

**AUGMENTATION OF THE
SAN JUAN RIVER RAZORBACK
SUCKER POPULATION: 2006**

**Interim Progress Report
(Final)**

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EXECUTIVE SUMMARY

- A total of 31,636 razorback sucker were stocked into the San Juan River between 1994 and 2006
 - 23,777 (75.2%) of these have been stocked in the last three years (2004-2006)

- A total of 18,793 razorback sucker were stocked into the San Juan River in 2006
 - This was the first year that the target stocking number for razorback sucker (n = 11,400 fish) has ever been met or exceeded
 - By far the most razorback sucker ever stocked in a single year
 - Most of the stocked fish did not meet the target stocking size (\geq 300 mm TL), however
 - 17,664 razorback sucker were harvested from the NAPI grow-out ponds and stocked into the San Juan River in 2006
 - Fish came from eight of the nine grow-out ponds
 - Ponds that contributed fish included all of the 6-Pack ponds, East Avocet Pond, and Hidden Pond
 - The 6-Pack ponds were all passively harvested using fyke nets, but not drained in 2006
 - East Avocet and Hidden ponds were first passively netted, then completely drained and emptied of all remaining fish
 - West Avocet Pond did not have any fish in it until November 2006
 - 3,447 (19.5%) of these fish were \geq 300 mm TL (i.e., the target stocking size)
 - 14,217 (80.5%) of these fish were $<$ 300 mm TL
 - Another 1,129 razorback sucker from Dexter NFH&TC were also stocked into the San Juan River in 2006
 - The mean TL for these fish was 305 mm TL

- Three ponds have been restocked with 200+ mm TL razorback sucker from Dexter NFH&TC
 - East and West Avocet ponds were stocked on 7 November 2006
 - n = 3,500 fish per pond
 - Hidden Pond was stocked on 9 May 2007
 - n = 3,467 fish

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INTRODUCTION

Razorback sucker (*Xyrauchen texanus*), is one of three San Juan River native fish species (the Colorado pikeminnow, *Ptychocheilus lucius*, and the roundtail chub, *Gila robusta* being the other two) that have become greatly reduced in numbers and range since the mid 1900's (Bestgen 1990, Minckley 1973). 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 have probably all contributed to the decline of these native species (Platania 1990, Brooks et al. 1993, Ryden and Pfeifer 1994a). Extremely small numbers of wild razorback sucker and the long-term lack of recruitment led to this species being listed as endangered under the Endangered Species Act on 22 November 1991 (U.S. Fish and Wildlife Service {USFWS} 1991). The razorback sucker is also currently protected by state laws in Arizona (AZ), California (CA), Colorado (CO), Nevada (NV), New Mexico (NM), Utah (UT), and by the Navajo Nation.

One of the two goals of the San Juan River Recovery Implementation Program (SJRIP) is to protect and recover endangered fishes in the San Juan River Basin with the ultimate goal of establishing self-sustaining populations of razorback sucker and Colorado pikeminnow (SJRIP 1995). Due to the paucity of historic and recent collections of this species, 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's Biology Committee (BC) initiated an experimental stocking program for razorback sucker in the San Juan River (Ryden and Pfeifer 1994a). Experimental stocking was implemented to provide needed insight about recovery potential and habitat suitability for the razorback sucker in the San Juan River between Farmington, NM and Lake Powell, UT (i.e., the area designated as Critical Habitat for razorback sucker; Maddux et al. 1993, USFWS 1994).

Between March 1994 and October 1996, 942 razorback sucker were stocked into the San Juan River at four stocking sites (RM 158.6, 136.6, 117.5, and 79.6). Data gathered on these fish identified habitat types being used year-round by razorback sucker in the San Juan River, and provided information on movements, survival, and growth rates. Based on the successes of the experimental stocking study, a full-scale augmentation effort for razorback sucker in the San Juan River was initiated by the SJRIP.

In 1997 a ***Five-Year Augmentation Plan For Razorback Sucker In The San Juan River*** was completed (Ryden 1997). The 1997 razorback sucker augmentation plan identified 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). In order to meet this target population, it was estimated that 73,482 razorback sucker would have to be stocked between 1997 and 2001. To this end, stocking of razorback sucker began in September 1997. Between September 1997 and November 2001, a total of 5,890 razorback sucker were stocked into the San Juan River, with all

stockings occurring at RM 158.6. This represented a 92.0% shortfall (n = of 67,592 fish) compared to the target stocking numbers specified in the 1997 augmentation plan.

Despite this shortfall, numerous encouraging observations were made among the relatively few fish that were stocked. To begin with, the recapture rate among razorback sucker stocked at ≥ 300 TL was better than expected (Ryden 2001). Second, aggregations of spawning adults were collected in 1997, 1999, and 2001 at RM 100.2 just downstream of Aneth, UT (Ryden 2001, 2003a). And third, crews from the University of New Mexico (UNM) collected larval razorback sucker every year since 1998 (Brandenburg 2000, Brandenburg et al. 2005, Brandenburg and Farrington 2007).

Based on these observations, the SJRIP-BC extended the augmentation effort for razorback sucker. *An Augmentation Plan For Razorback Sucker In The San Juan River: An addendum to the five-year augmentation plan for razorback sucker in the San Juan River* was completed in February 2003 (Ryden 2003b). This addendum outlines an additional eight-year augmentation period for razorback sucker. This eight-year augmentation period was scheduled to begin in 2004 and continue through 2011.

However, because of several mitigating circumstances (detailed in Ryden 2005), the timeline for beginning this eight-year augmentation effort has been pushed back, probably until 2008. Therefore, the razorback sucker stocking and augmentation efforts that occurred from 2002-2006 were considered to be interim efforts, separate from the two distinct razorback sucker augmentation efforts. This report provides an overview of the 2006 razorback sucker augmentation efforts.

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. Augmentation of razorback sucker increases population numbers, 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. The San Juan River Long Range Plan (SJRIP-BC 1995) identified the need to assess the feasibility of, and then implement the augmentation of razorback sucker. The revised augmentation plan provides the necessary guidance for those efforts as well as directly fulfilling objective 5.3.8.2 of the Long Range Plan. The Long Range Plan is undergoing revision. However, the need to artificially augment the San Juan River's razorback sucker population is specified in tasks 1.1.1, 1.1.3, 1.1.4, 3.1.3, 4.1.1, and 4.1.2 of the latest draft (dated October 30, 2006).

The objectives of this workplan for Fiscal Year 2006 (FY-2006) were as follows:

Objectives:

- 1) Obtain, rear, harvest, and stock razorback sucker in order to fulfill the tasks and objectives outlined in the current version of the razorback sucker augmentation plan addendum (*Ryden 2003b final*)
- 2) Monitor stocked razorback sucker in the wild for various parameters, including:
 - a) Spawning season habitat use and movement patterns
 - b) Survival and growth rates
 - c) Determine whether hatchery-reared razorback sucker will recruit into the adult population and successfully spawn in the wild
- 3) Remove nonnative fish species which prey upon and compete with native fish species in the San Juan River.

At the May 2007 meeting of the SJRIP Biology Committee, it was decided that discussion pertaining to Objectives 2 and 3 of the FY-2006 workplan would be eliminated. Therefore, this report only includes information on the numbers, dates, and locations of razorback sucker that were stocked in 2006.

METHODS

Grow-out ponds were passively harvested using fyke nets. Fyke nets were set from a 14-foot aluminum jon boat and allowed to fish overnight. In the morning, nets were run and all fish collected were placed in live wells. Razorback sucker were measured (TL to the nearest mm), implanted with a 134 kHz PIT tag, and placed in oxygenated holding tanks for transport to the San Juan River. While the 6-Pack ponds were being harvested (from 26 June to 27 July 2006), the emphasis was on harvesting, PIT-tagging, and stocking fish ≥ 300 mm TL. This protocol was adopted in 2001 because better post-stocking survival had been observed for razorback sucker that had been stocked at ≥ 300 mm TL, during monitoring studies. However, relatively few fish of this size were harvested. In an effort to thin the numbers of fish from the smaller size-classes inhabiting the 6-Pack ponds, a number of smaller fish (< 300 mm TL) were also harvested, PIT-tagged, and stocked. All fish from the 6-Pack ponds were stocked into the San Juan River at RM 158.6.

On 25 July 2006, the decision was made to completely remove and stock all fish from ponds that were still scheduled to be harvested. This was to make room for incoming shipments of 200+ mm TL razorback sucker from Dexter National Fish Hatchery and Technology Center (Dexter NFH&TC) that were to be stocked into the grow-out ponds in the fall. Therefore, in August and September 2006, East Avocet Pond and Hidden Pond were passively harvested for one week.

During passive harvest, all fish collected were PIT-tagged and stocked into the San Juan River at RM 158.6. During the week immediately following passive harvest, the ponds were drained and all fish were removed and stocked into the San Juan River. Some of these fish were PIT-tagged. However, due to high observed stress levels, the majority of the razorback sucker being salvaged were stocked without PIT tags to reduce handling stress. After ponds were drained, they were allowed to dry for several weeks, then they were refilled with water.

RESULTS

On 7 November 2006, East and West Avocet ponds were stocked with the first shipments of 200+ mm TL razorback sucker ($n = 3,500$ per pond) to be delivered from Dexter NFH&TC. Hidden Pond was stocked with razorback sucker ($n = 3,467$) from Dexter NFH&TC on 9 May 2007.

Also on 14 November 2006, an opportunistic stocking of razorback sucker that met the target stocking size of ≥ 300 mm TL was also stocked at RM 158.6.

Six-Pack ponds 1-3 were harvested from 26-29 June 2006 and ponds 4-6 were harvested from 24-27 July 2006. A total of 3,289 razorback sucker were harvested, PIT-tagged and stocked into the San Juan River from the 6-Pack ponds (Table 1). Of the 3,289 razorback sucker harvested from these ponds, 1,807 (54.9%) were ≥ 300 mm TL. The other 1,482 fish (45.1%) were < 300 mm TL. By the end of July 2006, this was already the most successful stocking year since augmentation of razorback sucker began in 1994.

East Avocet Pond was passively harvested from 14-17 August 2006. It was drained and salvaged on 22-23 August 2006. A total of 7,960 razorback sucker were stocked from this pond into the San Juan River (Table 1). Of these, about 1,500 fish were stocked without PIT tags. A total of 1,345 fish (16.9%) were ≥ 300 mm TL and 6,615 fish (83.1%) were < 300 mm TL.

Hidden Pond was passively harvested from 28-31 August 2006. It was drained and salvaged on 5-7 September 2006. A total of 6,415 razorback sucker were stocked from this pond into the San Juan River (Table 1). Of these, about 3,500 fish were stocked without PIT tags. A total of 295 fish (4.6%) were ≥ 300 mm TL and 6,120 fish (95.4%) were < 300 mm TL.

Table 1. Razorback sucker stocked into the San Juan River in 2006.

Source	Number Stocked	Mean Total Length (in mm)	Range Of Total Lengths
6-Pack Pond # 1	567	267 mm	210-397 mm
6-Pack Pond # 2	424	336 mm	226-475 mm
6-Pack Pond # 3	505	353 mm	227-438 mm
6-Pack Pond # 4	1,003	302 mm	207-471 mm
6-Pack Pond # 5	260	296 mm	232-482 mm
6-Pack Pond # 6	530	397 mm	224-482 mm
Hidden Pond	6,415 (~3,500 of these fish were stocked without PIT tags)	201 mm (based on 2,913 fish measured = ~45.4% of all fish)	68-537 mm (based on 2,913 fish measured = ~45.4% of all fish)
East Avocet	7,960 (~1,500 of these fish were stocked without PIT tags)	244 mm (based on 2,533 fish measured = ~31.8% of all fish) Harvest = 239 mm TL Salvage = 256 mm TL	100-506 mm (based on 2,533 fish measured = ~31.8% of all fish) Harvest = 120-506 mm TL Salvage = 100-503 mm TL
West Avocet	0	There were no fish in West Avocet Pond until it was stocked on 7 November 2006.	
Dexter NFH&TC	1,129	305 mm TL	Not Specified

Thus, a total of 17,664 razorback sucker (range = 68-537 mm TL) from eight grow-out ponds were stocked into the San Juan River (Table 1). A total of 3,447 fish (19.5%) were \geq 300 mm TL and 14,217 fish (80.5%) were < 300 mm TL.

On 14 November 2006, another 1,129 razorback sucker from Dexter NFH&TC were also stocked into the San Juan River (Table 1). The estimated mean TL for this lot of fish was 305 mm TL, but the range of actual sizes stocked is not known.

The addition of the fish from Dexter NFH&TC brought the total number of razorback sucker stocked in 2006 to 18,793 fish. This was by far the largest number of razorback sucker stocked in any single year since augmentation began in 1994 (Appendix A).

In total, between 1994 and 2006, 31,636 razorback sucker have been stocked into the San Juan River. Of this total, 23,777 (75.2%) were stocked in the last three years (Appendix A).

DISCUSSION

The 18,793 razorback sucker stocked into the San Juan River in 2006 were by far the largest group of razorback sucker to be stocked since augmentation efforts for this species began in 1994. For the first time ever, the target number of 11,400 fish called for in the 2003 augmentation plan addendum (Ryden 2003b) was exceeded. However, most of the razorback sucker stocked in 2006 were smaller than the target size of ≥ 300 mm TL.

The number of fish being stocked in 2007 from the SJRIP's NAPI grow-out ponds should once again be relatively high, since at least 6-Pack pond #'s 5 and 6 will be drained and all fish will be removed and stocked. These two ponds are also scheduled to be restocked with 200+ mm TL razorback sucker from Dexter NFH&TC in 2007.

With the razorback sucker from the NAPI grow-out ponds combined with the fish being stocked directly into the San Juan River from Dexter NFH&TC and/or Uvalde NFH, it is anticipated that the target stocking number of 11,400 fish will be met again in 2007. However, as was the case in 2006, there will likely be a high number of razorback sucker that are < 300 mm TL stocked in 2007.

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APPENDIX A

Information on razorback sucker stocked from 1994-2006.

Table A-1. Year by year summary of razorback sucker stocked into the San Juan River, 1994-2006.

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 TL; Range = 100-446 mm TL)
1995	16 (Mean TL = 424 mm TL; Range = 397-482 mm TL)
1996	238 (Mean TL = 336 mm TL; Range = 204-434 mm TL)
Five-Year Augmentation Effort: 1997-2001 (n = 5,890 fish stocked)	
1997	2,883 (Mean TL = 192 mm TL; Range = 104-412 mm TL)
1998	1,275 (Mean TL = 250 mm TL; Range = 185-470 mm TL)
1999	0 N/A
2000	1,044 (Mean TL = 214 mm TL; Range = 111-523 mm TL)
2001	688 (Mean TL = 410 mm TL; Range = 288-560 mm TL)
Interim Stocking Years: 2002-2006 (n = 24,804 fish stocked)	
2002	140 (Mean TL = 319 mm TL; Range = 110-470 mm TL)
2003	887 (Mean TL = 327 mm TL; Range = 100-495 mm TL)
2004	2,988 (Mean TL = 353 mm TL; Range = 225-559 mm TL)
2005	1,996 (Mean TL = 355 mm TL; Range = 223-534 mm TL)
2006	18,793 (Mean TL = 265 mm TL; Range = 68-537 mm TL)
TOTAL: 1994-2006	31,636 (Mean TL = 278 mm TL; Range = 68-560 mm TL)