

**AUGMENTATION OF
COLORADO PIKEMINNOW
IN THE SAN JUAN RIVER: 2007**

Interim Progress Report
(Final Report)

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EXECUTIVE SUMMARY

- A total of 1,781,154 Colorado pikeminnow were stocked into the San Juan River between 2002 and 2007
 - A 25,154 fish (1.4%) surplus versus target stocking numbers over the first six years of the Colorado pikeminnow augmentation program (2002-2007)

- A total of 479,226 Colorado pikeminnow were stocked into the San Juan River in 2007
 - A 176,226 fish (58.2%) surplus over 2007 target stocking numbers
 - Second largest number of Colorado pikeminnow ever stocked into the San Juan River in any single year (500,000 larval Colorado pikeminnow were stocked in 1999)
 - Largest number of Colorado pikeminnow stocked since this eight-year augmentation effort began in 2002

- Both target stocking numbers were exceeded in 2007
 - Age-0 Colorado pikeminnow
 - Target stocking number = 300,000
 - Number stocked = 475,970
 - Age-1 Colorado pikeminnow
 - Target stocking number = 3,000
 - Number stocked = 3,256

- No opportunistically-obtained Colorado pikeminnow were stocked in 2007

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INTRODUCTION

Colorado pikeminnow is a federally-listed endangered fish native to the San Juan River (Ryden 2003). Captures of larval Colorado pikeminnow in 2004 and again in 2007, confirmed that a small, but reproducing population of Colorado pikeminnow was still extant in the San Juan River (Brandenburg et al. 2005, Brandenburg pers. comm.). 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 as well as determine the availability, use, and selection of habitats by early life stage Colorado pikeminnow. Between 1996 and 2000, approximately 832,449 larval and age-0 Colorado pikeminnow were stocked into the San Juan River by the UDWR (Ryden 2003). In addition, 197 adult Colorado pikeminnow were stocked into the San Juan River, 49 in 1997 and 148 in 2001 (Ryden 2003). In subsequent years, several hundred of those stocked juvenile and adult Colorado pikeminnow were recaptured during either seining or electrofishing efforts. Nine individual Colorado pikeminnow stocked in 1996 and 1997 have been documented as having recruited into the San Juan River's adult Colorado pikeminnow population (Jackson 2003, 2004, USFWS unpublished data). Based on data collected from these experimentally stocked fish, it is apparent that stocked, hatchery-reared, juvenile Colorado pikeminnow can survive in the San Juan River and can provide a viable method of supplementing the numbers and expanding the range of the wild San Juan River Colorado pikeminnow population.

In January 2003, An *Augmentation Plan For Colorado Pikeminnow In The San Juan River* (Ryden 2003) was finalized. This augmentation plan provided the necessary guidance for an eight-year augmentation effort. The Colorado pikeminnow augmentation plan calls for age-0 Colorado pikeminnow to be stocked each fall from 2002-2009 ($\geq 250,000$ in fall 2002 and $\geq 300,000$ each fall from 2003-2009). An addendum to this augmentation plan (Ryden 2005), calls for 3,000 age-1+ fish to be stocked each fall, beginning in 2006. Age-0 Colorado pikeminnow have been stocked, as scheduled, each fall since 2002. The first stocking of age-1 Colorado pikeminnow under the revised augmentation plan occurred in fall 2006.

In addition, several other lots of Colorado pikeminnow were obtained over the last five years from various sources and stocked into the San Juan River. These lots of fish became available to the San Juan River Recovery Implementation Program (SJRIP) because they were fish that were excess to augmentation efforts occurring elsewhere in the Colorado River basin. While not specified in the revised augmentation plan, the opportunistic stocking of these fish was approved by the SJRIP Biology Committee. These lots of opportunistically-stocked fish ranged from age-1 to age-5 and came from three different hatcheries: the Colorado Division of Wildlife's (CDOW) Mumma Native Species Hatchery (Mumma), near Alamosa, CO; Dexter National Fish Hatchery and Technology Center (Dexter NFH&TC), near Roswell, NM; and the Arizona Game and Fish Department's (AZG&F) Bubbling Ponds hatchery facility (Bubbling Ponds), near Sedona, AZ.

Relationship To The Recovery Program

The need for artificial propagation and augmentation of this species in the San Juan River is apparent for several reasons. The main reason for augmenting Colorado pikeminnow is to expand the size of the existing Colorado pikeminnow population (Ryden 2003). In addition, augmentation of Colorado pikeminnow provides more individuals for research purposes, adds genetic diversity to the existing gene pool, and provides a riverine refugia population that will, hopefully, remain stable until further research can identify factors limiting successful recruitment of this species in the San Juan River (Ryden 2004). The San Juan River Long Range Plan (SJRIP 1995) identified the need to assess the feasibility and implementation of augmentation of Colorado pikeminnow. The Long Range Plan is undergoing revision. However, the need to augment the San Juan River's Colorado pikeminnow population is specified in tasks 1.2.3, 1.2.4, 1.2.5, 1.2.6, 1.2.7, sub-element 2.2, 4.1.3, 4.1.4, and 4.1.5 of the draft dated October 30, 2006 (SJRIP 2006).

The objectives of this workplan for Fiscal Year 2007 (FY-2007) were as follows:

Objectives:

- 1.) Coordinate with Dexter National Fish Hatchery to procure and stock fish according to guidelines set forth in *An Augmentation Plan For Colorado Pikeminnow In The San Juan River*.
- 2.) Provide a report that gathers information from various sources on fingerling production, numbers of fish stocked, subsequent recaptures during various sampling efforts (other than the intensive monitoring effort), and makes recommendations (if necessary) for modifying methods being employed for Colorado pikeminnow augmentation efforts.

At the May 2007 meeting of the SJRIP Biology Committee, it was decided that discussion pertaining to Objective 2 of the FY-2007 workplan would be eliminated. Therefore, this report only includes information on the numbers, dates, and locations of Colorado pikeminnow that were stocked into the San Juan River in 2007.

METHODS

Age-0 and age-1 Colorado pikeminnow fingerlings were produced and reared at Dexter NFH&TC under a separate workplan. These fish were delivered to the San Juan River on four separate stocking dates, 18 April 2007, 3 October 2007, 7 November 2007, and 14 November 2007.

On 18 April 2007, 1,590 age-1 Colorado pikeminnow were stocked at RM 134.5 (i.e., 13.4 RM downstream of Shiprock bridge). Prior to stocking, block nets were set on the upstream and downstream ends of a slow-moving secondary channel at this site. Nonnative fish were removed from between the block nets via backpack electrofishing. Fish were tempered in the stocking truck, then stocked into this isolated habitat where they were allowed to acclimate for approximately 24 hours. After 24 hours, the block nets were removed and these fish were allowed to enter the river at their convenience. All age-1 fish stocked on this date were implanted with PIT-tags prior to stocking.

On 3 October 2007, the same process was repeated at RM 134.5. On this date, 1,666 age-1 and 81,974 age-0 Colorado pikeminnow were stocked at this site. These fish were once again acclimated for approximately 24 hours prior to block nets being removed. All age-1 fish stocked on this date were implanted with PIT-tags prior to stocking. Of the 81,974 age-0 Colorado pikeminnow stocked on this date, 11,774 were implanted with orange VIE tags on the left side of their dorsal fin. The remaining 70,200 age-0 Colorado pikeminnow were stocked without tags.

On 7 November 2007, a total of 199,717 age-0 Colorado pikeminnow were stocked from RM 180.2-170.5 (i.e., from the Animas River confluence to 3.9 RM upstream of the PNM Weir). Fish were tempered in the stocking trucks, then transferred to oxygenated live wells on two 16-foot rafts. Age-0 fish were then transported downstream via raft and stocked into numerous low-velocity habitats (e.g., backwaters, embayments, low-velocity shorelines, and irrigation return channels). Of the 199,717 age-0 Colorado pikeminnow stocked on this date, 9,850 were implanted with pink VIE tags on the left side of their dorsal fin. The remaining 189,867 age-0 Colorado pikeminnow were stocked without tags. No age-1 Colorado pikeminnow were stocked on this date.

On 14 November 2007, a total of 194,279 age-0 Colorado pikeminnow were stocked at RM 166.6, just downstream of the PNM Weir. Prior to stocking, block nets were placed at the upstream and downstream ends of a backwater that forms at the terminal end of the PNM Weir's sluiceway when it is not in use (i.e., directly across the river from the PNM fish ladder). Nonnative fish were removed from between block nets via seining. Fish were tempered in the stocking truck, then stocked into this isolated habitat where they were allowed to acclimate for approximately 24 hours. After 24 hours, the block nets were removed and these fish were allowed to enter the river at their convenience. Of the 194,279 age-0 Colorado pikeminnow stocked on this date, 11,778 were implanted with blue VIE tags on the left side of their dorsal fin. The remaining 182,501 age-0 Colorado pikeminnow were stocked without tags. No age-1 Colorado pikeminnow were stocked on this date.

RESULTS

A total of 479,226 Colorado pikeminnow were stocked into the San Juan River in 2007 (Table 1 and Tables A-1 and A-2 in Appendix A). Of these, 475,970 were age-0 fish and 3,256 were age-1 fish. All Colorado pikeminnow stocked in 2007 were from Dexter NFH&TC. No opportunistically-acquired groups of Colorado pikeminnow were stocked in 2007.

The 1,590 age-1 Colorado pikeminnow stocked at RM 134.5 on 18 April 2007 averaged 176 mm TL (range = 137-228 mm TL). The average TL for the 1,666 age-1 and 81,974 age-0 Colorado pikeminnow stocked at RM 134.5 on 3 October 2007 was not specified, nor was the TL range for the age-0 fish stocked on that date. However the TL range for age-1 fish stocked on 3 October 2007 was 147-208 mm. The 199,717 age-0 Colorado pikeminnow stocked from RM 180.2-170.5 on 7 November 2007 averaged 58 mm TL (range = 38-146 mm TL). Lastly, the 194,279 age-0 Colorado pikeminnow stocked at RM 166.6 on 14 November 2007 averaged 55 mm TL (range = 41-157 mm TL).

A total of 393,996 age-0 Colorado pikeminnow (82.8% of age-0 Colorado pikeminnow stocked in 2007 = 82.2% of all Colorado pikeminnow stocked in 2007) were stocked in Reach 6 (from RM 180.2-166.6) in 2007. A total of 85,230 Colorado pikeminnow (including 100% of all age-1 Colorado pikeminnow stocked in 2007 and 17.2% of all age-0 Colorado pikeminnow stocked in 2007 = 17.8% of all Colorado pikeminnow stocked in 2007) were stocked in Reach 5 (at RM 134.5) in 2007.

The 475,970 age-0 and 3,256 age-1 Colorado pikeminnow stocked in 2007 both exceeded the target numbers specified in the revised Colorado pikeminnow augmentation plan. This is the third consecutive year that stocking targets were exceeded by Dexter NFH&TC.

Target Stocking Numbers Versus Actual Numbers Stocked

A total of 1,781,154 Colorado pikeminnow (1,758,440 age-0 fish, 7,961 age-1, 12,493 age-2, 279 age-3, and 1,981 age-5) were stocked between 2002 and 2007 (Table 1 and Tables A-1 and A-2 in Appendix A). Of these, all of the age-0 fish and 6,456 of the age-1 fish were stocked to directly meet target numbers specified in the 2003 Colorado pikeminnow augmentation plan (Ryden 2003). The rest were opportunistically-stocked fish. This constitutes an overall surplus of 8,896 fish (i.e., a 8,440 {0.5%} fish surplus for age-0 fish and a 456 fish {7.6%} surplus for age-1 fish), or 0.5%, over the first six years, when compared to the target numbers of age-0 and age-1 fish (i.e., 1,756,000 fish) specified in the 2003 augmentation plan (Ryden 2003).

Table 1. Stockings of Colorado pikeminnow into the San Juan River in 2002-2007 versus the target number of fish specified in the revised Colorado pikeminnow augmentation plan.

Year	Number Of Fish Plan Calls For Annually	Number Of Fish Actually Stocked	Shortfall (-) Or Surplus (+) For the Year
2002	250,000 age-0	210,418 age-0	(-) 39,582
2003	300,000 age-0	175,928 age-0 1,005 age-1	(-) 123,067
2004	300,000 age-0	280,000 age-0 1,219 age-2	(-) 18,781
2005	300,000 age-0	302,270 age-0 500 age-1 4,041 age-2	(+) 6,811
2006	300,000 age-0 3,000 age-1	313,854 age-0 3,200 age-1 7,233 age-2 279 age-3 1,981 age-5	(+) 23,547
2007	300,000 age-0 3,000 age-1	475,970 age-0 3,256 age-1	(+) 176,226
2008-2009	300,000 age-0 3,000 age-1	NO DATA YET	NO DATA YET

If however, you ignore age-class stipulations and just add up the overall number of Colorado pikeminnow that the 2003 augmentation plan called for to be stocked between 2002 and 2007 (i.e., 1,756,000 fish) versus the overall number of all Colorado pikeminnow stocked during that period (i.e., 1,781,154 fish), then the overall surplus of stocked fish over the first six years of the current augmentation effort combined increases to 25,154 total fish, or 1.4%. Using just overall numbers of stocked fish (i.e., including opportunistically-stocked fish), there have been surpluses of 6,811 fish (2.3%) stocked in 2005, 23,547 fish (7.8%) stocked in 2006, and of 176,226 fish (58.2%) stocked in 2007 (Table 1).

DISCUSSION

The overall stocking shortfall that was being carried over the first five years of the eight-year augmentation effort for Colorado pikeminnow has disappeared. Instead, there is now a surplus of stocked Colorado pikeminnow in the San Juan River when compared to the overall numbers specified in the 2003 Colorado pikeminnow augmentation plan. In 2007, both target stocking numbers (i.e., $\geq 300,000$ age-0 fish and $\geq 3,000$ age-1 fish) were exceeded. It is anticipated that the target number of age-0 and age-1 fish will continue to be met by Dexter NFH&TC for remaining two years of this augmentation effort.

The 479,226 Colorado pikeminnow stocked in 2007 was the largest number of Colorado pikeminnow to be stocked into the San Juan River in a single year since this augmentation effort began in 2002 and the second largest number ever stocked (500,000 larval Colorado pikeminnow were stocked in 1999; Table A-2 in Appendix A). While more Colorado pikeminnow were actually stocked in 1999 than in 2007, it is anticipated that the survival of those fish stocked in 2007 would be greater over time, given their greater size and age at time of stocking.

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APPENDIX A

Information on Colorado pikeminnow stocked from 1996-2007.

Table A-1. Stockings of Colorado pikeminnow into the San Juan River that have occurred since the inception of the 2003 augmentation plan.

Dates	Number Stocked & (Age-Class)	River Miles Stocked At	Mean Total Length (in mm)	Range Of Total Lengths (in mm)	Responsible Agency ^a
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	USFWS-Dexter, USFWS-NMFRO
10/03/2007	81,974 (0)	134.5	Unknown	Unknown	USFWS-Dexter, USFWS-NMFRO
10/03/2007	1,666 (1)	134.5	Unknown	147-208	USFWS-Dexter, USFWS-NMFRO
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
Total number of fish stocked from 2002-2007 = 1,781,154					

^a USFWS-CRFP = U. S. Fish and Wildlife Service, 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; USFWS-Dexter = U. S. Fish and Wildlife Service, Dexter National Fish Hatchery and Technology Center, Dexter NM; AZG&F – Arizona Game and Fish Department, Bubbling Ponds Hatchery, Sedona, AZ.

Table A-2. A summary of Colorado pikeminnow that were stocked into the San Juan River, 1996-2007.

Year Stocked	Number Stocked	River Mile(s) Stocked At	Mean Total Length (in mm)	Range Of Total Lengths (in 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