

**COLORADO PIKEMINNOW BROODSTOCK COLLECTION FROM THE
GREEN AND COLORADO RIVERS, UTAH**

FISCAL YEAR 2021 SCOPE OF WORK

SUBMITTED TO THE U.S. BUREAU OF RECLAMATION

SUBMITTED BY

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**COLORADO PIKEMINNOW BROODSTOCK COLLECTION FROM THE
GREEN AND COLORADO RIVERS, UTAH
FISCAL YEAR 2021 PROJECT PROPOSAL**

Background

Colorado Pikeminnow *Ptychocheilus lucius* and Razorback Sucker *Xyrauchen texanus*, once common throughout the Colorado River basin, have declined from historic levels. Various factors have contributed to the decline of the species including alteration of natural stream flows and temperature regimes, loss of habitat and habitat fragmentation as a result of water development and the introduction of nonnative fish species. If an effort to halt the decline and recover these two species, recovery programs were established in the upper Colorado River basin and San Juan River basin. A cornerstone, among the myriad of tasks being undertaken to save these species from extinction, is the propagation and augmentation of wild populations with hatchery produced fish. Southwestern Native Aquatic Resource and Recovery Center (Southwest ARRC) has developed production guides for both species and produces large numbers of each for distribution throughout the upper and lower Colorado River Basin.

Southwestern ARRC has been the leader in propagating and culturing Colorado Pikeminnow since 1981. The facility maintains several captive stocks as genetic reserves and has successfully produced fish for the Upper and Lower Colorado River Basin programs and the San Juan River basin Recovery Implementation Program (SJRRIP). A primary emphasis of Colorado Pikeminnow study at Southwestern ARRC has been examining the reproductive biology of the species, broodstock development, and culturing age-0, age-1, and adult fish. Southwestern ARRC currently produces 400,000 age-0 fingerlings (50 mm TL) annually for reintroduction in the San Juan River. Broodstock consists of 200 (F1) and 450 (F2) adults. These fish are 1999, 2004 and 2006 year-class progeny from wild adults collected from the Yampa, Green and Colorado Rivers, respectively. In 2006 Southwestern ARRC staff began culturing a second broodstock of 500 (F2) individuals for future use. This stock is referred to as the 06CRDX lot, derived from the 1991 broodstock.

Recent investigations of the genetics of the Colorado Pikeminnow broodstock at Southwestern ARRC suggest the need to initiate the process of developing a new, and hopefully more genetically robust Colorado Pikeminnow broodstock using wild specimens from the Green and Colorado rivers. Early life-stage Colorado Pikeminnow monitoring is an ongoing effort in the Green and Colorado River basins to evaluate spawning success and monitoring of juvenile Colorado Pikeminnow occurs in conjunction with adult population estimates in the Green and Colorado rivers. Maintaining a healthy and robust Colorado Pikeminnow broodstock has been identified as a priority in both the San Juan and upper Colorado River basins, and may be necessary given recent declines in this species in the Green River basin. Southwestern Native Aquatic Resource and Recovery Center (Southwest ARRC) has requested, after discussions with the San Juan River basin recovery upper Colorado River basin programs, 1,000 individual YOY Colorado Pikeminnow for broodstock augmentation purposes from the Green and Colorado Rivers. Ideally, equal numbers of Colorado Pikeminnow can be collected from each of the three nursery habitat reaches (middle and lower Green River and lower Colorado River), over the next several years to improve the genetic diversity of the captive Colorado Pikeminnow population.

Objectives

The objective of this effort is identified below. This objective is related to the goals and tasks listed below in the 2016 Long Range Plan as reported by the San Juan River Basin Recovery Implementation Program (SJRRIP).

- 1) Collect young-of-year Colorado Pikeminnow from three nursery habitat reaches (two in the Green River, one in the Colorado River) and transport them to Southwestern ARRC for broodstock augmentation.

Goal 1.1 - Establish a Genetically and Demographically Viable, Self-Sustaining Colorado Pikeminnow and Razorback Sucker Populations.

Action 1.1.2 Produce, rear, and stock sufficient numbers of Colorado Pikeminnow to meet stocking goals of augmentation plan.

Task 1.1.2.2 Stock at least 400,000 age-0 (50–55 mm TL) Colorado Pikeminnow annually into the San Juan River.

Task 1.1.2.3 Opportunistically stock available Colorado Pikeminnow in excess of those described above.

Goal 1.2 - Identify and Implement Strategies for Improving the Colorado Pikeminnow and Razorback Sucker Augmentation Program and Genetic Integrity.

Action 1.2.1 Implement methods to evaluate status and success of stocked Razorback Sucker and Colorado Pikeminnow.

Task 1.2.1.2 Identify, describe, and implement strategies for improving survival and retention of stocked razorback sucker and Colorado Pikeminnow, including acclimation prior to stocking, size of fish stocked, time and location of stocking, physiological conditioning, and predator avoidance.

Goal 1.3 - Support Operations and Maintenance of Facilities to Support Colorado Pikeminnow and Razorback Sucker Stocking Programs.

Action 1.3.1. Support production and grow-out facilities.

Task 1.3.1.1 Support operation and maintenance of hatchery facilities at Southwestern ARRC for Colorado Pikeminnow and Razorback Sucker production.

Study Area

The study area for this project is Colorado Pikeminnow nursery habitat areas in the Green and Colorado rivers in Utah (Valdez et al. 1982; Archer et al. 1985; Tyus and Haines 1991). The three localities identified for sampling for YOY Colorado Pikeminnow in 2021 are:

- *Middle Green River* Split Mountain to Sand Wash (RM 319–RM 215)
- *Lower Green River* Green River State Park Colorado River confluence (RM 120–RM 0)
- *Colorado River* Cisco, Utah to its confluence with the Green River (RM 111–RM 0).

Methods:

Four week-long sampling trips will occur soon (one week) after conclusion of annual UDWR fall monitoring for young-of-year (YOY) Colorado Pikeminnow and small-bodied native fishes (usually conducted mid-September). Colorado Pikeminnow broodstock sampling teams will be comprised of staff from the Utah Division of Wildlife Resources (UDWR) and American Southwest Ichthyological Researchers (ASIR). UDWR personnel will provide the sampling vessels (two boats) and associated gear as well as two boat operators and supplemental sampling and holding gear. ASIR will provide sampling gear, live tanks to hold and transport captured specimens and two staff (with extensive Colorado Pikeminnow identification experience) for each boat. The two teams of three people will head to different reaches of the river(s) to conduct sampling for YOY Colorado Pikeminnow.

Access to the river sampling sites will be with 16' to 18' shallow water, high floatation, aluminum jon boats with float pods and tunnel hulls. The maximum beam (width) of these vessels are between 5' and 6' which adds to its extreme stability. The boats are powered by high horsepower (70–115 hp) outboard motors (jet-boots or propellers) and are able to safely navigate the waters in the study area of the Green and Colorado rivers.

Habitats will be sampled using a 1.2 m x 4 m seine with 3 mm mesh. Multiple seine hauls will be made in each habitat sampled but no attempt will be made to record the effort expended at a site as this work does not require determination of catch-per-unit-effort. Two people will seine and a third individual will assist in the sorting and identification of specimens collected.

At the end of each seining run, particular attention will be paid to ensure that captured fish remain in the water at all times and that processing of fish occurs as rapidly as possible (while ensuring accurate of identifications). Upon location of a captured YOY Colorado Pikeminnow, the specimen will be transferred, using a fine mesh aquarium net, from the seine to an Engel 19 quart live bait cooler (with a battery powered pump and air stone) that is filled with approximately 3 gallons of water taken from the habitat in which the specimen was captured. These coolers have latching clasps and a rubber gasket between the lid and base and will not spill if knocked over. Water temperature of the live bait cooler will be compared with water temperature of the habitat to ensure they are within 1°C. In addition, salt will be added to the water in the live bait cooler so that the solution is a 0.05% concentration of salt. The site of capture will be recorded with a GPS unit and water quality (water temperature, pH, conductivity, salinity, and Secchi depth) at the site will be recorded. At the completion of the sampling effort at that site, the specimen(s) will be returned to the boat where they will ultimately (upon equilibration of water temperatures) be transferred to a 30 quart Engel live bait cooler (with battery powered pump) that is being held inside a high density insulation ice chest. All Engle live bait coolers are lined with aquarium net material that is the same dimension of the inner box so fish never need to be handled and can be easily transferred between coolers. No more than 1 Colorado Pikeminnow will be held per gallon of water in the live bait coolers. At present, we have four 30 quart live bait coolers available for each boat.

Staff from Southwestern Native Aquatic Resources and Recovery Center (Southwestern ARRC) will provide a hatchery truck with a large reservoir live well (600 gallons) and will be responsible for all aspects of holding and transfer (back to Dexter, NM) of Colorado Pikeminnow that are collected as part of this effort. The simplistic plan for the daily sampling runs is to hold the YOY Colorado Pikeminnow on the sampling boats throughout the day and pass them onto Southwestern ARRC late that afternoon upon return to the launch site. However,

field crews will have to decide if they need to return, before the end of a sampling day, to the transfer their catch to the hatchery truck. This decision will be based on the number, size, and condition of YOY Colorado Pikeminnow collected, climatic conditions (air and water temperature, water conditions) and time of day. Field crews and hatchery personnel will discuss these matters each morning prior to departing for the day's sampling and proceed based upon the recommendation of Southwestern ARRC staff.

Once collected YOY Colorado Pikeminnow have been transferred to Southwestern ARRC personnel and the hatchery vehicle, those specimens become the responsibility of Southwestern ARRC. UDWR and ASIR will be available to assist Southwestern ARRC staff, but the latter organization is the ultimate authority on maintaining the health of those fish and the field sampling crews will always defer to their expertise.

We have scheduled for four consecutive weeks (five days/week) of sampling in late September and October. The template for the weekly sampling effort for ASIR follows:

- Day 1 Fieldwork preparation, travel from Albuquerque to Moab, UT (hotel).
- Day 2 Sample YOY Colorado Pikeminnow/camp on river
- Day 3 Sample YOY Colorado Pikeminnow/camp on river
- Day 4 Sample YOY Colorado Pikeminnow/hotel, Moab
- Day 5 Return to Albuquerque.

The sampling schedule for UDWR will differ in that they do not have to travel during days 1 and 5. Conversely, travel time for Southwestern ARRC is considerably longer than ASIR as they are 200 miles further away from Moab than ASIR, and they can not travel at a high rate of speed due to the size of their vehicle and volume of water they will be transporting upon return.

Laboratory Work

Biosecurity-Wild Fish Transport and Holding Protocol (Southwestern ARRC, Dexter, NM)

Fish transport and handling: All fish will be handled with the best animal husbandry practices available. Transport of all fish will follow guidelines described in the USFWS Protocols for Biological Investigations developed by Dr. Gary Carmichael, retired U.S. Fish and Wildlife Service employee. The protocol is as follows:

- (1) When any life stage of fish collected from the wild are handled they will be placed in a 0.5% salt bath to help in osmoregulation and reduce the effects of handling stress.
- (2) Temperature should be approximately 2-5 degrees Fahrenheit lower in the hauling truck than in the river.
- (3) Drivers must be informed of and follow a specified route.
- (4) Transport water will contain 0.5 percent NaCl (18.9 grams per gallon) and 15 mg/L Furacin (nitrofurazone).
- (5) Oxygen levels will be greater than 6.0 mg/L as determined with an oxygen meter.
- (6) Nets must be functional. Aeration equipment must be in place and must be used. A fish holding container will be a minimum of 5 gallons in size and fish densities will not exceed 1 lb of fish per gallon of water. Small, soft mesh nets will be present to transfer

the fish from one container to another, although it is preferred to have water to water transfer. Oxygenation/aeration equipment will be in place and working.

- (7) Prior to transfer and after the fish are concentrated, they should be quickly placed in the transport tank. When using nets to place fish in transfer buckets or tanks, nets should not be overloaded. The fish on the bottom will be crushed. Using a wet transfer with buckets is preferable. When emptying the nets and buckets, care will be taken to avoid adding algae and mud to the transport tank. Before loading, dissolved oxygen levels should be at saturation.
- (8) Immediately after loading, all equipment on the transport vehicle should be re-checked and the vehicle should depart. Oxygen concentrations and temperatures should be monitored at a minimum of every hour.
- (9) During unloading tempering water should be present and functional, and thermometers should be used to match water temperatures. Hauling water temperatures should be equal to receiving water temperature.

***Acclimatizing the fish to the receiving water temperature will be conducted in increments of 2 degrees towards equalizing per 30 minutes time. Due to the high alkalinity and TDS of Southwestern ARRC water, staff will temper and acclimate the transported fish to the receiving water quality for a minimum of 1 hour prior to release. This process will allow sufficient time for the fish to osmoregulate to the receiving water quality. Tempering can be accomplished in the shipping tank by adding receiving water to the tank at given intervals.**

Fish Isolation /Quarantine Protocols

Southwestern ARRC - Quarantine and disease treatment:

Southwestern ARRC houses a fully equipped isolation/quarantine building and lab. All aquatic species brought in from the wild or other facilities are housed in this area approximately 45 days or until diseases testing and prophylactic treatments are completed on the arriving fish. A fish health inspection will be conducted to examine fish for bacterial, viral and parasitic infections. Normally 60 fish per lot are sacrificed for an adequate sample. However, in the case of endangered or rare fish of genetic importance, numbers sampled will be less and will depend on availability. The Center also employs a full time certified veterinarian to prescribe and help administer treatments and associated animal drugs. Prophylactic treatments for the control and management of internal and external bacteria, parasites and aquatic invasive species are conducted on each wild fish lot received at Southwestern ARRC. Center staff will provide on-site monitoring for the species. Fish can be held in 10, 20 and 40 gallon aquaria, 3 and 4(ft.) diameter fiber glass tanks. No more than a 50 grams of fish/ per gallon will be held in each tank. All fish will undergo standard prophylactic bacterial and parasite treatments upon arrival and the hatchery staff will follow strict protocols for water treatments and exchanges. Hatchery staff will be advised of critical nature of this action and procedures to eliminate the possibility of contamination with other hatchery stocks will be followed. Fish condition will be monitored daily and mortality will be recorded. Fish will be fed a combination of live, frozen and prepared diets daily. If chronic mortality occurs fish health assessments will be completed by the Southwestern ARRC Fish Health Unit.

Upon arrival, fish will be slowly acclimated to water conditions within the holding tanks. Fish in the hauling tank will be exposed to water changes of 1/5 volume/hour, and observed carefully for signs of stress. If stress is noted (e.g., darkening or discoloration of color appearing on dorsal surface, gasping at surface, partial loss of equilibrium), the water change rate will be reduced to 1/10 volume/hour. The hauling tank will be aerated/oxygenated at all times during this procedure. Once acclimated, fish will be inventoried and placed into the quarantine tanks. Nylon tank covers will be placed on all tanks to stop fish from jumping out; aeration or oxygen will be supplied to the tank to ensure that dissolved oxygen levels are maintained at ≥ 6 mg/L. The lead Fish Culture biologist will administer and provide oversight during chemical treatments for the control and removal of internal and external bacteria, parasites and aquatic invasive species.

Treatment schedules:

The first week to ten days of maintaining the salvaged fish are the most critical. If the species has never been held on station or physiological response to the treatment chemicals is unknown, staff will conduct bioassays using 1 or 2 fish, and dosages adjusted prior to treating the entire lot. All static bath treatments require the addition of supplemental oxygen and concentrations are to be maintained at ≥ 6 mg/L during the duration of the treatment. Staff will monitor fish behavior during the treatment and no treatment will be left unattended. If fish begin to stress from the treatment, the chemical will be flushed from the system with fresh water. Starting dosages and frequency for chemical treatment of fish at Southwestern ARRC are as follows:

Bacterial prevention: Daily upon receipt for 3 consecutive days, 4-8 hours static bath. (0.5% NaCl is used in conjunction with one therapeutant only)

- 0.5 % NaCl
- Oxytetracycline 343 @ 15-20 mg/L -Or
- Nitrofurazone @ 15 mg/L
- Chloramine T - Can also be used to combat external bacterial and parasite infections when applied at 8-10ppm, 1 hour static bath.

Internal & External parasite control: Fish will undergo chemical treatments for external parasites that consist of static bath treatments with formalin at 25 -125 mg/L depending on bioassay results. The initial treatment is administered on day 2 in the AM for a 1-hour static bath, flushed for 1 hour and fish prepped for the daily scheduled anti-bacterial treatment. The formalin treatment is repeated on day 4 and a final treatment at day-11 post receipt of the fish.

If the fish are diagnosed with cestodes they are treated with Praziquantel at 2 mg/L for 24 hours (static bath) at day-7 post receipt of the fish. As a precaution, the fish will be treated twice for cestodes, with the second treatment administered at approximately 21 days post the initial treatment.

- 3' circular tanks= 2 grams Praziquantel mixed (dissolved) then added into tank.
- 4' circular tanks= 4 grams Praziquantel mixed (dissolved) then added into tank.

If diagnosed with lernaea (anchor worm) the fish are treated with Dimilin at 0.25 mg/L for 24 hours (static bath) at day-9 post receipt of the fish. The treatment is repeated 7 days later to ensure complete removal of parasite.

If parasite loads on the fish are heavy, treatment procedures will continue for several weeks depending on the life cycle of the parasites being treated. A daily log recording water quality, temperature, treatments and comments on fish health will be maintained.

Permitting

Fish will be collected under a U.S. Fish and Wildlife Endangered and Threatened Permit and reported annually.

Deliverables

Meetings

The number of Colorado Pikeminnow collected annually as part of this project will be reported at annual SJRRIP by ASIR in collaboration with UDWR, and Southwestern ARRC.

Products

A short (ca. 5 pages) draft report of the 2021 Colorado Pikeminnow Broodstock Collection from the Green and Colorado Rivers, Utah will be prepared by ASIR in collaboration with UDWR, and Southwestern ARRC and distributed to the San Juan River Basin Biology Committee for review by 31 March 2022. Upon receipt of written comments, that report will be finalized and disseminated to members of the San Juan River Basin Biology Committee by 30 June 2022 to meet Objective 5 of this proposal.

Literature Cited

- Archer, D.L., L.R. Kaeding, B.D. Burdick, and C.W. McAda. 1985. A study of the endangered fishes of the upper Colorado River. Final Report. U.S. Fish and Wildlife Service, Colorado River Fishery Project. Grand Junction, Colorado.
- Tyus, H.M. and G.B. Haines. 1991. Distribution, habitat use, and growth of age-0 Colorado squawfish in the Green River basin, Colorado and Utah. Transactions of the American Fisheries Society 120:79-89.
- Valdez, R., P. Mangan, R. Smith, and B. Nilson. 1982. Upper Colorado River investigation (Rifle, Colorado to Lake Powell, Utah). Pages 101-279 in W.H. Miller et al., editors. Colorado River Fishery Project Final Report; Part Two, Field Studies. U.S. Fish and Wildlife Service and Bureau of Reclamation. Salt Lake City, Utah.

**ASIR 2021 BUDGET: COLORADO PIKEMINNOW BROODSTOCK COLLECTION FROM THE
GREEN AND COLORADO RIVERS, UTAH**

Personnel

Field Sampling Efforts

Green and Colorado Rivers

Fisheries Biologist I (1 staff x 4 trips x 5 days x 8 hr/day at \$63.89/hr)	\$	10,222
Fisheries Technician (3 staff x 4 trips x 5 days x 8 hr/day at \$39.31/hr).....	\$	18,869

Personnel.....	Subtotal	\$	<u>29,091</u>
Personnel.....	GSA General and Administrative Fee (IFF)	\$	<u>218</u>
Personnel.....	Total	\$	<u>29,309</u>

Materials and Supplies

Safety dedicated first aid gear: (<i>Value added contribution</i>)	\$	0
Fish Sampling and associated electronic recording gear: (<i>Value added contribution</i>)	\$	0

Materials and Supplies:	Total	\$	<u>0</u>
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Travel and Per Diem

Field Sampling Effort

Albuquerque to Moab, Utah (four trips)

Travel - (800 miles round trip x \$ 0.58/mile x 4 trips)	\$	1,856
Hotel Per Diem - 2 days/trip x 2 rooms (\$96/night GSA rate) x 4 trips	\$	1,536
Hotel Per Diem - 2 days/trip x 4 staff (\$55/day GSA rate) x 4 trips	\$	1,760
Camping Per Diem - 2 field days/trip x 4 staff (\$25/day) x 4 trips	\$	800

Travel and Per Diem:	Total	\$	<u>5,952</u>
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2021 Project Totals

Personnel:	Total	\$	29,309
Materials and Supplies:	Total	\$	0
Travel and Per Diem:	Total	\$	5,952

2021 Scope of Work:	GRAND TOTAL	\$	<u>35,261</u>
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2021 Costs for UDWR- Moab

Colorado Pikeminnow Broodstock Collection

Task 1. Pikeminnow collection (3 trips x 3 days x 2 people; note: 4th week funded by UCREFRP)

Labor: salary + benefits + applicable overtime

	Rate	Hours	Cost
Project Leader	\$38.10	50	\$1,905
Biologist	\$33.91	150	\$5,086
Technician	\$17.08	100	\$1,708
		subtotal	\$8,699

Food and Transport

	Rate	Quantity	Cost
Monthly fleet rental (2 trucks)	\$199.37	2	\$399
Mileage (2 trucks x 250 miles x 3 trips)	\$0.40	1500	\$600
Food (3 days/trip)	\$35.00	18	\$630
Fuel for motors (60 gallons/trip)	\$4.00	180	\$720
		subtotal	\$2,349

Equipment

	Rate	Quantity	Cost
Camping gear repair/replacement:			\$300
Sampling gear repair/replacement:			\$600
Boating gear repair/replacement:			\$1,500
		subtotal	\$2,400

Task 1 Subtotal: \$13,448

Task 2. Project coordination, reporting

Labor: salary + benefits + applicable overtime

	Rate	Hours	Cost
Project Leader	\$38.10	20	\$762
Biologist	\$33.91	40	\$1,356
Technician	\$17.08	0	\$0

Task 2 Subtotal: \$2,118

Total Expenses \$15,566

Administrative Overhead (16% on all personnel services) \$1,731

UDWR-Moab Total	\$17,297
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TOTAL 2021 BUDGET: COLORADO PIKEMINNOW BROODSTOCK COLLECTION FROM THE GREEN AND COLORADO RIVERS, UTAH - \$52,558