

**AUGMENTATION OF
COLORADO PIKEMINNOW
(*Ptychocheilus lucius*)
IN THE SAN JUAN RIVER: 2012**

Annual Report



Boyd Park (A-RM 1.0), photo by D.W. Furr

Submitted By:

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To:
The San Juan River Basin Recovery Implementation Program

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EXECUTIVE SUMMARY

- Third 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 2012 stockings

- A total of 395,640 Colorado pikeminnow were stocked into the San Juan River Basin in 2012
 - November 13 – Boyd Park, Farmington, NM (Animas-River Mile 1.0)
 - 316,000 fish acclimatized for 18 hours
 - Total length (TL) between 50-65 mm, 2012 year class (YC)
 - November 13 – Verde del Rio Park, Bloomfield, NM (River Mile 196.1)
 - 79,640 fish hard released
 - Averaged 65 mm TL, 2012 YC
 - Under annual stocking target by 4,360 age-0 fish (1.09% shortfall)
 - No opportunistically acquired fish available in 2012

- 2013 Dexter NFH&TC following Phase II production
 - $\geq 400,000$ age-0 Colorado pikeminnow produced and stocked annually
 - Soft releases to occur in Fall 2013-2020

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INTRODUCTION

Colorado pikeminnow, *Ptychocheilus lucius*, is a federally-listed endangered fish native to the San Juan River. Colorado pikeminnow 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 2003). In addition, 197 adult Colorado pikeminnow (≥ 450 mm TL) were stocked into the San Juan River, 49 in 1997 and 148 in 2001 (Ryden 2003). 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 2003) 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 2005). 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 Division of Wildlife's Mumma Native Species Hatchery, SNARRC, and the Arizona Game and Fish Department's

Bubbling Ponds Hatchery. 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 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), 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, 2009) was created to provide a justification and framework for how *in situ* acclimatization would occur. Since 2007, a total of 1,642,436 age-0 and 377,343* age-1+ Colorado pikeminnow have been acclimatized 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).

An analysis of the San Juan River Basin Recovery Implementation Program's (SJRIP) endangered fish database indicated that 29 individual adult Colorado pikeminnow were recaptured in 2012 that have recruited to the adult size class within the San Juan River Basin. Captures of larval Colorado pikeminnow in 2004, 2007, and 2009-2011 confirms that limited reproduction is occurring in the San Juan River Basin (Brandenburg et al. 2012). 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 (Ryden 2008b, Davis and Furr 2008).

Relationship to the Recovery Program

Propagation and augmentation are management tools used to recover Colorado pikeminnow in the San Juan River. While augmentation increases overall population numbers, it also provides opportunities for research (i.e., movement studies, habitat and spawning site selection), can add genetic diversity to the existing gene pool, and fulfills specific recovery actions as outlined in the SJRIP's Long Range Plan (LRP) (SJRIP 2012). Subsequent data collection may identify factors limiting successful recruitment of this species in the San Juan River.

Goals, Actions, and Tasks relating to augmentation of Colorado pikeminnow defined in the SJRIP Long Range Plan (2012):

Goal 1.1 - Establish Genetically and Demographically Viable, Self-Sustaining Sustaining CPM and RBS Populations.

Action 1.1.1- Develop plans for rearing and stocking CPM.

Task 1.1.1.1 *Review and update augmentation plan for CPM and adjust stocking goals as scheduled*

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

Task 1.1.2.1- *Annually produce and rear at least 400,000 age-0 CPM (50–55 mm TL) at Dexter NFH.*

Task 1.1.2.2- *Annually stock >400,000 age-0 CPM into the San Juan River.*

Task 1.1.2.3- *Opportunistically stock available CPM in excess of those described above.*

Goal 1.2 - Evaluate RBS and CPM Augmentation Program and Genetic Integrity.

Action 1.2.1- Evaluate status and success of stocked RBS and CPM.

Task 1.2.1.2- *Determine survival and recruitment of stocked RBS and CPM to assess stocking success and to determine when to implement mark-recapture population estimates.*

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.

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 (FWCO) 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. New Mexico FWCO is the pertinent field office for processing of SJRIP stocking requests.

Objective for CPM Augmentation Fiscal Year 2013 (Oct. 1, 2012 - Sept. 31, 2013)

The objective for FY 2012 was to coordinate with SNARRC to procure and stock fish 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 2009).

STOCKINGS

On November 13, 2012, Dexter NFH&TC and NMFWCO soft released 316,000 age-0 (2012 YC) Colorado pikeminnow at Boyd Park, Farmington, NM (Animas-RM 1.0). 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 were acclimatized in the enclosure for approximately 18 hours prior to final release. An additional 76,640 Colorado pikeminnow were hard released at Verde del Rio Park, Bloomfield, NM (RM 196.1) (Table 1).

In accordance with NMFWCO 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). Due to operational constraints, the PNM Sluiceway was unavailable for stocking so alternative stocking sites were identified. Upon arrival at the new locations, temperatures were re-taken to ensure that hauling water and receiving water temperatures were also within 1°C. Once temperatures were verified fish were off-loaded.

Due to the limited time available after moving to new stocking locations, no pre-stocking site fish community sampling was conducted.

Table 1- Colorado pikeminnow stockings in the San Juan River 2012.

Date	Age/Year Class	# of Fish	TL (mm)	Release Site River Mile	Release Type (soft vs. hard)
November 13	0/2012	316,000	50 - 65	A-RM 1.0	Soft
November 13	0/2012	76,640	65	196.1	Hard
Total Stocked		395,640			

All Colorado pikeminnow stocked into the San Juan River in 2012 were produced and reared at SNARRC under a separate agreement with the Bureau of Reclamation.

DISCUSSION

Augmentation efforts for 2012 did not fully satisfy SJRIP-LRP *Task 1.1.2.1* and *Task 1.1.2.2* - *Annually produce and rear at least 400,000 age-0 CPM (50–55 mm TL) at Dexter NFH, and Annually stock >400,000 age-0 CPM into the San Juan River, as a total of 395,640 (1.09% shortfall) were stocked. Task 1.1.2.3 - Opportunistically stock available CPM in excess of those described above, was not fully satisfied as no surplus Colorado pikeminnow were available. Task 1.2.1.2- Determine survival and recruitment of stocked RBS and CPM to assess stocking success and to determine when to implement mark-recapture population estimate, is ongoing. 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, is ongoing. Data collected during 2013 sampling efforts will be considered when developing the Fall 2013 stocking schedule and will address **Task 1.2.1.2** and **Task 1.2.2.1**.*

Age-0 Colorado pikeminnow were stocked at two locations on November 13, 2012. Originally, the stocking site located at the PNM Pumping Plant Sluiceway (RM 166.6, North bank) was intended for use to soft release 250,000-300,000 age-0 fish (depending on specific numbers being hauled by the individual hatchery trucks) with a second release site at Boyd Park (Animas-RM 1.0) receiving the remaining fish. The PNM Sluiceway site was selected due to previous successful use for acclimatizing large numbers of Colorado pikeminnow, presence of low velocity habitats, and easy accessibility by the hatchery truck. However, a miscommunication with PNM staff hindered the use of the PNM Sluiceway site. The second release site at Boyd Park was substituted as the primary release site, as it had similar features to the PNM Sluiceway site. A new secondary release site at Verde del Rio Park (RM 196.1) in Bloomfield, NM was selected and used. Although a soft release enclosure could not be erected at this location, it was decided by NMFWCO staff to use this site in order to stock a limited number of Colorado pikeminnow at the most upstream location currently available. The reason for doing this was to provide the opportunity to determine, from subsequent recaptures, if suitable habitat persists to satisfy life history requirements for age-0 and older Colorado pikeminnow in this upper area of the San Juan River. Information gleaned from this release, and possibly future releases at this location, will help guide decisions considering favorable stocking locations for age-0 Colorado pikeminnow. In order to evaluate the efficacy of stocking upstream of the Animas River confluence (in both the San Juan River and in the Animas River) the NMFWCO recommends conducting annual sampling from Verde del Rio Park (RM 196.1) downstream to the PNM Weir (RM 166.6), and from Berg Park (A-RM 5.0) downstream to the confluence with the San Juan River (A-RM 0.0). The 2012 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 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	COW-Mumma
2004: 281,219 total fish stocked					
06/09/2004	1,219 (2)	180.2	218	144-278	COW-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	COW-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	COW-Mumma
2006: 326,547 total fish stocked					
07/13/2006	3,247 (2)	180.2	200	119-278	COW-Mumma
07/13/2006	279 (3)	180.2	216	155-276	COW-Mumma
07/20/2006	3,986 (2)	180.2	211	117-297	COW-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; COW-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.

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
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, 2011-2020 (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