

**SAN JUAN RIVER
RAZORBACK SUCKER *Xyrauchen texanus* &
COLORADO PIKEMINNOW *Ptychocheilus lucius*
POPULATION AUGMENTATION: 2013**

Annual Report



Photo by USFWS

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To:

The San Juan River Basin Recovery Implementation Program
July 1, 2014
Agreement number: R13PG40051

EXECUTIVE SUMMARY

Razorback Sucker:

- **15,362** razorback sucker were stocked during 2013 augmentation efforts
 - 3,962 fish stocked above the annual target of 11,400 fish (134.8% of target fulfilled)
 - Several stocking sites on the San Juan River were used
 - Between River Mile (RM) 93 (Montezuma Creek, UT) upstream to RM 196.1 (Verde del Rio Park, Bloomfield, NM)
 - Two sites on the Animas River in Farmington, NM were used
 - Animas River Mile (A-RM) 1.0 (Boyd Park) and A-RM 5.0 (Berg Park)
 - Soft releases conducted for hatchery stocked fish when possible
 - Fifth year of 8 year augmentation plan
 - 86,779 fish stocked to date under 8 year augmentation effort
 - 95% of the 8 year augmentation target (91,200) have been stocked from 2009 to 2013

Sources of Razorback Sucker:

- **3,310** fish stocked from Ouray National Fish Hatchery (NFH)-Grand Valley Unit in the San Juan River Basin
 - Three hard releases conducted
 - September 24 at RM 147.9 (Shiprock Bridge)
 - 758 fish released
 - Mean total length (TL)= 372 mm, Range 273-460 mm
 - October 15th and 16th at RM 93
 - 828 and 985 fish released; respectively
 - Mean TL= 355 mm, Range 222-474 mm
 - One soft release conducted
 - October 29 at A-RM 1.0
 - 739 fish acclimatized in enclosure (≈18hrs.) and released

- Mean TL= 386 mm, Range 260-455 mm
 - All Ouray NFH fish were 2012 Year Class (YC)
- **5,809** fish stocked from Uvalde NFH in the San Juan River Basin
 - Two hard releases conducted
 - October 10 at A-RM 5.0
 - 1,565 fish released
 - Mean TL= 428 mm, Range 230-582 mm
 - October 16 at A-RM 5.0
 - 1,754 fish released
 - Mean TL= 433 mm, Range 325-545 mm
 - Two soft releases conducted
 - October 22 at A-RM 1.0
 - 1,626 fish acclimatized (≈20hrs.) and released
 - Mean TL= 423 mm, Range 330-535 mm
 - October 29 at RM 166.6 (PNM Sluiceway)
 - 864 fish acclimatized (≈21hrs.) and released
 - Mean TL= 423 mm, Range 326-540 mm
 - All Uvalde NFH fish were 2009 YC
- **6,243** fish stocked from Navajo Agricultural Products Industry (NAPI) ponds in the San Juan River Basin
 - 10,500 stocked into ponds
 - 59.5% return rate
 - Mean TL= 336 mm, Range 223-470 mm
 - Fish stocked at multiple locations
 - between RM 147.9 upstream to 196.1, and at A-RMs 1.0 and 5.0
 - All NAPI fish were 2011 YC
- All razorback sucker stocked in 2013 were PIT tagged and measured for Total Length

- Adaptive management 2014 through 2016
 - Hatchery sources of razorback sucker for use in 2014-2016 augmentation efforts under review by the San Juan River Basin Recovery Implementation Program
 - Continue to investigate potential stocking sites throughout the San Juan River Basin

Colorado Pikeminnow:

- Fourth year of Phase II (2010-2020) Colorado pikeminnow augmentation plan
 - The Southwestern Native Aquatic Resources and Recovery Center (SNARRC, previously Dexter National Fish Hatchery & Technology Center) provided all Colorado pikeminnow for the Fall 2013 stockings
- A total of 439,264 Colorado pikeminnow were stocked into the San Juan River Basin in 2013
 - October 28
 - PNM Sluiceway, Fruitland, NM (RM 166.6)
 - 331,388 fish acclimatized ≈21 hours
 - Total length (TL) between 52-58 mm, 2013 year class (YC)
 - Boyd Park, Farmington, NM (Animas-River Mile 1.0)
 - 107,876 fish acclimatized ≈22 hours
 - Averaged 52-58 mm TL, 2013 YC
 - 109.8 % of baseline annual stocking target fulfilled
 - No other opportunistically acquired fish available in 2013
- In 2014 SNARRC continuing to follow Phase II production
 - ≥400,000 age-0 Colorado pikeminnow produced and stocked annually
 - Soft releases to occur in Fall 2014-2020

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INTRODUCTION

Razorback sucker *Xyrauchen texanus*, is one of three San Juan River native fish species, along with Colorado pikeminnow *Ptychocheilus lucius* and roundtail chub *Gila robusta*, that have declined in numbers and range since the mid 1900's ([Minckley 1973](#), [Bestgen 1990](#)). Physical alterations of riverine habitats, water impoundment in the form of Navajo Reservoir and Lake Powell and their associated effects on flow and thermal regimes, introduction of non-native fish species, and contaminants may have contributed to the decline of these native species ([Platania 1990](#), [Brooks et al. 1993](#), [Ryden and Pfeifer 1994a](#)). Razorback sucker (RBS) was listed as endangered under the Endangered Species Act in 1991 ([U.S. Fish and Wildlife Service](#), {USFWS}, [1991](#)). In addition to federal protection, razorback sucker is currently a protected species in Arizona, California, Colorado, Nevada, New Mexico, Utah, and the Navajo Nation.

One goal of the San Juan River Basin Recovery Implementation Program (SJRIP) is to establish self-sustaining populations of the two endangered fishes ultimately leading to recovery and downlisting of the two species ([SJRIP 1995](#)). Due to the paucity of historic collections of razorback sucker, including the failure to collect any wild razorback sucker during three years (1991-1993) of intensive studies on all life stages of the San Juan River fish community ([Buntjer et al. 1993, 1994](#), [Lashmett 1993, 1994](#), [Ryden and Pfeifer 1993, 1994b](#), [Gido and Propst 1994](#)) the SJRIP Biology Committee initiated an experimental stocking program for razorback sucker in the San Juan River; 1994-1996 ([Ryden and Pfeifer 1994a](#)). Experimental stocking was implemented to provide insight about recovery potential and habitat suitability for the razorback sucker in the San Juan River between river mile (RM) 158.6 Hogback Diversion, NM and Lake Powell, UT RM 0 ([Maddux et al. 1993](#)). Data from these stockings indicated that razorback sucker could persist in the San Juan River and this information led to the implementation of a full-scale augmentation program for razorback sucker in 1997 ([Ryden 2003b](#)). Additionally, based on these and other studies, critical habitat for razorback sucker in the San Juan River was designated from RM 158.6 downstream to Neskahi Canyon in the San Juan arm of Lake Powell ([USFWS 1994](#)).

In 1997 a *Five-year augmentation plan for razorback sucker in the San Juan River* was completed ([Ryden 1997](#)). This plan identified the establishment of a target population of 15,900 razorback sucker in the San Juan River between Hogback Diversion (RM 158.6) and Lake Powell (RM 0.0).

To meet this goal, it was estimated that 73,482 razorback sucker would have to be stocked between 1997 and 2001. From September 1997 to November 2001, a total of 5,896 razorback sucker were stocked into the San Juan River. The shortfalls in stocking numbers were a result of insufficient numbers of razorback sucker available to the SJRIP augmentation program. From 1997 to 2001, the SJRIP acquired for use, or constructed, several ponds on Navajo Agricultural Products Industry (NAPI) lands for the purpose of rearing razorback sucker for stocking into the San Juan River. These ponds were the primary source of razorback sucker for the SJRIP's augmentation program. Ponds were stocked with young razorback sucker each Spring, of which appropriately sized individuals (≥ 300 mm TL) were passively harvested (fyke nets) and stocked into the San Juan River each Fall. Fish that failed to meet the minimum size requirement were left in the ponds for continued grow-out. This strategy led to the presence of multiple cohorts in the ponds creating unpredictability during Fall harvest efforts.

Despite the augmentation shortfalls, useful recapture data were collected. First, razorback sucker were recaptured during every spring and fall fish community monitoring trips from 1997-2001 ([Ryden 2001](#)). Second, aggregations of spawning adults were encountered in the spring of 1997, 1999, and 2001 at RM 100.2 (McElmo Creek) just downstream of Aneth, UT ([Ryden 2001, 2003a](#)). Lastly, larval razorback sucker have been collected every year since 1998, with over 1,000 larvae being collected in each of three years, 2010-2012, and 972 collected in 2013 ([Farrington et al. 2014](#)). Although larval razorback sucker have been collected for the last 16 years, documented recruitment to juvenile life stages is limited ([Hines 2014, Schleicher 2014](#)).

Based on these observations, the SJRIP-BC extended the augmentation effort for razorback sucker and approved *An augmentation plan for razorback sucker in the San Juan River: Addendum to the five-year augmentation plan for razorback sucker in the San Juan River (Ryden 1997)* in February 2003 ([Ryden 2003b](#)). This addendum outlined an additional eight-year augmentation period for razorback sucker. The eight-year augmentation period was scheduled to begin in 2004 and continue through 2011. Between 2002 and 2008, 52,084 razorback sucker were stocked with 41,629 (79.9%) of those being stocked over two years, 2006 and 2007. The large number of fish stocked in those years was attributable to the harvest of all razorback sucker from the NAPI ponds in preparation for a shift from a multiple cohort to a single cohort rearing strategy in East and West Avocet ponds, and Hidden Pond. Many of the fish stocked were under the target size of ≥ 300 mm (2006 mean TL = 265

mm, range of 68-537 mm; 2007 mean TL = 268 mm, range of 110-573 mm) and due to complicating factors during harvesting roughly 25% of those fish were stocked without Passive Integrated Transponder (PIT) tags. Although large numbers of fish were stocked in 2006 and 2007, recapture rates, three years post stocking, were similar to those from smaller stockings ($n < 10,000$) ([Durst 2014](#))

In response to changes in the augmentation strategy, the timeline for beginning the eight-year augmentation effort was delayed, with full implementation beginning in 2009. This report provides an overview of the fifth year (2013) of the eight-year effort (2009-2016) for razorback sucker augmentation in the San Juan River Basin. Details summarizing the grow-out of razorback sucker at the NAPI ponds during 2013 are covered in a separate report by the Navajo Nation Department of Fish and Wildlife.

Colorado pikeminnow *Ptychocheilus lucius* is a federally-listed endangered fish native to the San Juan River. Colorado pikeminnow (CPM) were first listed as endangered in 1967 by the United States Fish and Wildlife Service (USFWS) and then given full protection under the Endangered Species Act of 1973. In 1996, experimental stocking of Colorado pikeminnow into the San Juan River was undertaken by the Utah Division of Wildlife Resources (UDWR) Moab field station. The purposes of this effort were to evaluate dispersal and retention of stocked juvenile Colorado pikeminnow, and to determine the availability, use, and selection of habitats by early life stages. Between 1996 and 2000, 832,449 larval and juvenile age-0 Colorado pikeminnow were stocked into the San Juan River by UDWR ([Ryden 2003c](#)). In addition, 197 adult Colorado pikeminnow (≥ 450 mm TL) were stocked into the San Juan River, 49 in 1997 and 148 in 2001 ([Ryden 2003c](#)). In subsequent years, several hundred of those experimentally released Colorado pikeminnow were recaptured during either seining or electrofishing efforts ([Ryden 2008a](#)).

An *Augmentation plan for Colorado pikeminnow in the San Juan River* ([Ryden 2003c](#)) provided the guidance for an eight-year augmentation effort. This plan called for the annual stocking of age-0 Colorado pikeminnow in the fall of each year, 2002-2009 ($\geq 250,000$ in fall 2002 and $\geq 300,000$ 2003-2009). An addendum to this augmentation plan called for an additional 3,000 age-1+ PIT tagged Colorado pikeminnow to be stocked annually, beginning in 2006 ([Ryden 2005a](#)). This plan,

referred to as Phase I, expired at the end of 2009. A new augmentation plan was drafted in 2010 and called for the continuation of stocking through 2020 ([Furr 2010](#)).

In addition to fish stocked as part of the annual requests under the Phase I augmentation plan, Colorado pikeminnow were opportunistically obtained from various sources between 2003 and 2006 and stocked into the San Juan River. These fish became available to the SJRIP because they were excess to augmentation efforts occurring elsewhere in the Colorado River Basin. Although not specified in the Phase I augmentation plan, the stocking of these fish was approved on a case-by-case basis by the SJRIP Biology Committee (SJRIP-BC). Ages of opportunistically stocked fish ranged from 1-5 and were reared at three different hatcheries: the Colorado Parks and Wildlife's John W. Mumma Native Aquatic Species Restoration Facility, SNARRC, and the Arizona Game and Fish Department's Bubbling Ponds Native Fish Research Facility. A total of 16,258 fish were opportunistically acquired and accounted for 44.5% of all age-1 or older (age-1+) fish stocked from 2002-2009.

Experimental soft releases by Golden et al. ([2006](#)) indicated that short-term survival and retention were improved by acclimatizing Colorado pikeminnow to riverine conditions in netted enclosures for up to 7 days prior to release into the mainstem. Based on this study and others ([Cresswell and Williams 1983](#), [Olla et al. 1992](#), [Kaya and Jeanes 1995](#), [Brown 2002](#), [Schlechte and Buckmeier 2006](#)), beginning in 2007 all stocked Colorado pikeminnow were acclimatized, when possible, for up to 24 hours prior to release into the river. A *Stocking Plan and Protocol for the Augmentation of Colorado pikeminnow (Ptychocheilus lucius) in the San Juan River* ([Furr and Davis, 2009a](#)) was created to provide a justification and framework for how *in situ* acclimatization would occur. Since 2007, a total of 2,081,700 age-0 and 377,343* age-1+ Colorado pikeminnow have been acclimatized in enclosures and released at multiple locations upstream of RM 133.3 in the San Juan River (*182,412 of the soft released age-1+ fish were fish intended for release as age-0 in Fall 2010 but were held over for stocking in Spring 2011; these fish were not stocked with PIT tags implanted).

An analysis of the SJRIP endangered fish database indicated that 29 individual adult Colorado pikeminnow were recaptured in 2013 that have recruited to the adult size class within the San Juan River Basin. Captures of larval Colorado pikeminnow in 2004, 2007, 2009-2011, and 2013 confirms that limited reproduction is occurring in the San Juan River Basin ([Farrington et al. 2014](#)). Data

indicate that hatchery-reared Colorado pikeminnow can survive in the San Juan River Basin and that stocking will likely assist in the re-establishment of a Colorado pikeminnow population there ([Davis and Furr 2008](#), [Ryden 2008b](#), [Schleicher 2014](#)).

Relationship To The Recovery Program

The main objective for augmentation is to facilitate the establishment of self-sustaining populations of Colorado pikeminnow and razorback sucker, with the eventual goal of recovering (i.e. delisting) these species in the San Juan River Basin ([Ryden 1997](#), [SJRIP 2014](#)). Augmentation is intended to increase overall population numbers, provide opportunities for research (i.e. movement studies, habitat and spawning site preferences), add genetic diversity to the existing gene pool, and contribute to the persistence of a spawning adult population. Subsequent data collection may identify factors limiting successful recruitment of these species in the San Juan River.

The SJRIP Long-Range Plan (LRP) ([SJRIP 2014](#)) identifies the need to assess the feasibility and implementation of Colorado pikeminnow and razorback sucker augmentation. There are numerous documents that provide the necessary guidance for the efforts to fulfill the goals, actions, and tasks defined in the 2014 LRP ([Ryden 2003b](#), [Ryden 2003c](#), [Ryden 2005a](#), [Ryden 2005b](#), [Furr 2010](#), [Furr & Davis 2009a](#), [Furr & Davis 2009b](#)). The requirements of the augmentation program for the San Juan River's Colorado pikeminnow and razorback sucker populations are specified in the draft 2014 LRP under the following goals, actions, and tasks:

- **Goal 1.1 - Establish a Genetically and Demographically Viable, Self-Sustaining CPM and RBS Populations.**
 - **Action 1.1.1** Develop plans for rearing and stocking CPM and RBS.
 - **Task 1.1.1.1** Review and update augmentation plan for CPM and adjust stocking goals as scheduled.
 - **Task 1.1.1.2** Review and update augmentation plan for RBS and adjust stocking goals as needed.
 - **Action 1.1.2** Produce, rear, and stock sufficient numbers of CPM to meet stocking goals of augmentation plan.
 - **Task 1.1.2.2** Stock at least 400,000 age-0 (50–55 mm TL) CPM annually into the San Juan River.

At least 400,000 age-0 (50–55 mm TL) CPM will be released annually from the SNARRC into the San Juan River and will continue until stocking targets are modified by the SJRRIP (see Task 1.1.1.1).
 - **Task 1.1.2.3** Opportunistically stock available CPM in excess of those described above.
 - **Action 1.1.3** Produce, rear, and stock sufficient numbers of RBS to meet stocking goals of augmentation plan.
 - **Task 1.1.3.2** Rear and stock hatchery-reared RBS from three NAPI grow-out ponds (3,000-3,500 fish per pond, > 200 mm TL).
 - **Task 1.1.3.4** Stock at least 91,200 RBS (> 300 mm TL) during eight year stocking period or 11,400 per year.

At least 91,200 RBS (> 300 mm TL) will be harvested annually from grow-out ponds and/or supplemental hatchery facilities and stocked into the SJR over an 8-year period or 11,400 per year. A 2005 addendum to the stocking plan specified the eight-year stocking period to begin when the production program was at full implementation, estimated to start no later than 2007. Time frame for current 8-year stocking plan is 2009-2016 (see Task 1.1.1.2).
 - **Task 1.1.3.5** Opportunistically stock available RBS in excess of the 11,400 described above.
 - **Task 1.1.3.6** Produce 2,000-4,000 RBS per year (>300 mm TL) at Horsethief Canyon Native Fish Facility (HCNFF), at Ouray NFH at Grand Junction, CO

- **Goal 1.2 - Evaluate RBS and CPM Augmentation Program and Genetic Integrity**
 - **Action 1.2.2** Evaluate methods to improve RBS and CPM stocking successes.
 - **Task 1.2.2.1** 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 RBS and CPM 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 SNARRC for CPM and RBS production.
 - **Task 1.3.1.3** Operate and maintain Navajo Agricultural Products Industry (NAPI) grow-out ponds for RBS production.
 - **Task 1.3.1.3** Support operation and maintenance of Horse Thief Canyon Fish Rearing Ponds.

The stockings in Fall 2013 of razorback sucker from Uvalde NFH concludes the commitments from that hatchery to the SJRIP augmentation program. For 2014, and subsequent years, NAPI and Ouray National Fish Hatchery's (Ouray NFH) - Grand Valley Unit (GVU) will provide razorback sucker to meet annual stocking goals. All Colorado pikeminnow will be produced at SNARRC. Augmentation activities concerning opportunistically acquired fish will be considered on a case-by-case basis.

Stocking of fish reared at USFWS hatcheries in the Southwest Region are subject to Regional Policy No. 03-06, "Stocking of fish and other aquatic species". This policy applies to production, transport, and stocking for USFWS hatchery production and incorporates guidance and requirements from USFWS Fish Health Policy (713 FWM 1-5), Policy for Controlled Propagation of Species Listed under the Endangered Species Act (Federal Register 65:183), and goals and objectives of the USFWS's Strategic Plan for the Fisheries Program. The USFWS's Fish and Wildlife Conservation Offices are the primary conduit for satisfaction of policy requirements and ensure compliance with needs relative to fish health, stocking requests and priorities, deviation from approved stocking requests, pre-stocking treatments (e.g. nonnative fish removal from stocking sites), and applicable environmental regulation. NMFWCO is the pertinent field office for processing of SJRIP stocking requests.

Objectives for RBS & CPM Augmentation 2013

- 1) Obtain, rear, harvest, and stock razorback sucker to fulfill the tasks and objectives outlined in the current versions of the razorback sucker augmentation plan addendum ([Ryden 2003b](#)) and the SJRIP Long-range plan.
- 2) Conduct soft releases for all hatchery stocked razorback sucker using release locations at, or upstream of, the PNM Weir (RM 166.6). Soft releases consist of holding and monitoring fish within an enclosure with low/zero velocity for up to 24 hours allowing fish to recuperate from handling and hauling stressors, and acclimatize to water chemistry parameters, *in situ*, at specific locations.
- 3) Coordinate with SNARRC to procure and stock age-0 Colorado pikeminnow according to guidelines set forth in Augmentation of Colorado pikeminnow (*Ptychocheilus lucius*) in the

San Juan River Phase II, 2010-2020 (Draft Augmentation Plan) ([Furr 2010](#)) and Stocking plan and protocol for the augmentation of Colorado pikeminnow (*Ptychocheilus lucius*) in the San Juan River ([Furr and Davis 2009a](#)).

STOCKINGS

Razorback sucker:

Uvalde NFH 2013 Annual Commitment Stockings

In an effort to increase survival and retention of Uvalde NFH razorback sucker, changes in handling and hauling protocols were implemented by the hatchery in 2011. Under these protocols four stocking events were required to deliver Uvalde NFH's 2013 augmentation commitment. In addition, new stocking protocols were implemented by NMFWCO that included soft releases (when possible), similar to methods used for soft releases of Colorado pikeminnow ([Furr and Davis 2009a](#)), of all razorback sucker from Uvalde NFH. All fish were implanted with a PIT tag and had TL and WT measurements recorded prior to delivery. A summary of the four stockings from Uvalde NFH are presented in Table 1.

The four releases from Uvalde NFH resulted in 5,809 razorback sucker being stocked at one location in the San Juan River and two locations in the Animas River. Two Uvalde NFH hard releases (fish tempered in hauling tanks and then released directly into the river) were conducted due to lack of staff during the 2013 government shutdown. These two stockings occurred at Berg Park (A-RM 5.0). New Mexico FWCO personnel were able to conduct two soft releases for Uvalde razorback sucker in 2013. No pre-release site sampling was conducted during the two soft-releases. The first soft release was conducted at Boyd Park (A-RM 1.0) on October 22nd and the second at the PNM Sluiceway (RM 166.6) on October 29th. The Boyd Park site consists of a side channel (approximately 100 m x 20 m) formed by a large mid-channel cobble bar/island. Substrate was embedded cobble with benthic algae at the up-stream riffle of the channel and sand/silt in the down-stream pool. Depth throughout most of the side channel was 0.5-0.7. The PNM Sluiceway site

consists of a large concrete channel (46m x 6m) and a boulder/cobble lined stilling pool (19m x 8m). The concrete channel substrate was concrete with sand/silt deposits and in the stilling pool the substrate was boulder/cobble with sand/silt accumulation near the confluence with the San Juan River. Holding times for the soft releases ranged between 20-22 hours.

Table 1- Summary of Uvalde NFH and Ouray NFH-GVU razorback sucker stockings into the San Juan River, 2013.

Date	Site, River Mile	# of fish	Year Class	Mean TL (mm)	Range TL (mm)	Delivering Hatchery (release type)
Sept. 24	Shiprock Bridge RM 147.9	758	2012	372	247-460	Ouray (Hard)
Oct. 10	Berg Park A-RM 5.0	1,565	2009	4282	230-582	Uvalde (Hard)
Oct. 15	Montezuma Creek, UT RM 93	828	2012	355	270-474	Ouray (Hard)
Oct. 16	Berg Park A-RM 5.0	1,754	2009	433	325-545	Uvalde (Hard)
Oct. 16	Montezuma Creek, UT RM 93	985	2012	355	222-437	Ouray (Hard)
Oct. 22	Boyd Park A-RM 1.0	1,626	2009	423	330-535	Uvalde (Soft)
Oct. 29	Boyd Park A-RM 1.0	739	2012	386	260-455	Ouray (Soft)
Oct. 29	PNM Sluiceway RM 166.6	864	2009	423	326-540	Uvalde (Soft)
Total Stocked from Hatcheries		9,119				

Ouray NFH-GVU 2013 Annual Commitment Stockings

In 2013 Ouray NFH-GVU began delivering razorback sucker as part of its annual commitment to the SJRIP Augmentation Program. Current production at Ouray NFH-GVU allows for 2,000-4,000 razorback sucker to be available for stocking into the San Juan River annually. In 2013, Ouray NFH-GVU stocked 2,571 razorback sucker at 2 locations on the San Juan River; 1,813 fish at Montezuma Creek, Utah (RM 93) and 758 fish at Shiprock Bridge, NM (RM 147.9). These stockings were conducted during the government shutdown so standard hard release methods were used. A soft release of 739 razorback sucker was conducted at Boyd Park on the Animas River (A-RM 1.0) when NMFWCO personnel were available. Ouray NFH-GVU total augmentation contribution for 2013 was 3,310 age-1+ (2012 YC) fish (Table 1).

NAPI Ponds 2013 Stockings

A total of 6,243 razorback sucker were stocked using standard hard release protocols from the NAPI ponds into the San Juan River in 2013 (Table 2). There was a 59.5% return rate from the original 10,500 fish stocked into the ponds by SNARRC. Passive harvests began on September 12th and ran through October 1, 2013. Passively harvested fish were stocked at three locations: Verde del Rio/River Walk Park (RM 196.1), PNM/Nenahnezad Fish Ladder (RM 166.6), and Shiprock Bridge (RM 147.9). Active harvest for Hidden Pond occurred on October 16th, and fish were stocked at the Boyd Park (A-RM 1.0) and PNM/Nenahnezad Fish Ladder. East and West Avocet were actively harvested on October 18th, and fish were stocked at Berg Park (A-RM 5.0), Boyd Park, San Juan/Animas River Confluence (RM 180.6), PNM/Nenahnezad Fish Ladder, and Shiprock Bridge.

Table 2- Summary of 2013 NAPI pond harvest results as reported to NMFWCO by NNDGF.

Pond	Harvest Type	Number Recorded	Mean TL (mm)	Range TL (mm)	Mean WT (g)
East Avocet	Passive	467	327	300-400	353
	Active	1,496	330	235-400	380*
West Avocet	Passive	507	331	300-405	372*
	Active	1,972	337	225-470	404*
Hidden Pond	Passive	277	341	229-401	400*
	Active	1,522	342	223-420	436*
Total		6,243			

*indicates mean WT's were calculated from a subset of fish harvested. Numbers presented here may differ from actual numbers stocked due to duplicate or other PIT tag recording errors.

Razorback sucker with errors in their recorded data are removed from the SJRIP Access database and so may be represented in this report but will not be accounted for in other program documents. These fish were, however, included when calculating the 2013 annual augmentation totals ([Appendix B](#)).

Colorado pikeminnow:

On October 28, 2013 SNARRC and New Mexico FWCO soft released 439,264 age-0 (2013 YC) Colorado pikeminnow. Two soft-release locations were used: PNM Sluiceway (RM 166.6) received 331,388 fish, and Boyd Park, Farmington, NM (Animas-RM 1.0) received 107,876 fish (Table 3). Soft-releases consist of holding and monitoring fish within an enclosure with low/zero velocity for up to 72 hours allowing fish to recuperate from handling and hauling stressors, and acclimatize to water chemistry parameters, *in situ*, at specific locations. Fish are typically acclimatized in the enclosure for 18-24 hours prior to final release.

In accordance with stocking protocols, Colorado pikeminnow were tempered in the hauling tank for at least one hour and to within 1°C of the measured river temperature. Fish were tempered at the PNM/Neenahnezad Fish Ladder (RM 166.6, South bank) prior to delivery to the PNM Sluiceway. Fish being stocked at Boyd Park where tempered on site. Once temperatures were verified to be within 1°C fish were off-loaded into the soft-release enclosures.

Due to the limited access, time, and crew available no pre-stocking fish community sampling was conducted.

Table 3- Colorado pikeminnow stockings in the San Juan River 2013.

Date	Age/Year Class	# of Fish	TL (mm)	Release Site River Mile	Release Type (soft vs. hard)
Oct. 28	0/2013	107,876	52 -58	A-RM 1.0	Soft
Oct. 28	0/2013	331,388	52 -58	166.6	Soft
Total Stocked		439,264			

All Colorado pikeminnow stocked into the San Juan River in 2013 were produced and reared at SNARRC under a separate agreement with the Bureau of Reclamation.

DISCUSSION

The SJRIP Augmentation Program accomplished *Actions* and *Tasks* set forth in SJRIP-LRP *Goal 1.1*. Actions are being taken to address *Goal 1.2* and evaluations are currently ongoing. A total of 15,362 razorback sucker and 439,264 Colorado pikeminnow were stocked in 2013. This represents an exceedance of the annual stocking target of 11,400 razorback sucker by 3,962 fish and 400,000 Colorado pikeminnow by 39,264 fish. The SJRIP Augmentation Program is expected to meet, or exceed, its annual stocking target for Colorado pikeminnow based on current production capabilities at SNARRC. However, the total number of razorback sucker available annually will likely be reduced. NAPI pond harvest return rates are expected to be between 40-60% of the initial 10,500 razorback sucker stocked for grow-out by SNARRC ([SJRIP 2014](#)). Therefore, it is expected that NAPI will supply 4,000-6,000 fish annually. Ouray NFH-GVU will supply another 2,000-4,000 annually. Combined, these two sources are expected to provide SJRIP between 6,000-10,000 razorback sucker each year. This is below the annual target stocking number of 11,400. However, the overall augmentation goal is to stock 91,200 over an 8 year period and given that by the fifth year 95% (n=86,779) razorback sucker have already been stocked, the slight shortfall in razorback sucker available in subsequent years will not likely impede reaching the overall 8-year augmentation target. Furthermore, ongoing analysis of the SJRIP database indicates that post-stocking survival and retention rates for razorback sucker from these sources may be relatively high resulting in more fish in the river after the first over-winter period than previously assumed and therefore warrant a downward adjustment in the annual stocking target (Nate Franssen, personal communication). However, if augmentation targets need to be maintained at, or increased from, current levels then the SJRIP will need to identify additional sources of razorback sucker.

In 2013, razorback sucker were stocked over a wider range than in previous years. This is due to utilizing a new downstream release site (Montezuma Creek, RM 93). It is intended that by using a more expansive range of stocking locations in the San Juan and Animas Rivers it will facilitate both an upstream range expansion and a more longitudinally uniform population density for this species. Annual stockings of razorback sucker will continue to be scheduled in autumn, preferably after the end of irrigation and field sampling seasons, in an attempt to lessen entrainment and post-stocking sampling disturbance.

No anomalies, fish health issues, or substantial mortalities were witnessed during soft released razorback sucker by NMFWCO personnel in 2013.

As the effects of augmentation on the razorback sucker population, and on the San Juan River fish community as a whole, are better understood, management decisions will invariably be reconfigured to address these new data. Due to the stochastic nature of the San Juan River, an adaptive management approach can best respond to the myriad of issues that may arise during augmentation efforts. Stocking protocols, including the conducting of soft releases for razorback sucker, will be evaluated annually and changes made to subsequent stockings and production protocols in order to expedite recovery.

Age-0 Colorado pikeminnow were stocked at two locations on October 28, 2013. The use of two stocking locations is to facilitate longitudinal dispersal for this species in the San Juan River Basin. The stocking site located at the PNM Sluiceway (RM 166.6) is typically used to soft-release approximately 300,000 (75% of annual target) age-0 fish. The PNM Sluiceway site was selected due to previous use for acclimatizing large numbers of Colorado pikeminnow, presence of low velocity habitats, and easy accessibility by the hatchery truck. The second release site chosen in any given year is to receive the remaining fish. In 2013 the site at Boyd Park was chosen because it had similar features to the PNM Sluiceway site but is approximately 15 river miles upstream and in the Animas River. By stocking at this location the upstream range for Colorado pikeminnow will hopefully be increased.

Information gleaned from recapture analysis of fish from these releases will help guide determinations of future stocking locations for age-0 Colorado pikeminnow. In order to evaluate the efficacy of stocking near, or upstream, of the Animas River's confluence with the San Juan River (in both the San Juan River and in the Animas River) the NMFWCO recommends continuing annual sampling from Verde del Rio Park (RM 196.1) downstream to the PNM Weir (RM 166.6), and implementing sampling in the Animas River from at least Berg Park (A-RM 5.0) downstream to the confluence with the San Juan River. Considering the paucity of data regarding Colorado pikeminnow and razorback sucker use of the Animas River, the SJRIP would benefit from a clearer understanding of how these fishes are utilizing this important tributary. The 2013 Fall stockings

were representative of future annual stocking efforts as outlined under the Phase II augmentation plan ([Furr 2010](#)).

Phase II augmentation efforts will be subject to annual review and revision under an adaptive management approach. Information and reports from ongoing management activities will be analyzed by the SJRIP-BC to guide augmentation strategies regarding appropriate numbers, age-classes, and stocking locations of Colorado pikeminnow ([Furr 2010](#)).

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Appendix A. Razorback sucker stocked from hatcheries into the San Juan River 2013.

<u>Date</u>	<u>Species</u>	<u>Year Class</u>	<u># of Fish</u>	<u>Mean TL mm</u>	<u>Tag type</u>	<u>Stocking Location</u>	<u>Release Type</u>	<u>Source/Age</u>
Sept. 24	Xyr tex	2012	758	372	PIT	RM 147.9	Hard	Ouray age-1
Oct. 10	Xyr tex	2009	1,565	428	PIT	A-RM 5.0	Hard	Uvalde age-4
Oct. 15	Xyr tex	2012	828	355	PIT	RM 93	Hard	Ouray age-1
Oct. 16	Xyr tex	2012	985	355	PIT	RM 93	Hard	Ouray age-1
Oct. 16	Xyr tex	2009	1,754	433	PIT	A-RM 5.0	Hard	Uvalde age-4
Oct. 22	Xyr tex	2009	1,626	423	PIT	A-RM 1.0	Soft	Uvalde age-4
Oct. 29	Xyr tex	2009	864	423	PIT	RM 166.6	Soft	Uvalde age-4
Oct. 29	Xyr tex	2012	739	386	PIT	A-RM 1.0	Soft	Ouray age-1

2013 Hatchery RBS Stocking Total = 15,362

Appendix B. Yearly summary of razorback sucker stocked into the San Juan River, 1994-2013

Year	Total number of razorback sucker stocked (Sizes of fish stocked)
Experimental Stocking Study: 1994-1996 (n= 942 fish stocked)	
1994	688 (Mean TL =251 mm; Range = 100-446 mm TL)
1995	16 (Mean TL = 424 mm; Range = 397-482 mm TL)
1996	238 (Mean TL = 336 mm; Range = 204-434 mm TL)
Five-Year Augmentation Effort: 1997-2001 (n= 5,890 fish stocked)	
1997	2,883 (Mean TL = 192 mm; Range = 104-412 mm TL)
1998	1,275 (Mean TL = 250 mm; Range = 185-470 mm TL)
1999	0 N/A
2000	1,044 (Mean TL = 214 mm; Range = 111-523 mm TL)
2001	688 (Mean TL = 410 mm; Range = 288-560 mm TL)
Interim Stocking Years: 2002-2008 (n= 41,093 fish stocked)	
2002	140 (Mean TL = 319 mm; Range = 110-470 mm TL)
2003	887 (Mean TL = 327 mm; Range = 100-495 mm TL)
2004	2,979 (Mean TL = 353 mm; Range = 225-559 mm TL)
2005	1,993 (Mean TL = 355 mm; Range = 223-534 mm TL)
2006	13,764* /18,793 (Mean TL = 265 mm; Range = 68-537 mm TL)
2007	16,906** /22,836 (Mean TL = 268 mm; Range = 110-573 mm TL)
2008	4,424 (Mean TL = 307 mm; Range = 225-390 mm TL)
<p>*18,793 total razorback stocked but 5,029 fish either had no PIT tag or an error in recording PIT tag number. **22,836 total razorback stocked but 5,930 fish either had no PIT tag or an error in recording PIT tag number. These untagged fish are not counted in the total fish stocked (n=) from 2002-2008.</p>	

Appendix B. - continued

Year	Total number of razorback sucker stocked (Sizes of fish stocked)
Eight-year Augmentation Effort: 2009-2016 (n= 86,726 fish stocked to date)	
2009	8,316* (Mean TL = 412 mm; Range = 136-560 mm TL)
2010	28,419 (Mean TL = 417 mm; Range = 222-575 mm TL)
2011	18,807 (Mean TL = 363 mm; Range = 208-540 mm TL)
2012	15,822 (Mean TL = 378 mm; Range = 102-581mm TL)
2013	15,362 (Mean TL = 377 mm; Range = 222-582mm TL)
TOTAL: 1994-2013	134,651
<p>* 4,021 razorback sucker stocked in Feb. 2010 are part of the 2009 stocking effort but are tallied in the 2010 stocking totals. NOTE: All reported numbers for razorback sucker stocked 2000-2012 have been reconciled with the SJRIP database to discount fish with PIT tag record errors. Previous reports included all fish stocked regardless of PIT tag status.</p>	

Appendix 1- Colorado pikeminnow stocked into the San Juan River under the Phase I augmentation plan (2002-summer 2010).

Dates	Number Stocked & (Age-Class)	Stocked at River Mile(s)	Mean Total Length (mm)	Range of Total Lengths (mm)	Responsible Agency
2002: 210,418 total fish stocked					
10/24/2002	105,209 (0)	180.2	51	32-127	USFWS-CRFP
10/24/2002	105,209 (0)	158.6	51	32-127	USFWS-CRFP
2003: 176,933 total fish stocked					
11/06/2003	155,764 (0)	180.2-170.5 & 158.6-148.5	58	38-100	USFWS-CRFP
11/06/2003	20,164 (0)	188.4-180.7 & 163.7-159.2	58	Unknown	BIO-WEST
11/06/2003	1,005 (1)	180.2	180	125-280	CDOW-Mumma
2004: 281,219 total fish stocked					
06/09/2004	1,219 (2)	180.2	218	144-278	CDOW-Mumma
10/21/2004	30,000 (0)	178.6-169.5 & 163.7-159.2	50	Unknown	BIO-WEST
10/21/2004 & 10/28/2004	250,000 (0)	180.2-170.5 & 158.6-148.5	50	35-116	USFWS-CRFP & BIO-WEST
2005: 306,811 total fish stocked					
07/07/2005	500 (1)	180.2	201	114-256	USFWS-Dexter
07/07/2005	1,491 (2)	180.2	204	121-281	CDOW-Mumma
10/20/2005	20,000 (0)	175.8, 167.5 & 167.4	55	32-151	BIO-WEST
10/20/2005 & 11/03/2005	282,270 (0)	180.2-170.5 & 158.6-148.5	55	32-151	USFWS-CRFP
11/10/2005	2,550 (2)	180.2	167	115-252	CDOW-Mumma
2006: 326,547 total fish stocked					
07/13/2006	3,247 (2)	180.2	200	119-278	CDOW-Mumma
07/13/2006	279 (3)	180.2	216	155-276	CDOW-Mumma
07/20/2006	3,986 (2)	180.2	211	117-297	CDOW-Mumma
08/03/2006	1,722 (5)	147.9	410	333-518	USFWS/AZG&F
09/06/2006	259 (5)	147.9	428	389-461	USFWS/AZG&F
10/03/2006	3,200 (1)	158.6	163	119-199	USFWS-Dexter
10/19/2006 & 11/02/2006	313,854 (0)	180.2-170.5 & 158.6-148.5	57	36-111	USFWS-CRFP
2007: 479,226 total fish stocked					
04/18/2007	1,590 (1)	134.5	176	137-228	SNARRC & NMFWCO
10/03/2007	81,974 (0)	134.5	~55	Unknown	SNARRC & NMFWCO
10/03/2007	1,666 (1)	134.5	~178	147-208	SNARRC & NMFWCO
11/07/2007	199,717 (0)	180.2-170.5	58	38-146	USFWS-CRFP
11/14/2007	194,279 (0)	166.6	55	41-157	USFWS-CRFP
2008: 275,091 total fish stocked					
4/15/2008	2,057 (2)	134.9	209	Unknown	SNARRC & NMFWCO
10/21/2008	2,800 (2)	134.3	299	Unknown	SNARRC & NMFWCO
11/06/2008	270,234 (0)	166.6	55	Unknown	SNARRC & NMFWCO
2009: 476,942 total fish stocked					
3/17/2009	1,442 (3)	133.5	240	Unknown	SNARRC & NMFWCO
3/17/2009	1,500 (3)	133.5	240	Unknown	SNARRC & NMFWCO
10/26/2009	4,000 (2+)	133.5	325	Unknown	SNARRC & NMFWCO
10/26/2009	1,000 (2+)	133.3	325	Unknown	SNARRC & NMFWCO
11/09/2009	468,000 (0)	166.6	55	~50-60	SNARRC & NMFWCO
11/09/2009	1,000 (2+)	180.2	325	Unknown	SNARRC & NMFWCO
2010: 353 total fish stocked					
7/28/2010	353 (2)	181	306	240-356	SNARRC & NMFWCO
Total number of fish stocked from 2002-2010 = 2,532,306					

USFWS= U.S. Fish & Wildlife Service; CRFP = Colorado River Fishery Project, Grand Junction, Colorado; BIO-WEST = BIO-WEST, Inc., Logan, Utah; CDOW-Mumma = Colorado Division of Wildlife, J.W. Mumma Native Species Hatchery, Alamosa, Colorado; SNARRC = Southwest Native Aquatic Resources and Recovery Center, Dexter, NM; AZG&F = Arizona Game and Fish Department, Bubbling Ponds Hatchery, Sedona, AZ; NMFWCO= New Mexico Fish & Wildlife Conservation Office, Albuquerque, NM. ~ indicates estimates

Appendix 2- Colorado pikeminnow stocked into the San Juan River under the Phase II augmentation plan, 2010-2020.

Dates	Number Stocked & (Age-Class)	Stocked at River Mile(s)	Mean Total Length (mm)	Range of Total Lengths (mm)	Responsible Agency
2010: Stocking postponed until Spring 2011					
2011: 645,051 total fish stocked					
May 17	182,412 (1)	166.6	85	Unknown	SNARRC & NMFWCO
May 18	32,308 (1)	A-RM 1.0	121	Unknown	SNARRC & NMFWCO
May 18	3,743 (2)	A-RM 1.0	247	160-363	SNARRC & NMFWCO
Nov 2	268,350 (0)	166.6	70	Unknown	SNARRC & NMFWCO
Nov 2	158,238 (0)	A-RM 1.0	60	Unknown	SNARRC & NMFWCO
2012: 395,640 total fish stocked					
Nov 13	316,000 (0)	A-RM 1.0	na	50-65	SNARRC & NMFWCO
Nov 13	79,640 (0)	196.1	65	Unknown	SNARRC & NMFWCO
2013: 331,388 total fish stocked					
Oct. 28	331,388	166.6	na	52-58	SNARRC & NMFWCO
Oct. 28	107,876	A-RM 1.0	na	52-58	SNARRC & NMFWCO
Total number of fish stocked from Fall 2010-2020 = 1,040,691					

SNARRC = Southwest Native Aquatic Resources and Recovery Center, Dexter, NM; NMFWCO= New Mexico Fish & Wildlife Conservation Office, Albuquerque, NM. A-RM= Animas River Mile;

Appendix 3- Summary of Colorado pikeminnow stocked into the San Juan River, 1996-2010 (Phase I).

Year Stocked	Number Stocked	Stocked at River Mile(s)	Mean Total Length (mm)	Range of Total Lengths (mm)	Age-Class & (Year-Class) of Fish Being Stocked	Type of Stocking	Entity/Agency Responsible for Stocking
1996	100,000	148.0 & 52.0	55	25-85	Age-0 (1996)	Experimental	UDWR
1997	116,878	148.0 & 52.0	45	35-55	Age-0 (1997)	Experimental	UDWR
1997	49	180.2	644	550-753	Age-16 (1981)	Opportunistic	USFWS
1998	10,571	148.0	24	18-28	Age-0 (1998)	Experimental	UDWR
1999	500,000	158.6	"Larvae"	Unspecified	Age-0 (1999)	Experimental	UDWR
2000	105,000	141.9	"Larvae"	Unspecified	Age-0 (2000)	Experimental	UDWR
2001	148	180.2	540	442-641	Age-10 (1991)	Opportunistic	USFWS
2002	210,418	180.2 & 158.6	51	32-127	Age-0 (2002)	Augmentation	USFWS
2003	175,928	180.2-170.5 & 158.6-148.5 (a) 188.4-180.7 & 163.7-159.2 (b)	58	38-100	Age-0 (2003)	Augmentation	USFWS (a) & BIO-WEST (b)
2003	1,005	180.2	180	125-280	Age-1 (2002)	Opportunistic	CDOW
2004	280,000	180.2-170.5 & 158.6-148.5	50	35-116	Age-0 (2004)	Augmentation	USFWS & BIO-WEST
2004	1,219	180.2	218	144-278	Age-2 (2002)	Opportunistic	CDOW
2005	302,270	180.2-170.5 & 158.6-148.5	55	32-151	Age-0 (2005)	Augmentation	USFWS & BIO-WEST
2005	500	180.2	201	114-256	Age-1 (2004)	Opportunistic	USFWS
2005	4,041	180.2	181	115-281	Age-2 (2003)	Opportunistic	CDOW
2006	313,854	180.2-170.5 & 158.6-148.5	57	36-111	Age-0 (2006)	Augmentation	USFWS
2006	3,200	158.6	163	119-199	Age-1 (2005)	Augmentation	USFWS
2006	7,233	180.2	207	117-297	Age-2 (2004)	Opportunistic	CDOW
2006	279	180.2	216	155-276	Age-3 (2003)	Opportunistic	CDOW
2006	1,981	147.9	411	333-518	Age-5 (2001)	Opportunistic	AZG&FD, USFWS & BIA
2007	475,970	180.2-170.5, 166.6 & 134.5	58	37-157	Age-0 (2007)	Augmentation	USFWS
2007	3,256	134.5	176	137-228	Age-1 (2006)	Augmentation	USFWS
2008	2,057	134.9	209	Unspecified	Age-2 (2006)	Augmentation	USFWS
2008	2,800	134.3/133.5	299	Unspecified	Age-2 (2006)	Augmentation	USFWS
2008	270,234	166.6	55	Unspecified	Age-0 (2008)	Augmentation	USFWS
2009	2,942	133.5	240	Unspecified	Age-3 (2006)	Augmentation	USFWS
2009	5,000	133.5/133.3	325	Unspecified	Age-2 (2007)	Augmentation	USFWS
2009	468,000	166.6	55	~50-60	Age-0 (2009)	Augmentation	USFWS
2009	1,000	180.2	325	Unspecified	Age-2(2007)	Augmentation	USFWS
2010	353	181	306	240-356	Age-2 (2008)	Opportunistic	USFWS

Appendix 4- Summary of Colorado pikeminnow stocked into the San Juan River, 2010-2020 (Phase II).

Year Stocked	Number Stocked	Stocked at River Mile(s)	Mean Total Length (mm)	Range of Total Lengths (mm)	Age-Class & (Year-Class) of Fish Being Stocked	Type of Stocking	Entity/Agency Responsible for Stocking
2011	214,720	166.6/A-RM 1.0	85/121	Unspecified	Age-1 (2010)	Rescheduled 2010 Augmentation	USFWS
2011	3,743	A-RM 1.0	247	160-363	Age-2 (2009)	Rescheduled 2010 Augmentation	USFWS
2011	426,588	166.6/A-RM 1.0	70/60	Unspecified	Age-0 (2011)	Augmentation	USFWS
2012	395,640	196.1/A-RM 1.0	50/57/65	Unspecified	Age-0 (2012)	Augmentation	USFWS
2013	439,264	166.6/A-RM 1.0	Unspecified	52-58	Age-0 (2013)	Augmentation	USFWS