out of ten miles in the Desolation-Gray Canyon and lower Green River reaches. More intensive sampling in the middle Green River involves boating and scanning every Razorback Sucker observed, as well as monitoring populations with fyke nets and antennas at concentration areas.

### Study Area

The Green River Basin, including Green River main stem, the lower White River, and portions of the Yampa River.

### Task Descriptions

*Task 1. Complete at least 3 sampling passes for Colorado Pikeminnow.*

Annual sampling will involve a minimum of three sampling occasions through the Yampa River between Deerlodge Park and Craig, Colorado, excluding Cross Mountain Canyon (RM 135 to 47.5). Electrofishing will be the primary gear in main channel and small backwaters.

Passes will occur in May and June when temperatures and flows are appropriate. Each pass requires 6 or more days, 3 boats, and 8 people.

Other field stations will sample other reaches of the Green, White, and Yampa rivers.

### Deliverables

The end products are abundance and survival estimates for sub-adult and adult Colorado Pikeminnow and Razorback Sucker (where appropriate data are collected) for each of the White, Yampa, and Green River populations. An overall estimate will also be calculated. The report for data gathered in the 2022-2024 period. Year 2025 will be for data analysis and a report available in late 2025 or early 2026. All data will be submitted to the Data Manager and Study Principal Investigator by November of each year.

### Activity C Budget

C	FY 2024	FY 2025
Permanent		
Seasonal	\$69,699	\$71,414
Materials	\$16,912	\$17,250
Equipment		
Travel	\$16,800	\$17,136
Contracts		
<b>C Total</b>	<b>\$103,411</b>	<b>\$105,799</b>

### ACTIVITY D - Mechanically remove Smallmouth Bass in the Yampa River (Project 125)

#### Activity Principal Investigators

Donald Tuttle/Kevin R. Bestgen

Larval Fish Laboratory

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## Study Goals

We are implementing mechanical removal of nonnative Smallmouth Bass in the middle and upper Yampa River; we coordinate our sampling with Colorado Parks and Wildlife (CPW) and U.S. Fish and Wildlife Service (FWS) who are responsible for nonnative fish removal in adjacent reaches during certain times of the year. We (CSU) will be responsible for management and analysis of Smallmouth Bass data collected by CPW, CSU, and FWS from the Yampa River.

## Smallmouth Bass

The goal is to reduce the number of Smallmouth Bass and decrease their spawning success in the middle Yampa River to benefit native fishes and assist in the recovery of endangered fishes.

## Study Area

### Middle Yampa River:

Craig – Dinosaur National Monument: 88 miles: South Beach (RM 135) to Deerlodge Park (RM 47).

- April – July: Smallmouth Bass sampling with boat electrofishing using a 10-days on and 4-days off rotation including eight consecutive sampling days and two travel days. Both Northern Pike and Smallmouth Bass are susceptible to electrofishing when they occupy shallow shoreline and flooded off-channel habitats during runoff flows. Spring runoff sampling also allows for safer navigation with large electrofishing boats. As discharge declines and water clears, young Smallmouth Bass become more susceptible to capture.
- July- August: Age-0 bass sampling during base flow from the lower 12-miles of the Little Yampa Canyon reach. Removing age-0 bass only in the 12-mile treatment reach in Little Yampa Canyon maintains the Control-Treatment study design originally designated in 2004 in the native fish response evaluation by Project 140.

## Task Descriptions

### *Task 1. Complete as many sampling and removal passes as possible to remove nonnative fishes in the Yampa River. Mechanical Removal*

Each year, we will remove Smallmouth Bass from the middle Yampa River on multiple occasions to reduce their number and size structure. Sampling in May and early June will be accomplished in coordination with CPW, who has committed to assisting according to the specifics in project 98a. CSU crews will maintain flexibility to react to hydrologic conditions to accomplish early season sampling in conjunction with CPW.

Fish will be captured with boat electrofishing from April through July when flow is sufficient or with backpack or bank electrofisher, seine, trammel, fyke, or gill net, angling, or suction devices for small, or larval fish. A third boat (chase boat) will be used as needed to count, measure, and assess condition of

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fish. We will sample each reach on multiple occasions each year with an interval of 4–10 days between occasions.

Passes will occur in April through July when temperatures and flows are appropriate. Each pass requires 10 days, 3 boats, and 8 people.

### *Task 2. Complete capture recapture sampling, Little Yampa Canyon. Abundance Estimates*

In the Little Yampa Canyon reach only, Smallmouth Bass >100 mm TL will be marked with a numbered Floy tag and released on at least one sample occasion each year to serve as a mark for abundance estimation. On all other non-marking sample occasions, Smallmouth Bass will be removed from the river. For a description of the sampling protocol, see Hawkins et al. (2009a).

Marked Smallmouth Bass that are returned to the river will be Floy tagged and released within the ½-mile section from which they were captured. Backwater and flooded tributary mouth areas will be sampled by electrofishing boat, fyke, gill, or trammel nets or block-and-shock techniques described by Nesler (1995). To determine spawning locations and timing of Smallmouth Bass reproduction, we will note when we observe males on nests and the reproductive condition of captured fish. Spawning areas will be intensively targeted for removal of nesting, spawning, or nest guarding adult fish. When feasible, young bass will be removed from active nests and those nests destroyed.

Passes will occur in May or June when temperatures and flows are appropriate. Each pass requires 5 days, 3 boats, and 8 people.

### *Task 3. Intensive sampling during Smallmouth Bass spawning (The Surge)*

We will use current knowledge about Smallmouth Bass spawning ecology to focus and increase removal of spawning Smallmouth Bass. Once mean-daily temperatures reach 16° C, we will increase removal efforts in areas with known or potential spawning habitat by organizing and coordinating a multi-agency effort known as “The Surge”. Our goal is to disrupt all bass life stages during the spawning period, including pre-spawn nest building, spawning, and nest guarding. This activity has been shown to increase the catch of adult fish, disrupt the spawning event, remove guarding males from active nests, and is expected to ultimately reduce the survival of young bass. Modeling shows that disrupting early season nests via the Surge is an effective means to reduce survival of young bass, thus reducing the abundance of year classes throughout the future. Removing spawning adults from nesting areas during the earlier nest building and spawning stages will create a sink in these areas for late spawners which will then be targeted for removal. Adult bass on nests are vulnerable to electrofishing gear because they are in shallow water and have a tendency to remain and protect the nest rather than flee.

Our plan is to remove spawning fish and create a void in desirable spawning habitat so that new bass can move in and occupy those areas and be removed on subsequent sampling occasions. In that process, we will also be disrupting and decreasing the survival of eggs or young in nests. Sampling effort will be directed at river sections with concentrations of spawning bass. We will focus on the reaches between South Beach and Lower Juniper (RM 135–90), because those reaches have abundant spawning habitat.

### Additional resources during The Surge:

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Increased removal effort requires additional people and equipment; therefore, we (CSU) will work closely with CPW and FWS crews. Fish and Wildlife Service Grand Junction FWCO, Green River Basin FWCO and Colorado Parks and Wildlife (CPW) will assist with intensive sampling for up to 2 weeks (when budgets allow).

Passes will occur in June or July when temperatures and flows are appropriate. Each pass requires 5 days, 6 boats, and 12 people.

### *Task 4. Young of Year Smallmouth Bass removal.*

After spawning and during low stream discharge in July and August, we will focus on removing young (age-0 and age-1) Smallmouth Bass from the lower 12-mile section of the Little Yampa Canyon study site (i.e. the original treatment reach designated in 2004). This reach is part of the control–treatment design within the native fish evaluation study (Bestgen et al. 2007). Young Smallmouth Bass will be captured with a 10 m-long electric seine powered by a 2000-watt generator.

Other gear may include boat or backpack electrofisher, angling, seine, trap net, or cages with baited or scented attractants. We will conduct at least three separate sampling occasions, in July and August, each about 10 days long and reaches will be sampled multiple times on each occasion. We will sample primarily shallow, low-velocity shorelines associated with backwaters, embayments, or among boulders deposited from talus slopes. All native and nonnative species will be handled as they are during boat electrofishing unless specified differently by the state collecting permit. Results from this sampling will be analyzed and reported under Activity G (Project 140).

Passes will occur in July through September when temperatures and flows are appropriate. Each pass requires 10 days, 3 boats, and 5 people.

### **Deliverables**

Recovery Program annual reports submitted following the field seasons after sampling was conducted. We have also participated in the annual non-native fish workshops and presented data that were collected as recently as one month prior to the meeting.

All data will be submitted to the Data Manager and Study Principal Investigator by late autumn.

### **Activity D Budget**

<b>D</b>	<b>FY 2024</b>	<b>FY 2025</b>
Permanent		
Seasonal	\$113,157	\$115,883
Materials	\$27,266	\$27,811
Equipment		
Travel	\$60,161	\$61,364
Contracts		
<b>D Total</b>	<b>\$200,583</b>	<b>\$205,058</b>



## UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

### ACTIVITY E – Mechanically remove Northern Pike in the Yampa River (Project 125)

#### Activity Principal Investigator

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#### Study Goals

We are implementing mechanical removal of nonnative Northern Pike in the middle and upper Yampa River; we coordinate our sampling with Colorado Parks and Wildlife (CPW) and U.S. Fish and Wildlife Service (FWS) who are responsible for removal of nonnative species in adjacent reaches during certain times of the year. The goal is to reduce the number of Northern Pike from the middle Yampa River between South Beach and Deerlodge Park and from the upper Yampa River between Steamboat Springs, CO and the Hayden Power Station Intake Boat ramp to benefit native fishes and assist in the recovery of endangered fishes. We will coordinate Northern Pike removal with CPW and USFWS-Vernal, who will also analyze and report on data. The USFWS-Vernal will be responsible for management and analysis of Northern Pike data collected from this project in the middle Yampa River.

#### Objectives:

In the upper Yampa River between Steamboat Springs and Hayden (Project 98c):

- Obtain an estimate of the number of Northern Pike using a mark-recapture abundance estimator in 2019 and in future years (2025 preferred or 2026 as backup) as directed by the Recovery Program. Requires coordination with field sampling to complete this element.
- Remove Northern Pike on two or more removal passes.
- Identify potential spawning locations.

In the upper Yampa River between Hayden and Craig (Project 98a):

- Remove Northern Pike in early spring (pre-spawn to runoff) by gillnetting in backwaters.
- Obtain an estimate of the number of Northern Pike using a mark-recapture abundance estimator on a five-year frequency, beginning in 2025 or 2026.

In the middle Yampa River sites:

- Conduct removal passes for Northern Pike.

#### Study Area

##### Upper Yampa River:

Steamboat Springs – Hayden: 24 miles: Tree Haus Bridge (RM 194.1) to CPW boat ramp at Highway 40 Bridge and Hayden Power plant intake (RM 170.6).

- April/May: Adult pike sampling with raft electrofishing (timing dependent upon flows, temperatures, and access).

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Hayden – Craig: 48 miles: Carpenter Ranch (RM170) to Round Bottom (RM 122).

- April/May: Gillnet sampling in backwaters for Northern Pike (timing dependent upon flows, temperatures, and access).

### Middle Yampa River:

Craig – Dinosaur National Monument: 88 miles: South Beach (RM 135) to Deerlodge Park (RM 47).

- April – July: Smallmouth Bass sampling with boat electrofishing using a 10-days on and 4-days off rotation including eight consecutive sampling days and two travel days. Both Northern Pike and Smallmouth Bass are susceptible to electrofishing when they occupy shallow shoreline and flooded off-channel habitats during runoff flows. Spring runoff sampling also allows for safer navigation with large electrofishing boats.

## **Task Descriptions**

### *Task 1. Upper Yampa River Raft Electrofishing*

The river in this reach flows primarily through private property and most of the access points (boat ramps) require landowner permission so the crew leader and CPW will contact and seek landowner permission for bank access for the mentioned activities. We will focus our sampling primarily in backwaters where Northern Pike congregate to reduce potential negative effects of sampling the river channel where trout and Mountain Whitefish primarily reside. We will sample on at least two occasions, typically in April or May depending on access and flows. We will remove Northern Pike on all sampling occasions except in years determined necessary to monitor abundance. In those years, we will complete at least one mark occasion prior to removal occasions. Abundance will be determined using appropriate estimators. We last estimated Northern Pike abundance in 2019 and suggest another mark-recapture estimate take place in 2025 or 2026, the year after Colorado Pikeminnow abundance estimation efforts are completed. As a measure of pike abundance, we will calculate catch-per-unit-effort for each pass to compare with catch rates in prior years and other reaches.

Passes will occur between mid-April to early May when temperatures and flows are appropriate. Each pass requires 4 days, 2 boats, and 4 people.

### *Task 2. Backwater Gillnet Sampling*

Backwater areas in the vicinity of Craig, Colorado that have been identified as known or likely Northern Pike concentration areas will be gill netted as the ice recedes and hydrological conditions allow, beginning in mid- to late March through the end of April or early May (up to six weeks-30 days of which at least five days/week are on the river; with collaboration between Green River Basin Fish and Wildlife Conservation Office (FWCO) and CSU in Project #125). The goal of this effort is to remove Northern Pike from the backwater areas before they spawn and thus, reduce the annual cohort contributed to the Yampa River Northern Pike population by riverine spawning. Backwater areas in Project #98a and #98b sections of the Yampa River where CPW has obtained landowner permission will be included in the netting effort. A Jon boat and float tubes will be used by a small crew (two to four people) to set gill nets in the backwater areas, which will be set overnight and retrieved the following day.

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Net sets will occur between late March to late April when temperatures and flows are appropriate. Each year requires 30 days, 1 boat, and 3-4 people.

### *Task 3. Middle Yampa River Removal*

Each year, we will remove Northern Pike and Smallmouth Bass from the middle Yampa River on multiple occasions in an attempt to reduce their number and size structure. Sampling varies slightly depending on when abundance estimates for Colorado Pikeminnow occur (presently FY 2022-2024). Sampling in May and early June will be accomplished in coordination with CPW, who has committed to assisting according to the specifics found in project 98a. CSU crews will maintain flexibility to react to hydrologic conditions to accomplish early season sampling in conjunction with CPW.

Fish will be captured with boat electrofishing from April through July when flow is sufficient (>1000 cfs) to navigate the river with 17-ft. aluminum, Jon-boats fitted with outboard jet motors. Both shorelines will be sampled concurrently with two electrofishing boats using ETS brand electrofisher control units using pulsed-DC output current following Standard Operating Procedures (Martinez and Kolz, 2015). Sampling will occur in a downstream direction covering about 6-10 miles per day.

Other sampling gear may include backpack or bank electrofisher, seine, trammel, fyke, or gill net, angling, or suction devices for small, and larval fish. A third boat will be used as needed to count, measure, and assess condition of fish. We will sample each reach on multiple occasions each year with an interval of 4–10 days between occasions.

Passes will occur in April through July when temperatures and flows are appropriate. Each pass requires 10 days, 3 boats, and 8 people.

### **Deliverables**

Recovery Program annual reports submitted following the field seasons after sampling was conducted. We have also participated in the annual non-native fish workshops and presented data that were collected as recently as one month prior to the meeting.

All data will be submitted to the Data Manager and Study Principal Investigator by late autumn.

### **Activity E Budget**

<b>E</b>	<b>FY 2024</b>	<b>FY 2025</b>
Permanent		
Seasonal	\$11,870	\$12,109
Materials	\$17,809	\$18,165
Equipment		
Travel	\$11,448	\$11,677
Contracts		
<b>E Total</b>	<b>\$41,126</b>	<b>\$41,951</b>

## UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

### **ACTIVITY F – Monitor fish community response to Flaming Gorge Dam releases (Project 115)**

#### **Study Principal Investigator**

Kevin Bestgen  
Larval Fish Laboratory

#### **Activity Principal Investigator**

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#### **Study Goals**

Overall Goal: Remove non-native fishes and determine if changes in Green River flow and thermal regimes are associated with changes in distribution and abundance patterns of native and nonnative fishes in Browns Park, Lodore and Whirlpool canyons, and Island-Rainbow Park.

Objective 1. Remove non-native fishes and determine if shifts in distribution and abundance of large-bodied fishes have occurred in Lodore Canyon and Whirlpool Canyon by comparing the results of shoreline electrofishing and trammel net surveys with the results of previous studies, particularly Bestgen and Crist (2000), Bestgen et al. (2007) and results through 2022 sampling.

Objective 2. Remove non-native fishes and determine if shifts in the distribution and abundance of small-bodied fishes have occurred in Brown's Park, Lodore and Whirlpool canyons, and Island-Rainbow Park by comparing results of low-velocity, nearshore seining with the results of previous studies, particularly Bestgen and Crist (2000), Bestgen et al. (2007), and results through 2022 sampling. Includes time required for sample identification and processing.

Objective 3. Analyze hydrological records as recorded by the USGS at their gaging station (09234500) near Greendale, Utah, to compare differences in current and historical operations.

Objective 4. Analyze temperature records of the Green River through Browns Park, Lodore Canyon, and Whirlpool Canyon to compare differences in current and historical operations. This activity has been expanded with more thermographs in other locations to further document warming and mixing patterns of the Green River, especially downstream of the Yampa River.

Objective 5. Monitor effects of flow spikes in late spring or summer to reduce reproductive success of Smallmouth Bass in the Green River (Bestgen 2018). This section is expanded for 2024 and beyond to account for increased sampling, analyses, and planning required to implement this activity in flow planning activities. The objective of that analysis is to understand hatching dates and growth rates of bass related to flow and water temperature regimes.

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Objective 6. Based on results of objectives 1–5, determine physical effects of new operations and subsequent effects on the fish community of the Green River downstream of Flaming Gorge Dam.

### Study Area

In general, the fish community of the Green River will be sampled between the Swinging Bridge in Brown's Park and the lower end of Rainbow Park in Dinosaur National Monument. Additional Northern Pike sampling in upstream reaches will also be conducted but specific areas dependent on habitat availability. Specific reaches and gear include:

Boat, raft, trammel net or seine sampling for small-bodied fishes and Northern Pike: Beginning upstream near Red Creek in Brown's Park and extending downstream through Island-Rainbow Park.

Raft-based electrofishing and trammel-netting: Lodore Canyon: Entire Canyon, which consists of four contiguous, 5-mile reaches and; Whirlpool Canyon: Entire Canyon, which consists of 2 contiguous, 5-mile reaches.

### Task Descriptions

Task 1: Remove non-native fishes and sample main-channel fish community (large-bodied fishes)

The Vernal office of the US Fish and Wildlife Service assist with this sampling. Three sampling trips will be conducted each year. Sampling will begin in early to mid-summer and end in autumn. Sampling typically is two trips using electrofishing and a third trip using primarily netting gear. Seine sampling will occur on all trips, with additional sampling for Smallmouth Bass during flow spike experiments. The two electrofishing trips will be 5-days in length and use 8 person crews; netting trips have similar requirements but use 4 people and 4-day trips.

Large-bodied fishes; Electrofishing: Two electrofishing rafts will simultaneously sample the left and right shoreline. Each two-person crew (one boat operator and one netter) will collect all fish. Each 5-mile reach will be sampled in segments, usually about 1-2 miles each. At the lower end of each section all fish will be enumerated as an adult or sub-adult (based on pre-determined total length ranges per species) and electrofishing effort will be recorded. Rare fish (T&E species) will be weighed, measured, and PIT-tagged. Thus, mean CPUE/trip/reach will be generated from the section samples.

Large-bodied fishes; Trammel netting: Multi-filament trammel nets (23m x 1.8m; 25-cm outer mesh; 2.5-cm inner mesh) will be set at locations in Lodore and Whirlpool canyons with a main goal of sampling chubs in the genus *Gila*. Trammel nets collect a variety of species, but have been used in other studies as a primary gear type to collect native chubs in canyon-bound reaches of the Green (Chart and Lentsch 1999) and Colorado Rivers (Chart and Lentsch 2000, Valdez and Ryel 1995, McAda 2000). Trammel nets will be fished during crepuscular and nighttime hours at sites in Lodore and Whirlpool canyons. Nets will be set in low velocity habitats and along eddy lines. The number of nets set will be contingent on habitat availability and accessibility. Nets will be checked every 2 hours to reduce fish mortality.

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Task 2: Remove non-native fishes and sample small-bodied fish community, with pike sampling in Browns Park. The Vernal office of the US Fish and Wildlife Service assist with this sampling.

Small-bodied fishes; Seining: The purpose of this sampling will be to track shifts in distribution and abundance of the small-bodied nonnative (Red Shiner, Sand Shiner, Fathead Minnow) and native (Speckled Dace) cyprinids, and YOY of all other species. We will sample mostly backwaters, eddies, and shorelines; other habitat types (e.g., riffles) will be sampled as needed to detect species of interest. Two or more seine hauls will be taken in each sampled habitat and each seine haul will represent a sample. Physical measurements including area seined and habitat area will be gathered to quantify habitat dimensions and calculate CPUE. Seines used in this study will conform with the ISMP-recommended gear type. Readily identified endangered species will be measured and released alive. Other fish will be preserved in 10% buffered formalin and identified at CSU/LFL.

Task 3: Process preserved samples of small-bodied fish and conduct otolith analyses (fish from seine samples). Samples will be inventoried, cleaned, identified, and counted, with lengths and weights collected on selected groups of specimens.

Task 4: Conduct assessment of flow spike effects on Smallmouth Bass reproduction and abundance. Sample bass and habitat in backwater locations in Lodore and Whirlpool Canyons, and Island-Rainbow Park before, during, and after a 3-day flow spike from Flaming Gorge Reservoir. Smallmouth Bass are sampled in discrete backwater habitats to measure their abundance. Physical dimensions of backwater habitat are measured before, during, and after flow spikes to assess changes in water velocity, substrate disturbance and water temperature changes prior to and during the flow spike. Details are in Bestgen (2018).

Task 5: Prepare and submit annual report.

### **Deliverables**

Annual reports describing trends in fish community abundance and environmental conditions will be prepared in October/November and submitted to the Recovery Program per deadlines. More comprehensive summary reports are prepared irregularly for fish community sampling. Analyses describing flow spike analyses are prepared annually and reported out at several meetings and venues.

All data will be submitted to the Data Manager and Study Principal Investigator when samples are analyzed and data is available; large-bodied fish data will be submitted by late autumn.

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## Activity F Budget

F	FY 2024	FY 2025
Permanent		
Seasonal	\$23,134	\$23,709
Materials	\$9,272	\$9,457
Equipment		
Travel		
Contracts		
<b>F Total</b>	<b>\$32,406</b>	<b>\$33,166</b>

## ACTIVITY G – Monitor native fish response to invasive species control in the Yampa River (Project 140)

### Activity Principal Investigator

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### Study Goals

The goal of this work is to reliably estimate the response of resident native fishes to a known, relatively large, and well-estimated level of predator removal. Specific objectives necessary to achieve that goal for Yampa River fish removal evaluation studies follow.

1. Consider treatment and reference areas for study.
2. Implement removal of Smallmouth Bass and Northern Pike in treatment reaches in spring (mostly conducted in Project 125).
3. Assess relative abundance of predators in treatment and reference reaches to determine removal effects.
4. Conduct additional removals of small Smallmouth Bass prior to summer and early autumn (mostly under project 125, but also some associated with evaluation sampling in this study).
5. Estimate response of native fishes in autumn in control and treatment reaches after spring-summer predator removal, including, if access allows, some emphasis on the Lily Park section of the Yampa River.

### Study Area

Treatment and reference reaches have been established in the Yampa River as a part of non-native predator removal studies. The upper study area consists of a 24-mile reach (RM 125-101) beginning upstream of Morgan Gulch and ending downstream of Little Yampa Canyon. The downstream 12-mile

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reach has been designated the removal reach, and the upstream 12-mile reach has been designated the reference reach. This reach was chosen because it is relatively accessible and the reference reach has a sampling history that will be valuable to assessing trends in fish abundance over time. Sampling is in late summer and autumn.

The other treatment area (no reference) is a 5-mile river reach in Lily Park. We plan to continue sampling in the Lily Park reach of the Yampa River if we can maintain access, because it offers a substantially more intact native fish assemblage than the upstream reach and will give us insights into effects of removal in that setting. Sampling in that reach will also offer insights into longitudinal patterns of the fish community, both for native and non-native species, which will allow us to put findings in the upstream reach into better perspective. This sampling is also consistent with nonnative fish predator removal efforts planned under associated project 125. For the past several years we have not been able to sample Lily Park so shifted work to Little Yampa Canyon.

### Task Descriptions

#### *Task 1. Community fish sampling*

Travel to Little Yampa Canyon by 4-WD vehicles and float the river with canoes. Community fish sampling will be along shorelines with standard seine, electric seine and backpack electrofisher.

Passes will occur in July through September when temperatures and flows are appropriate. Each pass requires 10 days, 3 boats, and 5 people.

### Deliverables

Recovery Program annual reports submitted following the field seasons after sampling was conducted. We have also participated in the annual non-native fish workshops and presented data that were collected as recently as one month prior to the meeting. We completed a four-year data summary and evaluation (Bestgen et al. 2007). Another such effort is underway and planned for completion in 2023.

All data will be submitted to the Data Manager and Study Principal Investigator when sample work is completed, usually early winter.

### Activity G Budget

<b>G</b>	<b>FY 2024</b>	<b>FY 2025</b>
Permanent		
Seasonal	\$15,423	\$15,806
Materials	\$8,058	\$8,219
Equipment		
Travel	\$25,453	\$25,962
Contracts		
<b>G Total</b>	<b>\$48,934</b>	<b>\$49,987</b>



## **ACTIVITY H – Larval Fish Lab Identification and Curation (Project 15)**

### **Activity Principal Investigator**

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### **Study Goals**

To provide taxonomic, curatorial, and in the past, statistical analysis services for various Recovery Program projects. This study provides basic data on fish community composition of samples for investigators to use in their projects.

### **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.

### **Task Descriptions**

- Task 1. Project 22F, LFL—Final verification of samples to assess Yampa and Middle-Green River Colorado Pikeminnow and Razorback Sucker larval abundance and samples collected in the White River.
- Task 2. Project 158, Utah Division of Wildlife Resources and U. S. Fish and Wildlife Service, Vernal, Utah offices—samples associated with middle Green River baseflow monitoring and presence of early life stages of Colorado Pikeminnow and ISMP samples collected at the same time. We are not presently receiving funds for this project because the former analog, the backwater study, was suspended. In its place, Utah Division of Wildlife Resources is collecting large numbers of samples with many specimens as part of the base flow monitoring study, which first occurred in 2021. We will attempt as many samples as possible with the funding available, and may subsample some collections, to increase efficiency and save funding.
- Task 3. 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 4. Project 163, USFWS, Grand Junction, Colorado—Samples associated with Gunnison River and Colorado River fish community monitoring.
- Task 5. Project FR-164, USFWS, Vernal, Utah—Samples associated with Green River Larval Trigger Study Plan monitoring in floodplain wetlands in the Green River Basin.
- Task 6. Project FR-165, UDWR, Vernal, Utah—Samples associated with Green River Larval Trigger Study Plan monitoring in Stewart Lake floodplain wetland.

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Task 7. Project 176, UDWR, Moab, Utah.—Samples associated with Matheson Wetland studies to examine larvae entrainment.

Task 8. Catalog and incorporate in the LFL Collection other preserved UCRB specimens deposited by Recovery Program projects and researchers (Task 1-7). Continue curation (maintenance and management) of all cataloged UCRB specimens in the LFL Collection. Other identifications and specimen work, including workshops are conducted gratis. Most curation and some sample work will be delayed or eliminated in FY 24 due to budget accommodations.

### Deliverables

We write an annual report to describe activities related to tasks above, along with returning data to investigators when samples are identified and completed. Other determinations of specimen identity and data. Other identifications are also conducted; an example is analyses of grass carp larvae from Lake Powell, verification of Smallmouth Bass from Grand Canyon, identity determination of sunfish from the Grand Valley. We also catalog and collections and other deposited UCRB fish collections in the LFL Collection. We also provide 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.

### Activity H Budget

H	FY 2024	FY 2025
Permanent		
Seasonal	\$95,172	\$97,331
Materials	\$3,747	\$3,822
Equipment		
Travel		
Contracts		
<b>H Total</b>	<b>\$98,919</b>	<b>\$101,153</b>

### ACTIVITY I – Detect larval Razorback Sucker and Colorado Pikeminnow emergence and drift in the middle Green and Yampa Rivers (Project 22f)

#### Study Principal Investigator

Kevin Bestgen  
Larval Fish Laboratory

#### Activity Principal Investigator

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FY 2024-25 CSU Larval Fish Lab Scope of Work

Last updated: 8/18/2023

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## Study Goals

The goal of this project is to detect timing of reproduction by Razorback Sucker and Colorado Pikeminnow and determine patterns of presence of larvae and their relative abundance downstream of potential spawning sites in the middle Green River system. A second goal is to aid with monitoring effects of temperature regimes of the Green and Yampa rivers in order to comply with Flaming Gorge flow recommendations, because this task requires understanding the reproductive and drift periods for Colorado Pikeminnow.

## Study Area

**Razorback Sucker**—The study area for Razorback Sucker sampling is the middle Green River from the Escalante reach spawning area to near Sand Wash, and the White River, Utah. Several specific sampling sites are located in the reach and were chosen because of documented presence of larval Razorback Sucker in the past. Most of these sites are associated with off-channel habitats such as tributary streams, washes, backwaters, or flooded bottomlands and are in the vicinity of the Escalante spawning bar (RM 301.7 - 319.4), Jensen (RM 276.9 - 301.7), and Ouray (RM 248.1 - 276.9). Additional sampling may be conducted in other locations within the middle Green River or the White River if suitable habitat is found and if the budget allows. Additional sampling will be conducted in middle Green River wetlands in summer just post-connection with the Green River to determine presence of entrained larvae. Field crews have flexibility to change sites or sample additional sites based on discharge, accessibility, and habitat conditions at each site.

**Colorado Pikeminnow sampling**—A single site, the lower Yampa River. This locality was sampled as part of the Flaming Gorge studies program because it is downstream of a known spawning area for Colorado Pikeminnow.

## Task Descriptions

Task 1. Collect drift net samples for Colorado Pikeminnow. The Larval Fish Laboratory will be responsible for this task. This includes sampling in the lower Yampa River as well as in the lower Green River, in Echo Park (formerly in Project 115).

Task 2. Preliminary identification of spring razorback sucker light trap samples collected by USFWS-Vernal and drift net samples. Preliminary identifications will be conducted by the responsible sampling entity, with assistance from the LFL, as samples are collected to provide real-time data. Final specimen identification and curation will be conducted by the LFL under Project 15.

Task 3. Continue otolith analyses of Razorback Suckers, as needed, to understand timing of spawning and hatching and to document growth rate differences of larvae.

Task 4. Summarize specimen data collection in an annual report.

## Deliverables

A key feature of data collected is to be able to provide information to managers who need to make decisions about stream flows in real-time. Data are also used to make assessments of flow effectiveness

## UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

for recruitment studies. A report will also be submitted by end of the fiscal year that summarizes data collected to date.

All data will be submitted to the Data Manager and Study Principal Investigator by late autumn.

### Activity I Budget

I	FY 2024	FY 2025
Permanent		
Seasonal	\$15,423	\$15,806
Materials	\$10,007	\$10,207
Equipment		
Travel	\$5,280	\$5,347
Contracts		
<b>I Total</b>	<b>\$30,710</b>	<b>\$31,360</b>

### ACTIVITY J – Statistical analysis of tag-recapture data.

#### Study Principal Investigator

Travis Francis and Darek Elverud  
U. S. Fish and Wildlife Service  
Grand Junction, CO

Katie Creighton  
Utah Division of Wildlife Resources  
Moab, Utah

Others as needed

#### Activity Principal Investigator

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#### Study Goals

The goal of this project are to analyze data, mainly for other investigators, to provide abundance and vital rate estimates for fishes of interest in the UCRB.

#### Study Area

Upper Colorado River Basin.

FY 2024-25 CSU Larval Fish Lab Scope of Work

Last updated: 8/18/2023

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## Task Descriptions

Statistical analyses of tag recapture data for Colorado Pikeminnow from the Colorado River (Project 127), Humpback Chub data from Black Rocks and Westwater canyons (Projects 131 and 132), and Yampa River pike abundance estimation were previously covered in this project but have moved to Activity J. This work is completed by the PI and Dr. Gary White. Other activities envisioned in the future are abundance estimates for Northern Pike in the Yampa River associated with backwater gillnetting and main channel removal efforts to verify downward trends in abundance indicated by catch-effort data. This effort was eliminated for FY 24.

## Deliverables

Deliverables are data analyses and interpretations for investigators.

## Activity J Budget

J	FY 2024	FY 2025
Permanent	\$0	\$27,352
Seasonal	\$2,618	\$2,671
Materials		
Equipment		
Travel		
Contracts		
<b>J Total</b>	<b>\$2,618</b>	<b>\$30,024</b>

## Budget Summary

Fiscal Year	USBR Funding
2024	\$ 1,071,005
2025	\$ 1,304,976
2026	\$ 1,355,127
2027	\$ 1,366,046
2028	\$ 1,308,089
<b>Total</b>	<b>\$ 6,385,243</b>

**SUMMARY OF PROPOSED COSTS**

<b>Name of Servicing Agency:</b>	Colorado State University
<b>Project Name:</b>	Larval Fish Lab - All Activities

Enter the BEGINNING dates for each year ----->	YEAR 1		YEAR 2		YEAR 3		YEAR 4		YEAR 5		TOTAL
	10/1/2023		10/1/2024		10/1/2025		10/1/2026		10/1/2027		
	Through		Through		Through		Through		Through		
Enter the ENDING dates for each year ----->	9/30/2024		9/30/2025		9/30/2026		9/30/2027		9/30/2028		
<b>DIRECT LABOR AND FRINGE BENEFIT COSTS:</b>		<b>YEAR 1</b>		<b>YEAR 2</b>		<b>YEAR 3</b>		<b>YEAR 4</b>		<b>YEAR 5</b>	<b>TOTAL</b>
Direct Labor - Hourly	\$	553,027.00	\$	646,258.74	\$	659,183.91	\$	672,367.59	\$	685,814.94	\$ 3,216,652.19
Fringe Benefits - Hourly	\$	141,202.87	\$	170,878.45	\$	177,781.94	\$	184,964.33	\$	192,436.89	\$ 867,264.48
Subtotal of Direct Labor & Fringe Benefits:	\$	<b>694,229.87</b>	\$	<b>817,137.19</b>	\$	<b>836,965.85</b>	\$	<b>857,331.92</b>	\$	<b>878,251.83</b>	\$ <b>4,083,916.67</b>
<b>OTHER DIRECT COSTS:</b>		<b>YEAR 1</b>		<b>YEAR 2</b>		<b>YEAR 3</b>		<b>YEAR 4</b>		<b>YEAR 5</b>	<b>TOTAL</b>
Materials and Supplies	\$	93,532.25	\$	95,402.90	\$	97,310.96	\$	99,257.18	\$	101,242.31	\$ 486,745.60
Travel Costs	\$	123,731.80	\$	126,168.04	\$	128,653.00	\$	131,187.66	\$	133,773.01	\$ 643,513.50
Equipment	\$	-	\$	71,910.00	\$	73,348.20	\$	74,815.16	\$	-	\$ 220,073.36
Contractors	\$	-	\$	-	\$	-	\$	-	\$	-	\$ -
Subtotal of Other Direct Costs:	\$	<b>217,264.05</b>	\$	<b>293,480.94</b>	\$	<b>299,312.16</b>	\$	<b>305,260.00</b>	\$	<b>235,015.32</b>	\$ <b>1,350,332.46</b>
<b>INDIRECT/OVERHEAD COSTS:</b>		<b>YEAR 1</b>		<b>YEAR 2</b>		<b>YEAR 3</b>		<b>YEAR 4</b>		<b>YEAR 5</b>	<b>TOTAL</b>
Subtotal of Labor and Other Direct Costs:	\$	<b>911,493.92</b>	\$	<b>1,110,618.13</b>	\$	<b>1,136,278.01</b>	\$	<b>1,162,591.92</b>	\$	<b>1,113,267.15</b>	
Total dollars exempt from indirect/overhead base:	\$	911,493.92	\$	1,110,618.13	\$	1,136,278.01	\$	1,162,591.92	\$	1,113,267.15	
<Enter Description of Indirect/OH Cost #1>	0.00%	\$ -	17.50%	\$ -	17.50%	\$ -	17.50%	\$ -	17.50%	\$ -	\$ -
Total dollars exempt from indirect/overhead base:	\$	-	\$	-	\$	-	\$	-	\$	-	\$ -
<Enter Description of Indirect/OH Cost #2>	17.50%	\$ 159,511.44	17.50%	\$ 194,358.17	17.50%	\$ 198,848.65	17.50%	\$ 203,453.59	17.50%	\$ 194,821.75	\$ 950,993.60
Subtotal of Indirect/Overhead Costs:	\$	<b>159,511.44</b>	\$	<b>194,358.17</b>	\$	<b>198,848.65</b>	\$	<b>203,453.59</b>	\$	<b>194,821.75</b>	\$ <b>950,993.60</b>
<b>GRAND TOTAL:</b>	\$	<b>1,071,005.36</b>	\$	<b>1,304,976.30</b>	\$	<b>1,335,126.66</b>	\$	<b>1,366,045.51</b>	\$	<b>1,308,088.90</b>	\$ <b>6,385,242.73</b>