

**AUGMENTATION OF  
COLORADO PIKEMINNOW  
(*Ptychocheilus lucius*)  
IN THE SAN JUAN RIVER: 2009**

**Phase I Final Annual Report**



Submitted By:

D. Weston Furr, Fish Biologist  
U. S. Fish and Wildlife Service  
New Mexico Fish and Wildlife Conservation Office  
3800 Commons Ave NE  
Albuquerque, NM 87109

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To:

The San Juan River Basin Recovery Implementation Program

## EXECUTIVE SUMMARY

- 2,531,953 Colorado pikeminnow stocked into the San Juan River 2002-2009
  - 2,496,440 age 0 Colorado pikeminnow stocked / 2,350,000 target
    - Over target by 146,440 fish, 6.2%
  - 36,513 age 1+ Colorado pikeminnow stocked
    - 16,258 fish stocked 2003-2006
      - Age-1 through age-5
      - Fish were opportunistically acquired
    - 20,255 fish stocked 2006-2009 / 12,000 target
      - Age-1 through age-3
      - Over target for this period by 8,255 fish, 68.8%
  
- 476,942 Colorado pikeminnow were stocked into the San Juan River in 2009
  - 468,000 age 0 fish / 300,000 target
    - Over target by 168,000 fish, 56%
    - Soft released November 9 at river mile (RM) 166.6
      - Acclimatized for 22 hours
    - Total Length = 50-60 mm
    - 2009 year class (YC)
  - 8,942 age 1+ fish / 3,000 target
    - Over target by 5,942 fish, 198%
      - 2,942 Age 1+ released March 17 at RM 133.5
        - 1,442 soft released
          - acclimatized for 20 hours
        - 1,500 hard released
        - Mean total length = 240 mm
        - 2006 YC, age-3 fish
    - 5,000 Age 1+ released October 26, 2009
      - 4,000 soft released at Rescue Point, RM 133.5
      - 1,000 hard released at Mosquito Point, RM 133.3
      - Mean total length = 325 mm
      - 2007 YC, age-2+ fish
    - 1,000 hard released November 9 at RM 180.2
      - Released 200 meters up Animas River
      - Mean total length = 325 mm
      - 2007 YC, age-2+ fish
  
- Expiration of Eight Year Augmentation Plan, 2002-2009
  
- Phase II plan drafted to cover augmentation from 2010-2020

## **Table of Contents**

EXECUTIVE SUMMARY .....	i
INTRODUCTION .....	1
Relationship To The Recovery Program .....	2
Objectives for Augmentation Fiscal Year 2009 .....	4
STOCKINGS.....	4
SUMMARY .....	7
Literature Cited.....	8
Appendix 1.....	10
Appendix 2.....	11

### **List of Tables**

Table 1	Colorado pikeminnow stockings in the San Juan River 2009.....	4
Table 2	Water quality measurements recorded during the spring age-1+ Colorado pikeminnow release. ....	5
Table 3	Fish collected from PNM sluiceway prior to age-0 Colorado pikeminnow stocking Nov. 9, 2009.....	6

## 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, approximately 832,449 larval and age-0 Colorado pikeminnow were stocked into the San Juan River by 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 experimentally released Colorado pikeminnow were recaptured during either seining or electrofishing efforts (Ryden 2008a). 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). Captures of larval Colorado pikeminnow in 2004, 2007, and 2009 confirm that a small, but reproductively active, population of Colorado pikeminnow exists in the San Juan River (Brandenburg and Farrington 2010). Data suggest that stocked hatchery-reared Colorado pikeminnow can survive in the San Juan River and that stocking can facilitate the re-establishment of the San Juan River Colorado pikeminnow population (Ryden 2008b, Davis and Furr 2008).

*An Augmentation Plan For Colorado Pikeminnow In The San Juan River* (Ryden 2003) provided the necessary guidance for an eight-year augmentation effort. The plan called for age-0 Colorado pikeminnow to be stocked each fall 2002-2009 ( $\geq 250,000$  in fall 2002 and  $\geq 300,000$  each fall 2003-2009). An addendum to this augmentation plan called for 3,000 age-1+ Colorado pikeminnow to be stocked annually, beginning in 2006 (Ryden 2005). This plan, hereto referred to as Phase I, expired at the end of 2009.

Several lots of Colorado pikeminnow were opportunistically obtained between 2003 and 2006 from various sources and stocked into the San Juan River. These became available to the San Juan River Basin Recovery Implementation Program (SJRIP) because they were excess to augmentation efforts occurring elsewhere in the Colorado River basin. While not specified in the Phase I augmentation plan, the stocking of these fish was approved by the SJRIP Biology Committee (SJRIP-BC). Ages ranged from age-1 to age-5 and fish were reared at three different hatcheries: the Colorado Division of Wildlife's Mumma Native Species Hatchery, Dexter National Fish Hatchery and Technology Center (Dexter NFH&TC), and the Arizona Game and Fish Department's Bubbling Ponds Hatchery. A total of 16,258 fish were opportunistically acquired 2003-2006 and account for 44.5% of all age-1 or older (age-1+) fish stocked under Phase I augmentation.

Experimental soft releases by Golden et al. (2006) indicated that short term survivability and retention was improved by allowing Colorado pikeminnow to acclimatize to riverine conditions for up to 7 days prior to release into the mainstem. Beginning with the April 2007 soft release of 1,590 age-2 (2005 year class) Colorado pikeminnow by the USFWS's New Mexico Fish & Wildlife Conservation Office (NMFWCO) all subsequent age 1+ Colorado pikeminnow stockings utilized a soft release approach. At the May 2008 meeting the SJRIP-BC decided that future releases of age 1+ Colorado pikeminnow should incorporate a study design with a control group (fish released under typical hard release methods) and a treatment group (fish released under the soft release approach) to better quantify the effect of acclimatization. All age-0 Colorado pikeminnow would continue to be soft released.

### Relationship To The Recovery Program

The need for artificial propagation and augmentation of this species in the San Juan River is necessary for several reasons, most important of which is to expand the size of the existing Colorado pikeminnow population (Ryden 2003). While augmentation increases overall population numbers, it also provides opportunities for research (i.e., movement studies, habitat and spawning site preferences), adds genetic diversity to the existing gene pool, and

fulfills specific recovery actions (SJRIP 2008). Subsequent data collection may identify factors limiting successful recruitment of this species in the San Juan River.

Goal 2.1 in the 2008 revision of the SJRIP Long Range Plan (LRP) identifies the need to “Establish a Genetically and Demographically Viable, Self-Sustaining Colorado Pikeminnow Population” in the San Juan River. Actions 2.1.1 – 2.1.4 address the tasks to achieve Goal 2.1 (SJRIP 2008).

***Goal 2.1—Establish a Genetically and Demographically Viable, Self-Sustaining Colorado Pikeminnow Population.***

***Action 2.1.1 Develop plans for rearing and stocking Colorado pikeminnow.***

***Action 2.1.2 Produce, rear, and stock sufficient numbers of Colorado pikeminnow to meet stocking goals of augmentation plan.***

***Action 2.1.3 Monitor status and success of stocked Colorado pikeminnow.***

***Action 2.1.4 Evaluate factors limiting Colorado pikeminnow population recovery.***

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

## Objectives for Augmentation Fiscal Year 2009

- 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* (Ryden 2003) and *Stocking Plan and Protocol for the Augmentation of Colorado pikeminnow (Ptychocheilus lucius) in the San Juan River* (Furr and Davis 2009).
- 2.) Create a new plan for fiscal years 2010-2020 outlining Colorado pikeminnow augmentation in the San Juan River to facilitate achieving SJRIP-LRP Goal 2.1 and Action 2.1.1.

## STOCKINGS

**Table 1** Colorado pikeminnow stockings in the San Juan River 2009

Date	Age/Year Class	# of Fish	Release Site River Mile	Release Type (soft vs. hard)
March 17	3/ 2006	1,442	133.5	Soft
March 17	3/ 2006	1,500	133.5	Hard
October 26	2+/ 2007	4,000	133.5	Soft
October 26	2+/ 2007	1,000	133.3	Hard
November 9	0 / 2009	468,000	166.6	Soft
November 9	2+/ 2007	1,000	180.2	Hard
Total Stocked		476,942		

The spring release of age-1+ Colorado pikeminnow occurred on March 17, 2009 at RM 133.5 (Table 1). This site previously had been used for soft releases due to its low velocity during spring flows and easy accessibility by the hatchery truck. Block nets were positioned on the upstream and downstream ends of the secondary channel. The enclosure was sampled by seine (10 hauls with a 3m x 1m, 3/16<sup>th</sup> mesh; approximately 150 m<sup>2</sup> sampled) to assess the fish community occurring within the enclosure. No fish were collected within the enclosure. Water quality was measured with a YSI 556 multi-probe and recorded both before stocking and prior to release of fish from enclosure (Table 2). Fish were tempered in the hauling tank to within 1-2° Celsius (°C). The fish were PIT tagged and hauled as two distinct lots from Dexter NFH&TC. One lot was to be soft released, using the experimental protocols, and the

other lot hard released, using standard stocking protocols. The protocol under which each lot was stocked was noted in their PIT tag databases for future comparison with recapture data. A lot of 1,442 Colorado pikeminnow were transferred into the enclosure, and left overnight to acclimatize. The second lot of 1,500 Colorado pikeminnow was hard released directly above the upstream block net. After an acclimatization time of 20 hours, sampling by seine was conducted to confirm the presence of Colorado pikeminnow (n=8) within the enclosure. After sampling the block nets were removed and soft released fish allowed to disperse.

**Table 2** Water quality measurements recorded during the spring age-1+ Colorado pikeminnow release.

Date	March 17	March 18
Time	14:15	11:30
Temperature	12.37°C	10.22°C
Specific Conductance	.622 µS	.622 µS
Total Dissolved Solids	.404 g/l	.404 g/l
Salinity	.3 ppt	.3 ppt
Dissolved Oxygen	11.24 mg/l	11.38 mg/l
Dissolved Oxygen %	105.3%	101.7%
pH	8.5	8.53
Oxidation Reduction Potential	-81.2 mV	-82.5 mV

The fall releases of age-1+ Colorado pikeminnow occurred on October 26 and November 9, 2009 (Table 1). On October 26, 2009 the soft release site at RM 133.5 was again utilized. Due to the large number and size of fish to be stocked a larger area had to be enclosed. Block nets were placed across the inlet of the side channel (RM 133.7) and approximately 85 meters upstream of confluence with the main channel (RM 133.4). The fish were PIT tagged and hauled as two distinct lots from Dexter NFH&TC. Fish were tempered in the hauling tank to within 1-2° Celsius (°C). No YSI 556 multi-probe was available to record further water quality parameters. Following tempering, a lot of 4,000 age-1+ Colorado pikeminnow were released into the enclosure. The second lot of 1,000 age-1+ fish were hard released directly below the downstream block net. The protocol under which each lot was stocked was noted in their PIT tag databases for future comparison with recapture data. After a 22-hour acclimatization period the block nets were removed and soft released fish allowed to disperse. A second

stocking event of age-1+ Colorado pikeminnow occurred on November 9<sup>th</sup>. A single lot of 1,000 fish was hard released into the Animas River approximately 200 meters upstream of the confluence with the San Juan River. All fish were PIT tagged and the location and method of stocking recorded in the SJRIP Program Office database.

The fall soft release of age-0 Colorado pikeminnow occurred on November 9, 2009 utilizing the Public Service Company of New Mexico (PNM) river-water intake return sluiceway located at RM 166.6. Block nets were placed across the mouth of the backwater that the PNM sluiceway becomes when not in use (i.e. where the sluiceway return channel connects back to the mainstem San Juan River). Sampling by backpack electro-fishing unit was conducted to document the fish community within the enclosure and remove any nonnative fish present within the PNM sluiceway (Table 3). Two passes, totaling 937 seconds of sampling, were made throughout the entire enclosure. Dexter NFH&TC used two large fish hauling trucks (carrying 280,000 and 146,000 fish respectively) and one pick-up truck (carrying 42,000 fish) to deliver 468,000 age-0 Colorado pikeminnow. Fish were tempered in the stocking trucks to within 1-2°C prior to transfer into the enclosure. Following an acclimatization period of 22 hours the block nets were removed and fish allowed to disperse.

**Table 3** Fish collected from PNM sluiceway prior to age-0 Colorado pikeminnow stocking Nov. 9, 2009.

Species	# collected	Range of TL
Flannelmouth sucker	1	155 mm
Largemouth bass	6	115-232 mm
Black crappie	1	112 mm
Green sunfish	3	62-100 mm
Bluegill	1	109 mm

In accordance to stocking and nonnative fish control protocols non-native fishes are to be removed and sacrificed, but remaining native fish are returned to the habitats from which they were collected. Native piscivorous fishes (i.e. Colorado pikeminnow, roundtail chub, etc.) of sufficient size to pose a predation threat are placed back into the river outside the enclosure boundaries.

All age-0 and age-1+ Colorado pikeminnow stocked into the San Juan River in 2009 were produced and reared at Dexter NFH&TC under a separate workplan.

## **SUMMARY**

Augmentation efforts for 2009 surpassed SJRIP-LRP Task 2.1.2.2 - Annually stock  $\geq 300,000$  age-0 Colorado pikeminnow, by 168,000 fish (56%). Task 2.1.2.3 - Annually stock 3,000 age-1 Colorado pikeminnow, was exceeded by 5,942 fish (198%). No opportunistically acquired Colorado pikeminnow were stocked in 2009. A total of 476,942 Colorado pikeminnow of all year classes were stocked into the San Juan River in 2009.

By comparing stocking numbers across the Phase I augmentation effort (2002-2009), the SJRIP exceeded its augmentation target of 2,350,000 age-0 Colorado pikeminnow by 146,440 fish (6.2%). Furthermore, the SJRIP surpassed the 12,000 age-1+ target for 2006-2009 by 8,255 (68.8%) with a total of 20,255 fish stocked. If opportunistically acquired fish from 2003-2006 are included in the age-1+ stocking totals, then 36,513 age-1 through age-5 Colorado pikeminnow were stocked during the Phase I augmentation effort.

Augmentation for both age-0 and age-1+ Colorado pikeminnow will continue in 2010 following current protocols but 2010 will be the last year that age-1+ fish are stocked. Under Phase II, augmentation efforts will focus primarily on stocking increased numbers of age-0 fish (Furr 2010). Current facility and broodstock capabilities at Dexter NFH&TC will allow for  $\geq 400,000$  age-0 Colorado pikeminnow to be produced and stocked annually (Manuel Ulibarri pers. comm.). This will be the stocking target for 2011 and subsequent years unless further production capacity is identified and/or stocking targets modified by the SJRIP.

Phase II augmentation efforts will be subject to annual review and revision under the 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 to be stocked.

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## Appendix 1

### Colorado pikeminnow stocked into the San Juan River under the Phase I augmentation plan.

Dates	Number Stocked & (Age-Class)	River Miles Stocked At	Mean Total Length (in mm)	Range Of Total Lengths (in mm)	Responsible Agency <sup>a</sup>
<b>2002: 210,418 total fish stocked</b>					
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
<b>2003: 176,933 total fish stocked</b>					
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
<b>2004: 281,219 total fish stocked</b>					
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
<b>2005: 306,811 total fish stocked</b>					
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
<b>2006: 326,547 total fish stocked</b>					
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
<b>2007: 479,226 total fish stocked</b>					
04/18/2007	1,590 (1)	134.5	176	137-228	Dexter & NMFWCO
10/03/2007	81,974 (0)	134.5	~55	Unknown	Dexter & NMFWCO
10/03/2007	1,666 (1)	134.5	~178	147-208	Dexter & 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
<b>2008: 275,091 total fish stocked</b>					
4/15/2008	2,057 (2)	134.9	209	Unknown	Dexter & NMFWCO
10/21/2008	2,800 (2)	134.3	299	Unknown	Dexter & NMFWCO
11/06/2008	270,234 (0)	166.6	55	Unknown	Dexter & NMFWCO
<b>2009: 476,942 total fish stocked</b>					
3/17/2009	1,442 (3)	133.5	240	Unknown	Dexter & NMFWCO
3/17/2009	1,500 (3)	133.5	240	Unknown	Dexter & NMFWCO
10/26/2009	4,000 (2+)	133.5	325	Unknown	Dexter & NMFWCO
10/26/2009	1,000 (2+)	133.3	325	Unknown	Dexter & NMFWCO
11/09/2009	468,000 (0)	166.6	55	~50-60	Dexter & NMFWCO
11/09/2009	1,000 (2+)	180.2	325	Unknown	Dexter & NMFWCO
<b>Total number of fish stocked from 2002-2009 = 2,531,953</b>					

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; Dexter = Dexter National Fish Hatchery and Technology Center, Dexter, NM; AZG&F = Arizona Game and Fish Department, Bubbling Ponds Hatchery, Sedona, AZ; NMFWCO= New Mexico Fish & Wildlife Conservation Office, Albuquerque. ~ indicates estimates

## Appendix 2

A summary of Colorado pikeminnow that were stocked into the San Juan River, 1996-2009.

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
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