

**SAN JUAN RIVER  
RAZORBACK SUCKER (*Xyrauchen texanus*)  
POPULATION AUGMENTATION: 2011  
Annual Report**



Photo by USFWS

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

To:  
The San Juan River Basin Recovery Implementation Program

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## EXECUTIVE SUMMARY

- 18,830 razorback sucker were stocked during 2011 augmentation efforts
  - 165% of the annual target of 11,400 stocked; an additional 7,430 fish
  - Stocking range expanded above RM 166.6 (PNM Weir)
  - Soft release strategy implemented for Uvalde NFH stocked fish
  - Third year of 8 year augmentation plan
    - third consecutive year of exceeding stocking targets
  
- 11,378 fish stocked from Uvalde NFH
  - 348 fish were hard released at the Animas Confluence (A-RM 0.1) on Mar. 1, 2011
    - Mean TL= 462 mm, Range 396-540 mm
    - 2007 Year Class; Age-4 fish
  - 11,030 fish soft released in Fall at three stocking sites
    - Tagging, harvesting, handling, and hauling protocol changes in an effort to improve survival and retention were implemented at Uvalde NFH
    - 7 separate stocking events occurred from Oct. 18-Nov. 22
      - Oct. 18- 1,712 fish soft released at PNM Sluiceway (RM 166.6)
        - Mean TL= 365 mm, Range 302-454 mm
      - Oct. 25- 1,724 fish soft released at Boyd Park (A-RM 1.0)
        - Mean TL= 366 mm, Range 305-465 mm
      - Oct. 28- 1,713 fish soft released at Wild Horse Rd (RM 186.7)
        - Mean TL= 373 mm, Range 300-488 mm
      - Nov. 3- 1,715 fish soft released at PNM Sluiceway
        - Mean TL= 357 mm, Range 280-464 mm
      - Nov. 8- 1,593 fish soft released at Boyd Park
        - Mean TL= 379 mm, Range 315-455 mm
      - Nov. 15- 1,291 fish soft released at PNM Sluiceway
        - Mean TL= 393 mm, Range 314-500 mm
      - Nov. 22- 1,282 fish soft released at Boyd Park

- Mean TL= 394 mm, Range 310-492 mm
  - 99.7% of Uvalde NFH fish were  $\geq 300$  mm TL
  - All Uvalde NFH fish stocked in Fall were 2009 Year Class; Age-2 fish
- 7,452 fish harvested and stocked from NAPI ponds
  - 10,144 stocked by Dexter NFH&TC into NAPI ponds in the spring of 2011 for grow-out
    - 73.1% return
  - 92.9% of NAPI pond fish were  $\geq 300$  mm TL, Range 208-440 mm
  - Fish stocked at multiple stocking locations at, or upstream, of RM 147.9 (Shiprock Bridge)
- All razorback sucker stocked in 2011 were implanted with a PIT tag and had TL measurements recorded; all Uvalde NFH fish also had WT measurements recorded
- A Colorado pikeminnow was collected during pre-stocking sampling at the Wild Horse Rd soft release site (RM 186.7)
  - Farthest upstream documented capture of a Colorado pikeminnow since closure of Navajo Dam

## **Table of Contents**

EXECUTIVE SUMMARY .....	i
INTRODUCTION.....	1
Relationship To The Recovery Program.....	3
Objectives for Augmentation Fiscal Year 2011 .....	5
STOCKINGS .....	6
Uvalde NFH Opportunistic Stocking .....	6
Summary Results from NAPI Ponds.....	9
SUMMARY .....	10
Literature Cited.....	14
Appendix A. Razorback sucker stocked into the San Juan River 2011. *details of NAPI stocking dates and numbers covered under a separate NAPI 2011 report. ....	17
Appendix B. Yearly summary of razorback sucker stocked into the San Juan River, 1994-2011 .....	18

## **List of Tables**

Table 1- Summary of Uvalde NFH razorback sucker stockings into the San Juan River, 2011. ....	7
Table 2- Summary of fish collected during enclosure sampling at razorback sucker stocking sites. ....	8
Table 3- Summary of 2011 NAPI pond harvest results. ....	9

## 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 become greatly reduced 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 was protected as endangered under the Endangered Species Act on November 22, 1991 due to diminished numbers and lack of recruitment of this species in the wild (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 (1994-1996), for razorback sucker in the San Juan River (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 survive 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. These shortfalls were a result of insufficient numbers of razorback sucker available to the SJRIP augmentation program. In an attempt to rectify the deficit, between 1997 and 2001 the SJRIP acquired for use, or constructed, ponds on Navajo Agricultural Products Industry (NAPI) lands. These ponds were to be the primary source of razorback sucker for the SJRIP's augmentation program. Ponds would be stocked with young razorback sucker each Spring, establishing a multiple year-class cohort of fish from which appropriately sized individuals ( $\geq 300$  mm TL) could be harvested each Fall and stocked into the San Juan River. The continued shortfalls (only 43% of augmentation target was met) experienced between 1997 and 2007 were an artifact of the unpredictability of production, grow-out, and harvest at the NAPI ponds.

Despite this stocking shortfall, useful recapture data were collected. First, razorback sucker were recaptured during every spring and fall fish community monitoring trip 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 both 2010 and 2011 (Brandenburg et al 2012). Although larval razorback sucker have been collected for the last 13 years, documented recruitment to juvenile life stages is limited (Ryden 2008).

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 Navajo Agricultural Products Industry (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  $\geq 300$  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, recaptures for those fish were similar to recaptures from smaller stockings ( $n = <5,000$ ) at three years post stocking (Steve Ross, personal communication).

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 third year (2011) of the eight-year effort (2009-2016) for razorback sucker augmentation in the San Juan River. However, details summarizing the grow-out of razorback sucker at the NAPI ponds during 2011 will be covered in a separate report by the Navajo Nation Department of Fish and Wildlife.

### **Relationship To The Recovery Program**

The main objective for augmentation was to restore a wild population of razorback sucker to appropriate historic habitat, with the eventual goal of recovering this species in the San Juan River (Ryden 1997, SJRIP 2011). 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 continue the persistence of a spawning adult population. Subsequent data collection may identify factors limiting successful recruitment of this species in the San Juan River.

The San Juan River Long Range Plan (SJRIP 2011) identifies the need to assess the feasibility and implementation of razorback sucker augmentation. The revised augmentation plan (Ryden 2003b) and stocking plan and protocols for the NAPI ponds (Furr and Davis 2009b) provides the necessary guidance for those efforts to fulfill the goals, actions and tasks defined in the 2011 Long Range Plan. The requirements of the augmentation program for the San Juan River's razorback sucker population are specified in the 2011 Long Range Plan 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 1.1.1.2** *Review and update augmentation plan for RBS and adjust stocking goals as scheduled.*
- **Action 1.1.3** *Produce, rear, and stock sufficient numbers of RBS to meet stocking goals of augmentation plan.*
  - **Task 1.1.3.1** *Produce and rear RBS at Dexter NFH for stocking to grow-out facilities.*
  - **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 1.1.3.3** *Produce 12,000 RBS per year (>300 mm TL) at Uvalde NFH.*
  - **Task 1.1.3.4** *Stock at least 91,200 RBS (> 300 mm TL) during 2003-2011\* or 11,400 per year.[\* timeline rescheduled for 2009-2016]*
  - **Task 1.1.3.5** *Opportunistically stock available RBS in excess of the 11,400 described above.*
- **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 (Dexter and Uvalde NFH) for RBS production.*
    - **Task 1.3.1.2** *Operate and maintain NAPI grow-out ponds.*

In February 2007, the SJRIP-BC approved a shift in rearing strategies and management at the NAPI grow-out ponds, contracted Uvalde National Fish Hatchery (Uvalde NFH) to meet the yearly stocking requests of the SJRIP, and charged the USFWS's New Mexico Fish & Wildlife Conservation Office (NMFWCO) with San Juan River augmentation oversight.

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 2011**

- 1) Obtain, rear, harvest, and stock razorback sucker to fulfill the tasks and objectives outlined in the current version of the razorback sucker augmentation plan addendum (Ryden 2003b).
- 2) Implement soft releases for all Uvalde NFH stocked razorback sucker using stocking locations at, or upstream of, the PNM Weir (RM 166.6)

# **STOCKINGS**

## **Uvalde NFH Opportunistic Stocking**

On March 1, 2011 personnel from Uvalde NFH and NMFWCO hard released 348 razorback sucker in the Animas River immediately upstream of the confluence with the San Juan River (Animas River Mile, A-RM, 0.1) (Table 1). These fish were the remaining 2007 YC razorback sucker used for the seasonal stocking effort completed in 2010. The mean Total Length (TL) was 462 millimeters (mm) (Range= 396-540 mm); mean weight (WT) was 1058 grams (g) (Range= 635-1633 g). Fish were tempered on site in the hauling tank for at least one hour and to within 1° Celsius (°C) of the measured river temperature prior to release. All fish were implanted with a PIT tag and had TL and WT measurements recorded prior to delivery.

## **Uvalde NFH 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. Due to these changes seven stocking events were scheduled for Fall 2011. In addition, stocking protocols were changed by our office to incorporate soft releases of all razorback sucker from Uvalde NFH similar to those used for soft releases of Colorado pikeminnow (Furr and Davis 2009a). All fish were implanted with a PIT tag and had TL and WT measurements recorded prior to delivery. The details of the seven soft releases from Uvalde NFH are summarized in Table 1.

**Table 1- Summary of Uvalde NFH razorback sucker stockings into the San Juan River, 2011.**

Date	Site, River Mile	# of fish	Year Class	Mean TL	Range TL	Mean WT
March 1	Animas Confluence A-RM 0.1	348	2007	462 mm	396-540 mm	1058 g
Oct. 18	PNM Sluiceway RM 166.6	1,712	2009	365 mm	302-454 mm	463 g
Oct. 25	Boyd Park A-RM 1.0	1,724	2009	366 mm	305-465 mm	468 g
Oct. 28	Wild Horse Rd RM 186.7	1,713	2009	373 mm	300-488 mm	487 g
Nov. 3	PNM Sluiceway RM 166.6	1,715	2009	357 mm	280-464 mm	433 g
Nov. 8	Boyd Park A-RM 1.0	1,593	2009	379 mm	315-455 mm	529 g
Nov. 15	PNM Sluiceway RM 166.6	1,291	2009	393 mm	314-500 mm	613 g
Nov. 22	Boyd Park A-RM 1.0	1,282	2009	394 mm	310-492 mm	611 g
	<b>Total Stocked</b>	<b>11,378</b>	<b>Avg-&gt;</b>	<b>376 mm</b>	<b>280-540 mm</b>	<b>524 g</b>

The seven soft releases resulted in 11,030 fish released at two locations in the San Juan River and one location in the Animas River. Pre-release sampling of the enclosures was conducted with a Smith-Root Model 20 backpack electro-fishing unit. Fish encountered during sampling are summarized in Table 2 by release site and date. No sampling occurred for the November 3, 2011 stocking at PNM Sluiceway because it had been sampled the previous day in preparation for a Colorado pikeminnow stocking. Additionally, on November 15, 2011 the PNM Sluiceway was unexpectedly being flushed at the time of our arrival. The large volume of water moving through the sluiceway prevented our erecting an enclosure until that afternoon. Once the sluiceway gates were closed it was decided to set up the block net, forego enclosure sampling, and off-load the fish as expeditiously as possible.

**Table 2- Summary of fish collected during enclosure sampling at razorback sucker stocking sites.**

Release Site RM	Date	Species	Number	TL mm (range)	WT g (range)	Comments
PNM Sluiceway RM 166.6	Oct. 18	Ptyluc	4	(130-142)	(14-18)	
		Catlat	11	(108-182)*	(11-58)*	*5 juveniles measured, 6 adults collected but not measured
		Rhiosc	1	50	<1	
		Cypcar	2			2 adults not measured
		Micsal	1	146	36	
		Saltru	1	200	71	
Boyd Park A-RM 1.0	Oct. 25	Catlat	10	(52-146)	(<5-28)	
		Catcom	1	278	274	
		Cypcar	1	93	15	
		Pimpro	1	58	<5	
		Micsal	16	(66-131)	(<5-30)	
		Lepcya	4	(54-80)	(<5-6)	
	Nov. 8	Ptyluc	2	<55	na	Assumed recaptures from the 2NOV2011 Colorado pikeminnow stocking at site
		Xyrtex	16	(334-440)	(330-755)	All fish were recaptures from fish stocked at site on 25OCT2011
		Pimpro	1	58	2	
		Micsal	3	(53-109)	(2-16)	
		Amemel	1	87	10	
		Ptyluc	2	(42-53)	<2	Assumed recaptures from the 2NOV2011 Colorado pikeminnow stocking at site
		Xyrtex	26	(320-449)	(260-845)	All fish were recaptures from fish stocked at site on 25OCT2011, another 12 razorback sucker observed
		Micsal	1	124	20	
Lepcya	1	50	<5			
Wild Horse Rd	Oct. 28	Ptyluc	1	147	22	Implanted with a PIT tag

RM 186.7	Catlat	1	124	14.5	
	Rhiosc	12	<55	na	
	Cyplut	48		<1	

### Summary Results from NAPI Ponds

A total of 7,452 razorback sucker were stocked from the NAPI ponds into the San Juan River in 2011 (Table 3). This represents a 73.5% return from the original 10,144 fish stocked into the ponds by Dexter NFH&TC. Passive harvests began on August 25 and ran through October 14, 2011. Passively harvested fish were stocked a four locations: Verde del Rio/River Walk Park (RM 196.1), Wild Horse Rd (RM 186.7), Berg Park (A-RM 5), Animas Confluence (A-RM 0.1). Active harvests occurred on October 18 (West Avocet), October 25 (East Avocet), and October 26 (Hidden Pond). All actively harvested fish were stocked at Shiprock Bridge (RM 147.9).

**Table 3- Summary of 2011 NAPI pond harvest results.**

Pond	Harvest Type	Number Harvested	Mean TL (mm)	Range TL (mm)	Mean WT (g)*
East Avocet	Passive	1,208	348	241-435	417
	Active	702	374	305-440	523
West Avocet	Passive	1,123	344	228-425	382
	Active	1,372	355	235-423	408
Hidden Pond	Passive	594	317	280-400	313
	Active	2,454	330	208-426	373
<b>Total</b>		<b>7,452</b>			

\*indicates mean WT's were calculated from a subset of fish harvested.

Numbers presented here for NAPI harvests do not account for discrepancies in the database from which numbers were derived. Therefore, they may not be in agreement with numbers presented by Navajo Nation Department of Fish and Wildlife in their annual NAPI report and numbers recorded by the SJRIP-Program Office database.

## SUMMARY

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 are currently ongoing. A total of 18,830 razorback sucker  $\geq 300$  mm TL were stocked in 2011. This represents an exceedance of the annual stocking target of 11,400 razorback sucker by 7,452 fish (a surplus of 65%). Each of the first three years of the eight-year augmentation effort has surpassed the 11,400 fish stocking target, and future augmentation efforts are similarly expected to meet or exceed the annual augmentation target. With both Uvalde NFH committed to provide 11,400  $>300$  mm TL razorback sucker and the NAPI grow-out ponds expected to provide  $>5,000$  fish annually, the potential exists to routinely stock up to 16,400 adult and sub-adult razorback sucker each year.

Changes were made to handling, hauling, and stocking protocols for razorback sucker delivered from Uvalde NFH in 2011. Previously, razorback sucker were harvested from ponds in late Summer or early Fall, brought into indoor raceways, allowed to recuperate for a week or more, PIT tagged and measured, treated and allowed to recuperate for a week or more, and then loaded into the Regional Distribution Unit (RDU, a large semi-truck and fish hauling trailer) for delivery to the San Juan River. This schedule resulted in multiple handling events within a 3-4 week period immediately prior to a 16+ hour hauling time and ending in a hard release into the San Juan River.

Prior to 2011 and considering the number, and size, of fish requested ( $n \geq 11,400$  razorback sucker  $\geq 300$  mm TL) the RDU was used to haul the fish in two separate loads. The use of a large semi-truck fish hauling unit limited the use of stocking sites to those that had easy access with ample room for maneuvering. Also, there was concern regarding the potential loss of significant numbers of fish if there was a mechanical failure with the RDU. Once the RDU reached the stocking site fish were tempered in the hauling tanks for at least 1 hour and to within  $1^{\circ}$  C before being directly released into the San Juan River. Low recapture rates for fish stocked under these methods compelled a re-evaluation of the razorback sucker augmentation protocols in an attempt to ameliorate the possible effects these protocols may have had on retention and survival of Uvalde NFH razorback sucker.

In 2011 Uvalde NFH took steps to reduce prolonged handling stress by rescheduling PIT tagging to occur during Spring 2011. Fish were harvested, handled, and treatments given in the same manner as

they were previously; however, after fish recuperated from PIT tagging (2 weeks post tagging) they were returned to the outdoor ponds. Fish remained in the ponds for 3-4 months under a typical hatchery culturing regiment until 2 weeks prior to load up and hauling. At this time fish were moved back indoors, allowed to recuperate for a few days, scanned for a PIT tag and measured (fish with a 'dropped' tag were reprocessed and held back for future delivery), allowed to recuperate for a week or more, then loaded for delivery. A final protocol change was made once fish were loaded into the hauling tanks; the hauling water was exchanged prior to the addition of water conditioners to give fish the freshest water possible before leaving the hatchery.

As previously mentioned, issues associated with the RDU were identified in 2010 regarding limited site accessibility and potential risks with hauling fewer, but larger, loads. Therefore, in 2011 Uvalde NFH personnel hauled fish in a smaller distribution truck and at lighter hauling densities. The RDU has three 650 gallon tanks that would haul approximately 6,000 razorback sucker per load (roughly 3 fish/gallon); thereby only requiring two loads to haul the  $\geq 11,400$  fish to fulfill the annual commitment. The Uvalde NFH truck has two 500 gallon tanks that would haul approximately 1,700 razorback sucker per load (1.7 fish/gallon); thereby requiring seven loads to haul the  $\geq 11,400$  fish. This increase in effort was deemed necessary in order to expand the access to various, and smaller, stocking locations, while effectively halving the hauling densities in an effort to reduce hauling stress and associated mortalities. Additionally, by hauling fish in multiple loads the chance of losing all, or a significant portion, of the numbers requested from a catastrophic event was avoided.

To further reduce the effects of stressors, NMFWCO staff implemented a soft release strategy for all razorback sucker from Uvalde NFH similar to that currently used to stock Colorado pikeminnow (Furr and Davis 2009a). In 2011, two sites on the San Juan River (Wild Horse Rd- RM 187.6 and PNM Sluiceway- RM 166.6) and one site on the Animas River (Boyd Park- A-RM 1.0) were used to release Uvalde NFH razorback sucker. Fish were acclimatized for about 20 to 24 hours within an enclosure prior to final release.

There were a few highlights and lessons learned from the multiple soft release stockings. During pre-stocking sampling at Wild Horse Rd on October 28, 2011 a Colorado pikeminnow (147 mm TL) was captured and a PIT tag was implanted. Based on my investigation, this fish represents the farthest upstream capture of a Colorado pikeminnow since the closure of Navajo Dam. This collection, in

conjunction with other confirmed encounters and continued stockings, outside of the sampling area, suggests that it may be time to consider expanding the monitoring program to include portions of the lower Animas River and the San Juan River above the Animas River confluence. Expansion of monitoring into areas of the river that are now being stocked will allow the SJRIP to evaluate the relative success of these stockings.

The site at Wild Horse Rd was rated as 'Moderate' for the potential for anthropogenic disturbances during a stocking site evaluation (Furr 2011). Unfortunately this rating turned out to be accurate. On the morning of October 29, 2011 when NMFWCO personnel returned to the site to remove the block nets, a local child was encountered with a fishing pole rigged for 'snag' fishing. Apparently, the previous evening, after NMFWCO personnel left the site, this individual and others went fishing at the site and caught 11 razorback sucker. We took this opportunity to discuss the purpose of our efforts, endangered fish identification, and issues concerning recovery for razorback sucker and Colorado pikeminnow. This impromptu riverside fisheries management demonstration led to NMFWCO developing an education and outreach relationship with the City of Farmington's Riverside Nature Center to elevate the awareness regarding the efforts of the SJRIP in and around the Farmington area.

Another point of interest comes from the multiple stockings at Boyd Park (A-RM 1.0). The first stocking at this site occurred on October 25, 2011. Subsequently, two more stockings were conducted at Boyd Park. During the pre-stocking enclosure sampling on November 8, 2011 16 razorback sucker were recaptured from that initial October 25, 2011 stocking. Furthermore, on November 22, 2011 an additional 26 razorback sucker were recaptured, all from that initial October 25, 2011 stocking. The apparent affinity to this stocking site for the fish stocked there on October 25, 2011 is hopefully indicative of the suitability of the site for use as a soft release location for razorback sucker.

Based on recaptured data, it appears that razorback sucker exhibit some degree of site fidelity in the San Juan River (Davis and Furr 2007, 2008). Additionally, with the exception of spawning associated movement, adult razorback sucker tend to be predominantly sedentary (Tyus 1987; Tyus and Karp 1990). Data indicate that a majority of razorback sucker recaptures have occurred  $\pm 10$  miles of RM 158.6 (Davis and Furr 2007 and 2008). At the request of the SJRIP-Biology

Committee, multiple stocking locations are being used to reduce overcrowding and intraspecific competition within specific geomorphic reaches of the San Juan River. In 2011, 76 % of all razorback sucker stocked were released at, or upstream, of the PNM Weir/Sluiceway (RM 166.6). This comprised all razorback sucker from Uvalde NFH and from the NAPI passive harvests (n=14,303). All fish from NAPI active harvests (n=4,528) were stocked at Shiprock Bridge (RM 147.9). It is intended that using upstream areas of the San Juan River for soft releases will facilitate upstream range expansion and retention for this species. As additional spawning sites are identified, stocking in proximity to those sites may be advantageous in promoting increases in reproductive effort at those sites. 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 disturbance issues.

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 initiation of soft releases for razorback sucker, will be evaluated annually and changes made to subsequent stockings and production protocols in order to expedite recovery.

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**Appendix A. Razorback sucker stocked into the San Juan River 2011.** \*details of NAPI stocking dates and numbers covered under a separate NAPI 2011 report.

<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>
Mar. 1	Xyr tex	2007	<b>348</b>	462	PIT	A-RM 0.1	Hard	Uvalde age-4
Oct. 18	Xyr tex	2009	<b>1,712</b>	365	PIT	166.6	Soft	Uvalde age-2
Oct. 25	Xyr tex	2009	<b>1,724</b>	366	PIT	A-RM 1.0	Soft	Uvalde age-2
Oct. 28	Xyr tex	2009	<b>1,713</b>	373	PIT	186.7	Soft	Uvalde age-2
Nov. 3	Xyr tex	2009	<b>1,715</b>	357	PIT	166.6	Soft	Uvalde age-2
Nov. 8	Xyr tex	2009	<b>1,593</b>	379	PIT	A-RM 1.0	Soft	Uvalde age-2
Nov. 15	Xyr tex	2009	<b>1,291</b>	393	PIT	166.6	Soft	Uvalde age-2
Nov. 22	Xyr tex	2009	<b>1,282</b>	394	PIT	A-RM 1.0	Soft	Uvalde age-2
Aug. 25- Oct. 26	Xyr tex	2008/2009	<b>7,452</b>	343	PIT	196.1-147.9	Hard	NAPI age-2 or 3*

**2011 RBS Stocking Totals = 18,830**

## Appendix B. Yearly summary of razorback sucker stocked into the San Juan River, 1994-2011

Year	Total number of razorback sucker stocked (Sizes of fish stocked)
<b>Experimental Stocking Study: 1994-1996 (n= 942 fish stocked)</b>	
1994	<b>688</b> (Mean TL =251 mm; Range = 100-446 mm TL)
1995	<b>16</b> (Mean TL = 424 mm; Range = 397-482 mm TL)
1996	<b>238</b> (Mean TL = 336 mm; Range = 204-434 mm TL)
<b>Five-Year Augmentation Effort: 1997-2001 (n= 5,890 fish stocked)</b>	
1997	<b>2,883</b> (Mean TL = 192 mm; Range = 104-412 mm TL)
1998	<b>1,275</b> (Mean TL = 250 mm; Range = 185-470 mm TL)
1999	<b>0</b> N/A
2000	<b>1,044</b> (Mean TL = 214 mm; Range = 111-523 mm TL)
2001	<b>688</b> (Mean TL = 410 mm; Range = 288-560 mm TL)
<b>Interim Stocking Years: 2002-2008 (n= 52,084 fish stocked)</b>	
2002	<b>140</b> (Mean TL = 319 mm; Range = 110-470 mm TL)
2003	<b>887</b> (Mean TL = 327 mm; Range = 100-495 mm TL)
2004	<b>2,988</b> (Mean TL = 353 mm; Range = 225-559 mm TL)
2005	<b>1,996</b> (Mean TL = 355 mm; Range = 223-534 mm TL)
2006	<b>18,793</b> (Mean TL = 265 mm; Range = 68-537 mm TL)
2007	<b>22,836</b> (Mean TL = 268 mm; Range = 110-573 mm TL)
2008	<b>4,444</b> (Mean TL = 307 mm; Range = 225-390 mm TL)
<b>Eight-year Augmentation Effort: 2009-2016 (n= 55,733 fish stocked to date)</b>	
2009	<b>8,418*</b> (Mean TL = 412 mm; Range = 136-560 mm TL)
2010	<b>28,485</b> (Mean TL = 417 mm; Range = 222-575 mm TL)
2011	<b>18,830</b> (Mean TL = 363 mm; Range = 208-540 mm TL)
<b>TOTAL: 1994-2011</b>	<b>114,649</b>
* 4,021 razorback sucker stocked in Feb. 2010 are part of the 2009 stocking effort but are tallied in the 2010 stocking totals.	