

**COLORADO PIKEMINNOW FINGERLING PRODUCTION and RAZORBACK
REARING of SUBADULTS at the SOUTHWESTERN ARRC, Dexter, NM
San Juan River
FY-2016**

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In October of 2012 Dexter National Fish Hatchery and Technology Center's name was officially changed to the Southwestern Native Aquatic Resources and Recovery Center (Southwestern ARRC). The facility is located in the Pecos River Valley of southeastern New Mexico, 200 miles southeast of Albuquerque, 20 miles south of Roswell, and one mile east of Dexter on State Road 190.

The following scope of work identifies the facilities and methodologies that will be used to continue producing 400,000 age-0 Colorado Pikeminnow (CPM) and 11,000, 200+ mm razorback sucker (RBS) for use by the San Juan River Recovery Implementation Program (SJRIP) to meet its augmentation objectives for the species in the San Juan River. The primary purpose being the distribution of CPM to the San Juan River and RBS to existing grow-out ponds located on the Navajo Indian Irrigation Project. Southwestern ARRC has developed production guides for both species based on historical growth rates and produces large numbers of each species for distribution throughout the upper and lower Colorado River Basin.

The U.S. Fish and Wildlife Service (USFWS) has developed extensive infrastructure and expertise at Southwestern ARRC to successfully contribute to recovery programs and the facility has been totally devoted to the maintenance, propagation and culture of threatened and endangered fish species for forty years. During that period it has successfully cultured razorback sucker, bonytail, humpback chub and Colorado pikeminnow of the Colorado River system and currently maintains large genetically diverse broodstocks. Over the years staff have developed successful spawning, culture and distribution methodologies for the species that are still used today. The facility utilizes an abundant water supply to produce over 2.0 million fish annually.

Facilities

Situated on the northern fringes of the Chihuahuah Desert, the elevation at Dexter is 3,500 feet; average rainfall is 12 inches, and the growing season of 180-200 days. Station facilities include: Administration/Laboratory Building; Fish Culture Building; Visitors Center; Maintenance/Shop Building; Vehicle Storage Building; Equipment Storage Building; Feed Building; General Storage Building.; three government houses; one mobile home, two RVs and one RV space.

Fish culture facilities in operation consist of 75 earthen/lined ponds ranging in size from 0.1-1.0 acres, four (6' X 40') fiberglass raceways, four (8' X 40') concrete raceways, Twenty (2' X 12') rectangular fiberglass tanks, forty (4') fiberglass circular tanks, fifty (3') fiberglass circular tanks and 80 ten-gallon and 20 forty-gallon aquariums. The facility utilizes three water reuse systems in the fish culture building. Phase III Facility Improvement Project was completed on June 5, 2003.

Water

An abundant supply of fish culture water is supplied by five shallow aquifer wells (150 feet in depth) capable of pumping a combined 2,000+ gallons per minute. The well water is a constant 64⁰ F, pH of 7.5-8.5, total hardness of 2,100 ppm, and total dissolved solids of 3,500 ppm. Water rights, allocated through the New Mexico State Engineer's Office, total 2,185.5 acre-feet per annum or 10,927.5 acre-feet per five-year water period. Waste water from all fish culture operations collects in two sumps on the southeastern area of the facility and provides year round water to the wetlands.

I. Colorado Pikeminnow Fingerling Production

Background

Once very common throughout the Colorado River Basin, Colorado pikeminnow have declined from historic levels and are now found primarily in the Upper basin of the Colorado River. Various factors have contributed to the decline of the specie 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.

Colorado Pikeminnow are native to the San Juan River. Its historic distribution included the entire mainstem San Juan River up to Rosa, New Mexico, located approximately 25 miles upstream from present day Navajo Dam. Currently the species is considered extremely rare and the small population is estimated at less than 20 adults. This small group of fish has persisted in the San Juan River since the closure of Navajo Dam in 1962. Recent studies being conducted by the San Juan Recovery Implementation Program (SJRIP) indicate that the Colorado pikeminnow is reproducing and recruiting in the river to at least a limited degree, however the low numbers collected do not satisfy recovery goal requirements for the specie. The Recovery criteria calls for a target of 1,000 subadult's fish established by the end of a five year down listing period, and 800 adults maintained during the 7 year delisting period. The Upper Colorado River Endangered Fish Recovery Program has recommended that the wild population be increased by augmenting with hatchery produced fish. The **Augmentation Plan for Colorado Pikeminnow in the San Juan River (Phase I)**, (Ryden 2003) called for annual stocking of age-0 fish over an eight year augmentation program (2002-2009). As per the modified work plan, dated 6 April 2005, age-1 fish were produced at Dexter from 2006-2010 to augment the age-0 stockings in the San Juan River, (Ryden 2005, Addendum #1 to Augmentation Plan For Colorado Pikeminnow In The San Juan River). The augmentation plan (Phase I) for age-0 and age-1+ Colorado pikeminnow ended in 2010. Augmentation efforts identified in the Phase II (2010 – 2020) “draft” **Augmentation Of Colorado Pikeminnow (*Ptychocheilus lucius*) in the San Juan River Plan** (Furr 2009); focuses primarily on culturing and stocking increased numbers of age-0 fish. Current facility and broodstock capabilities at Southwestern ARRC allow for $\geq 400,000$ age-0 Colorado pikeminnow to be produced and stocked annually. This has been identified as the stocking target for 2016 and subsequent years unless further production capacity is identified and/or stocking targets are modified by the SJRIP.

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 SJ RIP. The main emphasis has been on examining the reproductive biology of the species, broodstock development and culturing age-0, 1 and adults. This work plan proposes the production of 400,000 age-0 fingerlings (50 mm TL) annually for reintroduction in the San Juan River.

Funding requested also covers costs associated with proper care of broodstock necessary to successfully carry out this project for future years and aide in restoration of the species. Stocking will require coordination with New Mexico Fish & Wildlife Conservation Office, Navajo Nation Department of Fish and Wildlife, New Mexico Department of Game and Fish, Colorado Division of Wildlife and Utah Department of Wildlife Resources.

Objectives

1. Produce 400,000 age-0 fingerlings (50 mm) for stocking in the San Juan River in 2016.
2. Transport and distribute 400,000 age-0 Colorado pikeminnow from Dexter, to the San Juan River.
3. Maintain 400 Colorado pikeminnow broodstock for recovery efforts.

Methods

Broodstock consists of 250 (F1) and 500 (F2) adults. These fish are 1999, 2004 and 2006 year-class (YC) progeny from wild adults collected from the Yampa, Green and Colorado Rivers, respectively. In 2006 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. In 2016 a maximum of 50 paired matings (1 female X 1 male) will be spawned from the 1999 YC broodstock. Given the past history of hormonal induced ovulation, 38 females (75%) should produce viable eggs during a given year. All members of the broodstock are PIT tagged and records of spawning pairs are maintained at Southwestern ARRC.

Spawning

Broodfish will be harvested from the culture pond in early May, males and females sorted and held indoor for spawning. Ovulation will be induced with intraperitoneal injections of common carp pituitary (CCP) at the rate of 4 mg/kg of body weight. When eggs can be expelled using slight pressure, a female will be stripped and milt added from one male. Each individual egg lot will be enumerated, incubated and kept separate in Heath Trays until hatching occurs, approximately 96 hours following fertilization at a constant water temperature of 72°F.

Rearing Ponds

To meet the production goal of 400,000 age-0 (50mm) fish, rearing ponds will be stocked at the following densities:

Age-0 Growth: (June thru October - 150 day growing period)

Pond 1B-	.87 acre Earthen @ 100,000 fry
Pond 2B-	.73 acre Earthen @ 100,000 fry
Pond 3A-	.89 acre Lined @ 100,000 fry
Pond 6D-	.25 acre lined @ 100,000 fry
Pond 7D-	.25 acre lined @ 100,000 fry

Earthen and plastic lined ponds will be used for production. In earthen ponds, the bottoms will be packed and graded prior to receiving fish. Non-level pond bottoms can hinder fish harvest and aquatic vegetation can entrap fish at harvest time. Fertilization and slow filling of ponds will start 10 to 14 days prior to stocking. Staff will ensure that water quality is monitored. Temperature, dissolved oxygen and pH readings will be taken twice daily at 7:00am and 3:00 pm at the deepest part of the pond.

If the dissolved oxygen drops to ≤ 3 mg/I, supplemental aeration will be started. All feeding, fertilization and chemical applications will be stopped till adequate oxygen levels are restored. Aerators will be run all night for several days till the oxygen is back up to acceptable levels, (5-7 mg/l). Staff will avoid handling fish for 7 -10 days following a stress related circumstance.

Pond Vegetation Control and Fertilization

Diuron and Barrier will be used in earthen ponds to control rooted aquatic vegetation. Staff will use granular form when possible and broadcast the entire pond bottom at the recommended rates.

Diuron – 2.0 lbs per acre (dry broadcast)

Barrier- 100 lbs per acre (dry broadcast)

Copper sulfate (CUSo₄) will be used to control floating filamentous algae blooms. Treatments will began approximately 45 days after fish are stocked into the ponds and repeated every 30 days. Application rates in Dexter ponds are 5 to 8 lbs per acre. A secondary benefit derived from using CUSo₄ is its effectiveness in controlling external parasites.

Zooplankton and invertebrate insect populations are cultured with the proper fertilization regime. Four types of fertilizer will be used:

- 1) Alfalfa meal
- 2) Alfalfa pellets
- 3) Cottonseed meal
- 4) Super phosphate

Initial fertilization rates for earthen ponds are 100 lbs of cottonseed meal, 100 lbs of alfalfa meal or pellets and 3 lbs of super phosphate. Follow up rates are administered on Monday and Thursday with 10 lbs cottonseed meal, and 10 lbs, alfalfa meal or pellets.

Water temperature, dissolved oxygen (DO) and pH readings will be taken in all rearing ponds daily. All readings will be recorded on record charts. If morning DO readings are below 3.0 or above 13.0 all fertilization will be stopped until DO's are brought back to accepted levels. If pH readings are greater than 9.5 fertilization will be terminated.

Feeding Schedule

Fish will be sampled at the end of every month. Size, weight and over all condition will be recorded. Feed amounts will be adjusted and projected for the upcoming month. Trout starter, #1 and #2 feed will be used and purchased from SKRETTING (formerly Nelson and Sons, Silver Cup), Murray, Utah. Age-0 fish will be fed three to four times daily at approximately 9:00am, 11:00am, 1:00pm and 3:00pm.

Feeding rates are based on water temperature and fish densities in the ponds and will be calculated as follows:

- water temp $> = 80$ °F feed 3 % BW per day, Mon, Wed and Fri.
- water temp 61-78 °F feed 2 % BW per day, Mon thru Fri.

- water temp < 60 °F feed 1.5 % BW per day, Mon and Thurs.

Staff will use the following guide to determine the proper particle size to offer the fish. Feed sizes will be mixed at ½ rations of each size when making the transition to the next larger size feed.

<u>Fish Size</u>	<u>Particle Size</u>
Fry	Starter
20mm	#1 crum
40mm	#2 crum
2-3"	1.0 mm

Schedule

Broodfish will be spawned in May 2016 and age-0 fish reared in earthen and plastic lined ponds from June - October 2016.

Projected Harvest Dates and Delivery Date

Age -0 fish will reach the target size of 50mm by the end of October of each year. The fish will be harvested from the ponds the final week of October and hauled and distributed into the San Juan River the first full week in November of each year.

Projected Duration Of Project:

Phase I of this project was initiated in 2002 in support of the SJRIP Colorado pikeminnow augmentation effort (2002-2009) identified in the **Augmentation Plan for Colorado Pikeminnow (CPM) in the San Juan River**, (Ryden 2003). As per the modified work plan, dated April 06, 2005 age-1 fish were produced at Dexter and delivered annually from 2006-2011 to the San Juan River (Ryden 2005, Addendum #1 to Augmentation Plan For Colorado Pikeminnow In The San Juan River). The augmentation plan (Phase I) for both age-0 and age-1+ Colorado pikeminnow ended in 2010. Under Phase II, augmentation efforts focus on culturing and stocking $\geq 400,000$ age-0 Colorado pikeminnow annually from 2011-2020 or as directed by the San Juan Recovery Implementation Program.

II. Rearing Razorback Sucker SubAdults at the Southwestern ARRC

Background

Lake Mohave Razorback Sucker Broodfish

Razorback sucker (RASU) have been maintained and cultured at The Southwestern ARRC since 1981. The captive broodstock represent the Lake Mohave population. Three separate broodstocks are maintained; the 1981, Paired Mated (PM) and Wild Caught (WC) broodstocks. The PM stock is comprised of 90 unique family groups produced from paired matings of wild caught adults spawned at Willow Beach NFH from 1994 to 2004. The WC broodstock consists of six year classes of larvae and juvenile wild-caught fish from Lake Mohave from 2000 to 2005. These fish were captured as fry from eight locations throughout Lake Mohave and given the designation of (WC) future broodstock .

From 2001-2013 production of subadult razorbacks at Southwestern ARRC has yielded excellent survival and growth. The overall survival for razorback sucker grown to 450mm is 90.5%, while 85% of the fish achieved the target growout size in two years. Spawning and growing season consists of fish being spawned in the early spring and fry stocked in to earthen or lined ponds and grown out-door from April to October. Total

dissolved oxygen and temperature are monitored daily and fish feed on phyto and zooplankton produced in fertilized ponds for approximately 45 days at which time they are offered a prepared razorback sucker diet. Fingerlings are routinely held and cultured in the Fish Culture building during the months of January - March to prevent mortalities associated with outdoor over wintering. In the fall of the year when the fish reach target size they are harvested from the ponds and transferred to the Fish Culture building for sorting and tagging. Following a 7 to 10 day rest and recovery period they are loaded into distribution trucks and hauled to their stocking locations. Southwestern ARRC staff has successfully hauled 300+mm razorbacks to the San Juan river and razorbacks and Bonytail to Lake Mohave, Arizona, in the lower Colorado River. The distribution trips to the San Juan average 400 miles (8 hours) and the trips to Lake Mohave average 660 miles (12 hours) of hauling time in one direction.

Production Plan

Objectives:

The main objective of this proposed work is to spawn razorback sucker adults and rear 11,000, 200+mm fish annually and deliver them to existing grow-out ponds located on the Navajo Indian Irrigation Project.

Additional objectives of the work include:

1. Improve, maintain and staff facilities at Southwestern ARRC to rear and distribute the target # of fish.
2. Maintain razorback sucker captive broodstock for recovery efforts.
3. Passive Integrated Transponder (PIT) tag all fish prior to stocking into the NAPI ponds. PIT tags will be provided by the SJRIP.

Methods

Captive propagation activities include spawning a minimum of 20 pairs of broodstock, incubating fertilized eggs, enumerating and stocking of swimup fry into rearing ponds, harvest of target sized fish from ponds, PIT tagging and distribution to the NAPI ponds near Farmington, NM on the Navajo Nation.

The project will utilize indoor and outdoor facilities. All spawning and incubation activities will be conducted indoor in the fish culture building. Razorback sucker will be initially reared in 2 earthen or lined ponds and in June of each year transferred to 3 ponds at surface acres of 0.79, 0.89 and 0.98.

Rearing Ponds

To meet the production goal of 11,000 (200mm) fish, rearing ponds will be stocked at the following densities:

Age 0 Growth: (April thru May - 60 day growing period)

Pond 1- .72 acre @ 12,000 fry

Pond 2- .79 acre @ 12,000 fry

Age I Growth: (June thru October - 150 day growing period)

Harvest Age I fish; enumerate and stock fingerlings into 3 ponds.

Pond 1- .79 acre @ 6,000 fingerlings
 Pond 2- .89 acre @ 6,000 fingerlings
 Pond 3- .98 acre @ 6,000 fingerlings

Earthen and lined ponds will be used for production. In earthen ponds the bottoms will be packed and graded prior to receiving fish. Non-level pond bottoms can hinder fish harvest and aquatic vegetation can entrap fish at harvest time. Fertilization and slow filling of ponds will start 10 to 14 days prior to stocking. Staff will ensure that water quality is monitored. Temperature, dissolved oxygen and pH readings will be taken twice daily at 7:00am and 3:00 pm at the deepest part of the pond.

If the dissolved oxygen drops to ≤ 3 mg/l, supplemental aeration will be started. All feeding, fertilization and chemical applications will be stopped till adequate oxygen levels are restored. Aerators will be run all night for several days till the oxygen is back up to acceptable levels, (5-7 mg/l). Staff will avoid handling fish for 7 -10 days following a stress related circumstance.

Pond Vegetation Control and Fertilization

Sonar, Diuron or Barrier will be used in earthen ponds to control rooted aquatic vegetation. Staff will use granular form when possible and broadcast the entire pond bottom at the recommended rates.

Diuron – 2.0 lbs. per acre (dry broadcast)

Barrier- 100 lbs. per acre (dry broadcast)

Copper sulfate (CUSo₄) will be used to control floating filamentous algae blooms. Treatments will began approximately 45 days after fish are stocked into the ponds and repeated every 30 days. Application rates in ponds are 5 to 8 lbs per acre. A secondary benefit derived from using CUSo₄ is its effectiveness in controlling external parasites.

Zooplankton and invertebrate insect populations are cultured with the proper fertilization regime. Four types of fertilizer will be used:

- 1) Alfalfa meal
- 2) Alfalfa pellets
- 3) Cottonseed meal
- 4) Super phosphate

Initial fertilization rates for earthen ponds are 100 lbs of cottonseed meal, 100 lbs of alfalfa meal or pellets and 3 lbs of super phosphate. Follow up rates are administered on Monday and Thursday with 10 lbs cottonseed meal, and 10 lbs, alfalfa meal or pellets.

Water temperature, dissolved oxygen (DO) and pH readings will be taken in all rearing ponds daily. All readings will be recorded on record charts. If morning DO readings are below 3.0 or above 13.0 all fertilization will be stopped until DO's are brought back to accepted levels. If pH readings are greater than 9.5 fertilization will be terminated.

Feeding Schedule

Fish will be sampled at the end of every month. Size, weight and over all condition will be recorded. Feed amounts will be adjusted and projected for the upcoming month. Razorback grower (0301) feed will be used and purchased from SKRETTING (formerly Nelson and Sons, Silver Cup), Murray, Utah. Fish will be fed twice daily, once at 9:00am and at 2:00pm.

Feeding rates are based on water temperature and fish densities in the ponds and will be calculated as follows:

- water temp ≥ 80 °F feed 3 % BW per day, Mon, Wed and Fri.
- water temp 61-78 °F feed 2 % BW per day, Mon thru Fri.
- water temp < 60 °F feed 1.5 % BW per day, Mon and Thur.

Staff will use the following guide to determine the proper particle size to offer the fish. Feed sizes will be mixed at ½ rations of each size when making the transition to the next larger size feed.

<u>Fish Size</u>	<u>Particle Size</u>
2-3"	1.0 mm
4-6"	2.0 mm
6-8"	3.0 mm

Schedule

Broodfish will be spawned in March and the fish reared in earthen ponds for their first growing season (April – October); held indoor during winter (November - March) and stocked into the NAPI ponds in April of 2016. Target sized fish are available for distribution in spring and fall of each year.

Projected Harvest Dates and Delivery Date

Year 2016 marks the eleventh year of razorback production at Dexter for distribution to the NAPI ponds. In 2007 a new single cohort fish rearing strategy was adopted by the SJRIP for the NAPI ponds. Since 2006, staff have stocked a total of 74,948 razorback's averaging 225mm in length into East and West Avocet and Hidden ponds and in 2012 stocked an additional 1,000 target sized RBS into the San Juan River. An additional 11,000 will be stocked into the NAPI ponds in April 2016. Based on historical growth rates for razorback at Dexter, the production target of 11,000, 200+mm fish is achieved in a fifteen month period. Fish delivery will be in the spring of each year based on the new rotational production plan (single cohort). Approximately 11,000 fish will be stocked each trip and Dexter staff will coordinate the deliveries with the Navajo Nation Department of Fish and Wildlife, BIA and USFWS FWCO personnel. The estimated duration of the program is scheduled for a total of 15 years (2005- 2020).

PIT Tagging

Starting in 2012 all fish stocked into the NAPI ponds are PIT tagged prior to stocking. The fish will be graded and sorted approximately 6 to 8 weeks before the scheduled stocking date. Fish that average 200mm will be PIT tagged and allowed to recover for a minimum of 10 to 14 days after each handling. The PIT tagged fish will then be scanned for tag retention and any fish that lost a tag will be retagged.

Projected Duration Of Project:

This project was initiated in January 2005 in support of the SJRIP razorback augmentation effort (2004-2011) identified in the **Five-Year Augmentation Plan for Razorback Sucker in the San Juan River** (Ryden 1997, 2003). The rearing of razorback sucker subadults at Southwestern Native ARRC could potentially continue till 2020 as per BOR RFP 04-SF-40-2250.

General Fish Husbandry Requirements and Conditions

Predator Control

Historically, Southwestern ARRC has not experienced excessive avian or mammal predation on fish stocks. Salamander, crayfish, frog and turtle infestation of ponds are nonexistent. On an annual basis specific ponds are covered with bird netting during the winter months to eliminate predation by migrating birds. An additional strategy employed by the staff is the harvest and hold stocks of fish indoor during the winter months of November to March. Razorback reared for this project will be maintained indoor in two 40,000 gallon systems during the winter months. These systems contain biofiltration, supplemental aeration, temperature control and alarm systems.

Handling and Transport Protocol

Transport of all fish will follow guidelines described in the USFWS Protocols for Biological Investigations developed by Dr. Gary Carmichael, retired U.S. Fish & Wildlife Service employee. The protocol is as follows:

1. When Colorado pikeminnow and razorback fingerlings, subadults and broodfish are handled they will be placed in a .5% salt bath to help in osmoregulation and reduce the effects of handling stress.
2. Temperature should be 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).
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 delta mesh (1/8") 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° F or (1°C) towards equalizing per 30 minutes time. Due to the high alkalinity and TDS of Southwestern Native 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 Health Monitoring Protocols

All fish should be handled with the best animal husbandry practices available. A feeding schedule will be developed and followed daily. All tanks will be cleaned of uneaten food and feces daily. A daily log recording times of feeding, water temperature and comments on fish health will be maintained. If fish are maintained in a re-circulating system, all filters and pumps will be routinely cleaned and monitored. If fish are held in ponds O₂ levels will be closely monitored. At least once a year, 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 may be less, depending upon availability. Non-lethal methods, if available, will be employed to obtain samples. Condition factors will be calculated on an annual basis and data added to a RBS database. Wet mounts will be examined for parasites and bacteria. Routine condition exams will be conducted and an examination will be conducted on all lots one month prior to delivery to the San Juan River and NAPI ponds on the Navajo Nation. Brood and refuge stock will have health checks annually and only when needed to minimize handling stress.

The U.S. Fish and Wildlife Service, Dexter Fish Health Program will provide bacterial and viral testing for razorback propagation and rearing activities. Treatment of disease will be the responsibility of the Southwestern ARRC fish culture staff. Fish health experts are available to advise on proper treatment, and to examine fish for infection.

Disposition of Fish

All fish propagated and cultured for this project are made available to the SJRIP for stocking and meeting augmentation requirements identified in Phase II (2010 – 2020) “*draft*” **Augmentation of Colorado Pikeminnow (*Ptychocheilus lucius*) in the San Juan River Plan**, (Furr 2009) and the **Five-Year Augmentation Plan for Razorback Sucker in the San Juan River** (Ryden 1997, 2003). In the case of catastrophic loss (>25% of the stock) at Southwestern Native ARRC, up to 1,000 individuals will be collected for testing and diagnosis to determine (if possible) reason for loss. A written statement describing the loss will be provided immediately to the US Fish and Wildlife Service (Service) Fisheries Division and the SJRIP Coordinator, Albuquerque, NM; followed by a detailed report of the diagnosis once results are available. Excluded from these reporting requirements are gametes and fish lost to natural attrition, including but not limited to non-viable eggs prior to hatch and incidental predation mortalities. As per the guidelines identified in the 2003 Memorandum of Understanding between the Service and University of New Mexico, Division of Fishes, Museum of Southwestern Biology (MSB), fish carcasses (specimens) will be provided to the MSB who serves as the repository for vouchered specimens of native fishes. Any additional mortalities above the 1,000 mark will be recorded in the annual Threatened and Endangered Species report and disposed of by burial onsite or at a local land fill.

If any concerns are identified leading to potential questions about stocking of fish, in the instance of fish having cleared the Service’s fish health testing for reportable pathogens and other agents of concern using established Fish Health Center SOPs and those of the American Fisheries Society – Fish Health Section Blue Book, the SJRIP has 30 days to formally respond with recommendations on the disposition of the fish. After 30 days, if no response is provided, in writing, the disposition action for the fish will be at the discretion of the Service.

Reporting

A draft annual progress report detailing fish culture and distribution activities will be completed and provided to the SJRIP by January 31, 2017.

Budget

RE: Colorado Pikeminnow Fingerling Production and Razorback Rearing of Subadults at the Southwestern ARRC, Dexter, NM. The following costs are associated with producing and stocking 400,000 age-0 fingerlings in the San Juan River and 11,000 200 mm subadults into the NAPI ponds on the Navajo Nation in 2016. Identified costs also include maintaining Colorado pikeminnow and Razorback broodstock for recovery efforts.

Budget -Detailed Spending Plan 2016**I. Colorado Pikeminnow Fingerling Production**O&M Labor Costs

The labor costs identified for 2015 are broken down as follows, and include fringe benefits and payroll additives for each position identified:

Southwestern Native Aquatic Resources and Recovery Center

(1) Fish Biologist (1,280 hours -16pay periods) - GS 482-9 @\$32.33/hr. = \$41,382

* Supervision, spawning, fish health and water quality monitoring, feeding, harvest and prep for distribution.

(1) Administrative Officer (240 hours- 3pay periods) - GS 341-9 @\$31.63/hr. =\$ 7,592

* Budget tracking, purchasing, data base management & reporting.

Subtotal = \$48,974

Equipment and Supplies:

Liquid oxygen and compressed oxygen 12 cylinders @ \$81.42	\$ 977
Airgas	
Spawning Supplies	\$ 980
Hormones (CCP 5 vials @ \$196 per 10ml/vial)	
Fish health sampling prior to stocking	\$ 2,111
Lab supplies for bacti, viral and parasite testing.	
Culture equipment (nets, seines, screens, etc.)	\$2,152
Eager, Memphis Net & Twine	
Pond management supplies, Barrier \$273.19/50# bag (20 bags)	\$5,463
Van Diest	
Fish feed,1.65/lb., 6,000 lbs.	\$9,900
SKRETTING	
Cyclical Maintenance costs for:	\$1,545
Tractors, mowers, gators, sweepers used in pond maintenance	
Subtotal	\$ 23,128

Utilities:

Pumping costs	
Electrical 200,257 kwh @ .094	\$18,824
Heating water for hatching eggs to swim-up	
Natural gas 1,525 ccf @ .99	\$ 1,509
Subtotal	\$20,333

Reintroduction Costs:

Salaries

GS-9 Fish Biologist	
24 hrs. @ \$32.35	\$776
GS-7 Fish Biologist	
24 hrs. @ \$24.04	\$577
WG-7 Maintenance Worker	
24 hrs. @ \$21.86	\$525
WG-5 Bio Science technician	
24 hrs. @ \$16.39	\$393
Lodging & Per Diem \$123/day (Dexter to Farmington, NM and return)	
\$123.00/trip x 2 trips x 4 employees =	\$ 984
Fuel costs and truck maintenance 1200 miles @ \$5.61	\$6,732
Subtotal	\$9,987

Annual subtotal (CPM)**(O & M Direct Costs)** **\$ 102,422****II. Rearing Razorback Sucker Subadults at the Southwestern ARRC**O&M Labor Costs

The labor costs identified in the 2015 Scope of Work are broken down as follows, and include fringe benefits and payroll additives for each position identified:

Southwestern Native Aquatic Resources and Recovery Center

(1) Fish Biologist (1,040 hours -13pay periods) - GS 482-9 @\$32.33/hr. = \$ 33,623
 * Supervision, spawning, fish health and water quality monitoring, feeding, harvest and distribution.

(1) Administrative Officer (160 hours- 2pay periods) - GS 341-9@\$31.63/hr. = \$ 5,060
 * Budget tracking, purchasing, data base management & reporting.

Subtotal = \$38,683Materials and Supplies

Cost based on SNARRC's historical purchases:

Fish Health

Fish health sampling prior to stocking	
Lab supplies for bacti, viral and parasite testing.	\$ 1,218
Fish Culture Supplies	
Nets, seines, tubs, screens.	\$ 2,060
Wet lab supplies (pipets, petri dishes, slides, probes, markers)	\$ 274
Theriputents- salt, Oxytetracycline, formalin, MS-222, stress coat	\$ 656
Liquid and compressed oxygen for fish distribution	\$ 218
Feed	
Production diet RBS0301 (2.0 tons) 4,000 lbs. \$ 1.55 per lb.	\$ 6,200
Spawning Supplies	
Hormones (HCG 10 vials @ \$ 54.64 per 10ml/vial)	\$ 546
Fertilizer	
Alfalfa pellets (1,000 lbs.) .28/lb.	\$ 280
Inorganic - Super Phosphate (10 bags) 8.20/bag	\$ 82
Chemicals- Aquatic Vegetation Control	
Barrier- (6 bags) \$273.19/bag	\$ 1,639
Diuron -(2 bags) \$ 81.96/bag	\$ 164
	Subtotal = \$13,337
Services	
Utilities & Equipment Maintenance	
* Electrical, fuel and phone	\$ 4,854
* Boiler system, heat exchanger maintenance	\$ 1,092
*#1 well and water tower and pumping station maintenance	\$13,471
	Subtotal = \$ 19,417
Travel	
- Fish stocking/distribution.	
Dexter to Farmington (NAPI) & return- (1640 miles @ 5.61 per mile DX truck) =	\$ 9,200
Fuel and routine vehicle maintenance.	
Per diem- \$123 per day X 2 trips X 2 individuals. =	\$ 492
	Subtotal = \$ 9,692
Annual subtotal (RBS)	
O&M DIRECT COSTS	\$81,129
I. Colorado Pikeminnow Fingerling Production	\$102,422
II. Rearing Razorback Sucker Subadults at the Southwestern ARRC	\$81,129

Annual total:	\$183,551
3 % Administrative Overhead	\$ 5,507
TOTAL REQUESTED FOR 2016	\$ 189,058

Projected out year funding request:

FY 2017	-	\$194,787
FY 2018	-	\$200,630
FY 2019	-	\$206,649
FY 2020	-	\$212,848

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- Furr, W. D. 2009. *Draft Augmentation Plan, Augmentation of Colorado Pikeminnow (Ptychocheilus lucius) in the San Juan River, Phase II 2010-2020*. U. S. Fish and Wildlife Service, Albuquerque, NM. 15 pages.
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- Ryden, D. W. 2003. *An Augmentation Plan For Colorado Pikeminnow In The San Juan River*. U. S. Fish and Wildlife Service, Grand Junction , Co. 63 pp. + appendices.
- Ryden, D. W. 2003. *An augmentation plan for razorback sucker in the San Juan River: An addendum to the five-year augmentation plan for razorback sucker in the San Juan River (Ryden 1997)*. U. S. Fish and Wildlife Service, Grand Junction, CO. 32 pp.
- Ryden, D. W. 2005. *Draft Addendum #1, Stocking Age-1 Fish To Supplement Ongoing Augmentation Efforts. An Augmentation Plan For Colorado Pikeminnow In the San Juan River*. U. S. Fish and Wildlife Service, Grand Junction , Co. 3 pages.