Public Service Company of New Mexico (PNM) Fish Passage Facility

2013

Annual Report

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To:
The San Juan River Basin Recovery Implementation Program

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Executive Summary

- PNM fish passage was operated for 200 days between April 1 and October 25, 2013
- 14,418 fishes were captured in the fish passage
    - 14,287 native fish were captured and transported upstream of the weir
        - 80 Colorado pikeminnow ranging in size from 121-636 mm TL
        - 39 razorback suckers ranging in size from 300-592 mm TL
    - 131 non-native fishes were captured and removed from the river

INTRODUCTION

The federally endangered razorback sucker (*Xyrauchen texanus*) and Colorado pikeminnow (*Ptychocheilus lucius*) are the focus of recovery efforts within the San Juan River Basin Recovery Implementation Program (SJRRIP). The decline in abundance of endangered fishes in the San Juan River is thought to be a function of altered flow regime, loss of physical habitat through water development, and negative interspecific interactions from introduced, non-native species (SJRRIP 2010, Brooks et al. 2000). For over a decade, management efforts aiming to recover the two endangered species have included large scale non-native fish removals, operation of Navajo dam to mimic a natural hydrograph, range expansion resulting from fish passage structures, and large scale endangered fish augmentation. These efforts have primarily been focused between river mile (RM) 180 (the confluence with the Animas River, New Mexico) downstream to RM 0 (Near Piute Farms, Utah). At river mile 0, a large waterfall created an upstream barrier separating the San Juan arm of Lake Powell from the San Juan River and at RM 166.6 a river-wide weir obstructs movement upstream except during high flow events and when the Public Service Company of New Mexico (PNM) fish passage is in operation.

This river-wide obstruction at RM 166.6, a 3.25’ diversion dam (weir) constructed in 1971, transects the entire width of the San Juan River, near Fruitland, NM. This weir includes a concrete barrier, a series of screened intake structures, an intake channel, a settling channel, and a pump house, which impede the ability of native and endangered fishes to move upstream (BOR 2001). Studies have shown that some upstream movement could likely occur when flows reach 7,000 cfs or greater; however, flows of this magnitude are relatively rare (BOR 2001). The weir diverts water to be used at the nearby San Juan Generating Station, and fish passage is needed to allow native fishes access to habitats above this diversion during critical periods (i.e.,

reproductive periods) and for refugia and foraging habitat. Adult monitoring upstream of the weir has continued to show use by endangered and other native fishes. Non-native species, particularly channel catfish, have lower densities in this reach than other reaches (Ryden 2009). For these reasons, selective passage at the PNM weir is important for the overall recovery of the San Juan River endangered fishes.

METHODS

The Navajo Nation Department of Fish and Wildlife is responsible for the operation of the PNM fish passage under the guidance and direction of the SJRRIP. The passage is operated seven months of the year (April through October), seven days a week. Generally, the passage is operated and fishes processed at approximately 11:00 am each day, thus the passage is set to capture fish over an approximate 24-hour period. There are two entrapment bays; however, only one bay is normally used. If there is a high density of fishes then both bays can be operated.

Water intake is controlled by a mechanical gate on the upstream end of the entrapment facility. The gate is opened as far as needed to allow the maximum amount of water through the facility that the river is able to provide at any given time. We try to maintain flow through the passage that consistently supplies enough volume to provide an adequate "cue" for fishes to find the passage entry from the river. Once fishes move up the 400 foot artificial passage, they enter an upstream angled grate, with an opening of approximately 5 inches. Once they have passed through this grate, fish are trapped in a concrete basin between a ¾" sieve at the upstream end and the angled grate at the downstream end, which is designed in a manner so fish cannot find the opening while having to swim in an upstream direction against the current.

The water intake control gate is closed prior to netting the captured fishes, thereby de-watering the basin for ease of capture. A large crane-mounted net is lowered into the capture basin while

fish are dip-netted and placed into the large crane net. Once all fishes have been collected from the basin, they are hoisted and placed in a holding table with 8” of water for processing. The passage and all sieves, gates and basins are then cleared of any debris.

All fishes captured are identified to species and enumerated. Endangered fishes (Colorado pikeminnow and razorback sucker) are measured for total length (TL - mm), standard length (SL - mm), and weight (WT - grams). They are scanned for a PIT tag and if a code is not found, a 134.2 kHz Passive Integrated Transponder (PIT) tag is implanted. All other native and non-native fishes are only enumerated and recorded. When all native fishes have been processed they are released into a 200 gallon holding tank and flushed through an eight inch PVC pipe that directs them upstream of the PNM weir. A minimum wait of 15 to 20 minutes is generally implemented before opening the water control gate to minimize the event of any stressed/exhausted fishes, which have just been released, potentially being swept into the upstream end of the passage and being held upon the ¾” sieve by the current. Non-native fishes are weighed and measured and removed from the river. If large numbers of catfish are captured, they are stocked into one of the Navajo Nation recreational fishing lakes or donated to local people for food.

RESULTS

During operation of the fish passage, 14,418 fishes were captured (Table 1). Of these, the majority were native (14287; 99.1%) and very few were non-native (131; 0.9%). Six species of native fishes were captured along with nine non-native species. Bluehead suckers (9254) were the most abundant species captured, followed by flannelmouth suckers (4871). One roundtail chub was captured at the facility in 2013, which is the first encounter over the entire operation

period of the fish passage. The individual was PIT tagged and data were collected before it was returned to the river.

Table 1. Native and non-native species captured at the PNM fish passage by month in 2013.

Species	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Total**
Native								
Bluehead sucker	606	3237	4214	749	389	57	2	9254
Flannelmouth sucker	525	725	2271	413	803	105	27	4871
Razorback sucker	27	3	1	1	1	2	4	39
Colorado pikeminnow	0	2	15	23	36	4	0	80
Mottled sculpin	0	2	0	0	0	0	0	2
Roundtail chub	0	0	0	1	0	0	0	1
					Native Fish Total:			14,287
Non-native								
Channel catfish	0	3	2	2	1	6	0	14
Black bullhead	0	1	21	11	26	1	1	61
Brown trout	4	11	0	1	0	0	0	16
Common carp	0	2	3	0	1	0	1	7
White sucker	1	1	6	2	0	0	1	11
Green sunfish	0	0	5	8	0	2	0	15
Rainbow trout	0	0	0	0	0	0	0	0
Largemouth bass	0	0	1	0	2	2	0	4
Bluegill	0	1	1	1	0	0	0	3
					Non-Native Fish Total:			131

High capture rates of native fishes were observed during the initial opening of the passage and during periods that corresponded with the descending limb of a high flow event (Figure 1). The highest capture event occurred following the peak of spring runoff in early June. Razorback suckers were primarily captured in April and May (Figure 2) although three individuals were captured in October. These individuals were from stocking events that occurred in 2013 at or near the fish passage.

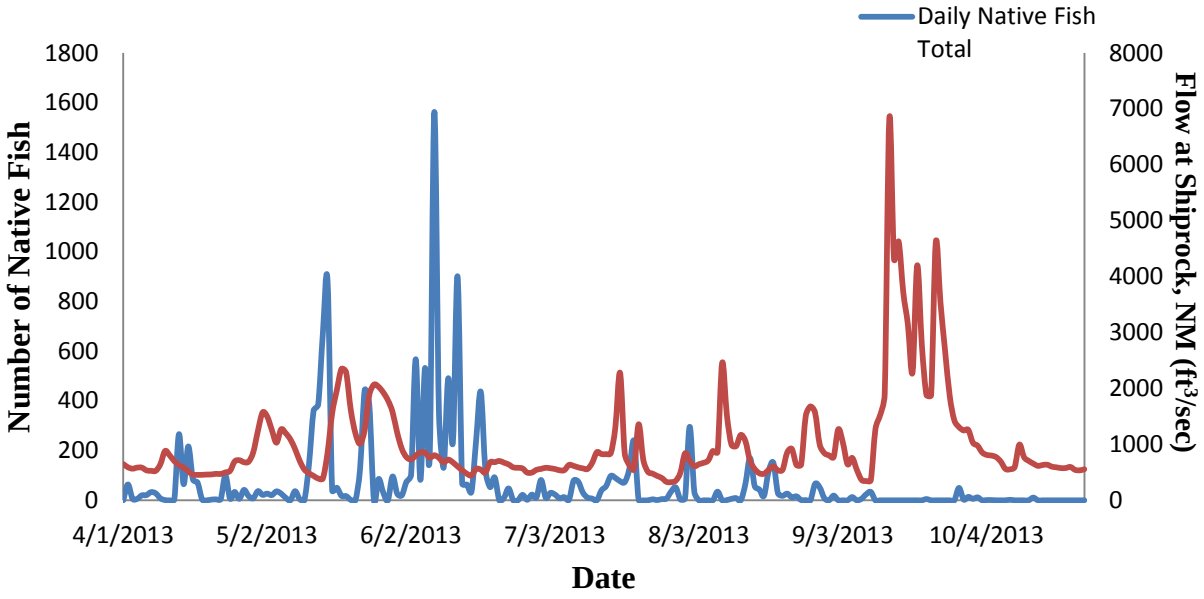

Figure 1. Daily total for native fishes captured in the PNM fish passage in 2013 along with the corresponding hydrograph for the San Juan River at Shiprock, NM.

Of the non-native fishes captured, black bullheads were the most common making up almost half of the total number of non-native fishes captured in 2013 (Table 1). Since 2010, bullhead (*Ameiurus spp*) captures have increased. Yellow and black bullheads were combined due to difficulty in identifying the two species and the likely possibility of technicians misidentifying. Bullheads made up 16% of non-native fishes capture in 2010 and only 2% of

captures in 2011. The proportion of non-native fishes that were bullheads increased drastically in 2012 to 52%. This trend continued in 2013 with bullheads making up 46% of the non-native fish captures.

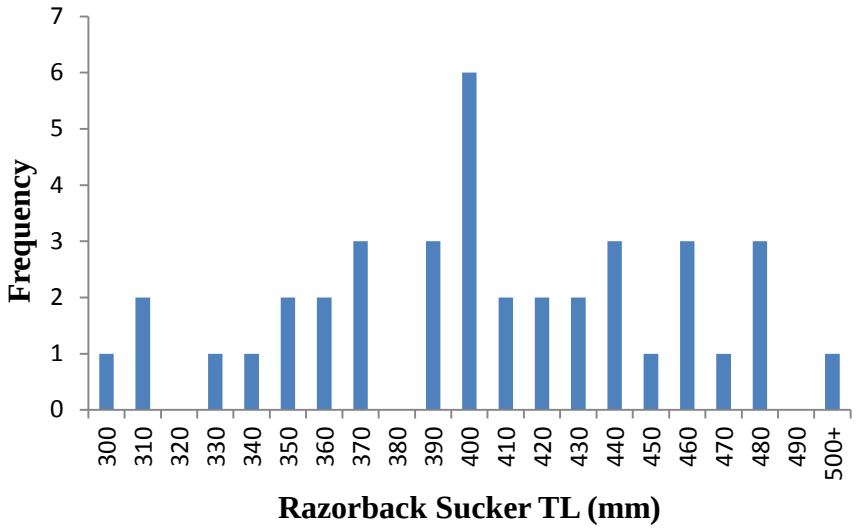

Figure 3. Length frequency histogram for razorback suckers captured at the PNM fish passage in 2013.

Razorback Suckers

There were 39 razorback suckers captured during the operation of the fish passage in 2013 and only one fish was not a recapture. The majority of the razorback suckers were between 350-449 mm TL, but spanned the range of 300-592 mm (Figure 3). The majority of razorback suckers captured in 2013 (82%) were from stocking at the PNM weir in 2012 (Figure 4). Four razorback suckers originated from stocking in the Animas River in 2012 and one was stocked into the Animas in 2011. The majority of stocked fish were reared in the NAPI ponds and the majority of those fish came from Hidden Pond (Figure 5). Razorback suckers in spawning condition (ripe and tuberculated) were observed from April 10 to April 23. Two ripe females were captured on April 20 and April 23.

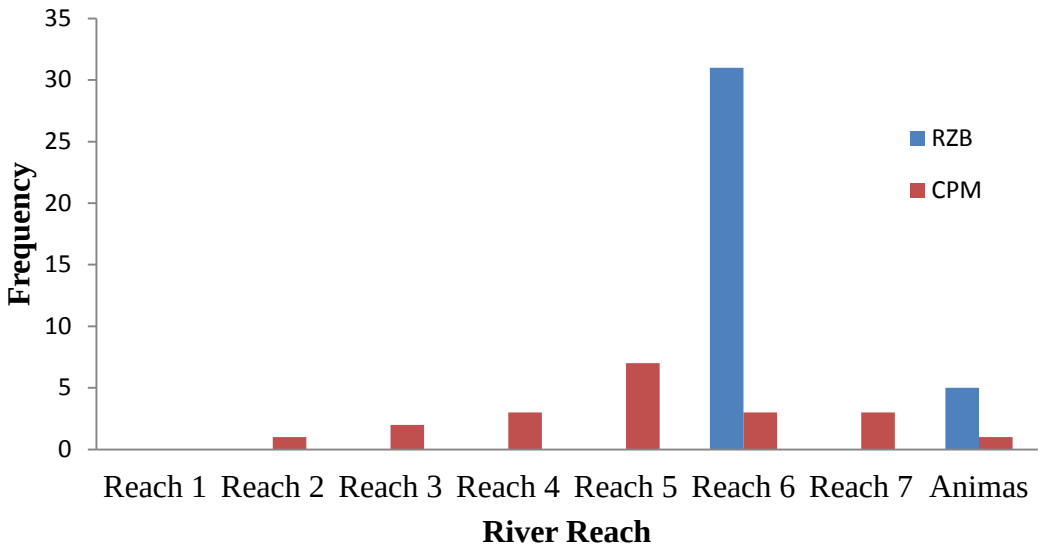

Figure 4. Frequency of endangered fishes captured at the PNM fish passage and the corresponding river reach in which they were first encountered or stocked. PNM fish passage is located in Reach 6.

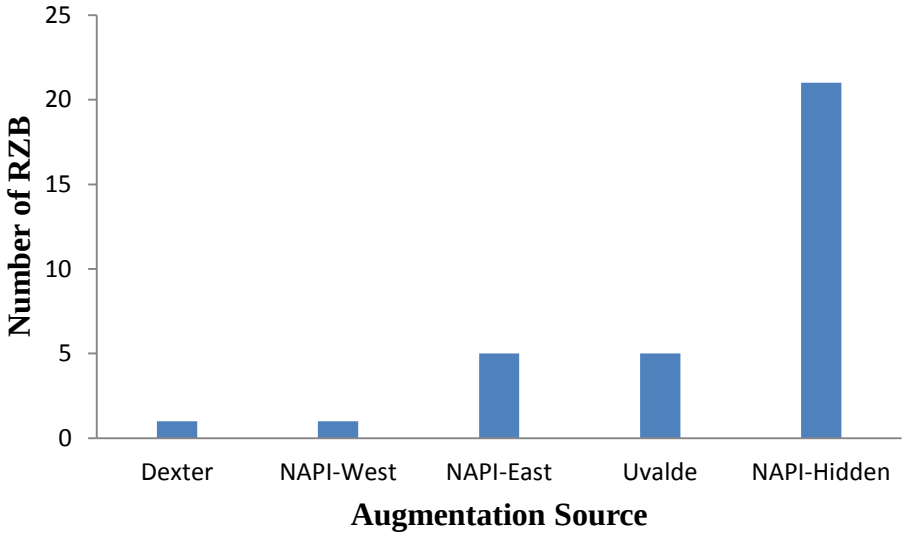

Figure 5. Rearing facility of origin and frequency razorback suckers captured at the PNM fish passage in 2013.

Colorado Pikeminnow

A total of 80 Colorado pikeminnow were captured during the 2013 season, of which 57 fish had not been previously captured. All untagged fish were implanted with P.I.T. tags. Pikeminnow ranged in size from 121 mm and 636 mm TL. The majority of pikeminnow were between 300-400 mm TL (Figure 6) and most were captured in July and August with relatively few captures in other months (Table 1).

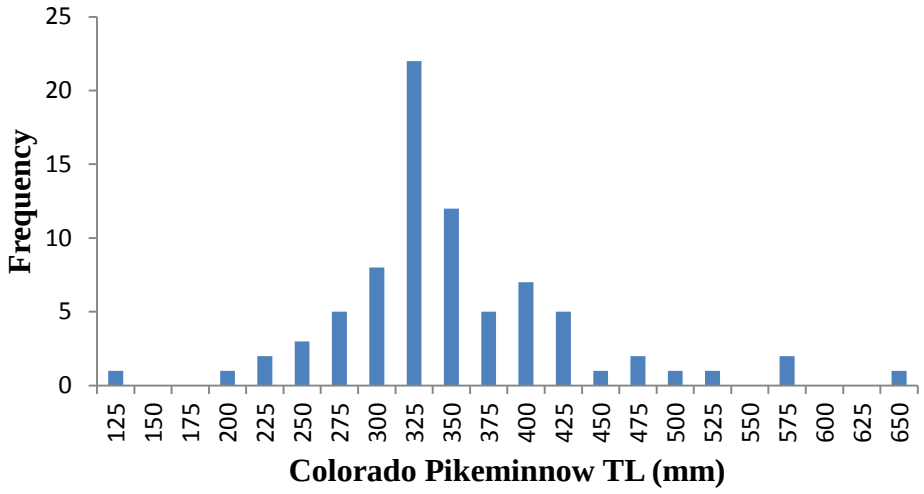

Figure 6. Length-frequency histogram for Colorado pikeminnow captured at the PNM fish passage in 2013

Colorado pikeminnow captured in 2013 were first encountered throughout the river except in Reach 1 (Figure 4). The majority of the pikeminnow captured in 2013 were first encountered in reaches 4, 5, and 6. One individual pikeminnow was captured twice at the passage in 2011 and was captured again in 2013 and another individual was captured twice at the passage in 2013.

DISCUSSION

During its operation in 2013 the fish passage was successful in allowing upstream movement of native fishes. More fishes were captured at the fish passage in 2013 than were captured in 2012, although the passage was closed after July 8th in 2012. Slightly fewer fish were captured in 2013 than were captured in 2010 even though the passage was not opened until June 1st in 2010. Capture rates in 2011 were over double of those in both 2012 and 2013.

More razorback suckers were captured in 2013 than were captured in 2012. This is at least partially due to the fact that the passage was operated for the entire season in 2013. An equal number of razorback suckers were captured in 2013 and 2011, with equal effort. More Colorado pikeminnow were captured in 2013 (80) than were captured in 2012 (19), again due to the lack of operation after July in 2012. The number of Colorado pikeminnow captured in 2013 (80) was significantly less than the number captured in 2011 (700). With the limited data and varying effort from year to year, it is difficult to find meaningful trends.

One variable that may be affecting capture rates from year to year is spring flow. When analyzing daily capture rates of native fishes compared to San Juan River flow, it appears that fish movement through the passage is closely tied to spring peak runoff (Morel 2012; Cheek 2013). The magnitude of peak runoff may correspond to the number of fish moving through the passage facility. More data are needed to assess this hypothesis, but with consistent operation of the facility it may be possible.

It is encouraging that few non-native species were captured at the passage facility in 2013, although this may be a product of inefficient operation during the monsoon season. In 2013, monsoon flooding occurred with high flows in August and September. Monsoon flows carry heavy loads of debris that make the passage difficult to operate. When the debris load in

the river is high, screens in the passage become clogged and do not allow water to pass through the facility. Screens are cleaned daily, but during the 2013 monsoon, screens clogged over night. Once the screens are clogged there is little water entering the passage which makes it difficult, if not impossible, for fish to move through the passage canal. The timing of the monsoon season also coincides with the time of year that non-native captures have historically been the greatest (Morel 2011; Morel 2012). This could partially explain the low number of non-native fishes and specifically the low number of channel catfish. Although non-native captures may have been decreased due to high debris load in the river, non-native captures have been low since 2010 (<200).

To alleviate the issue of clogging screens in 2014, we will explore options for minimizing the amount of debris that is entrained in the passage. We will accomplish this by installing a trash log upstream of the passage to deflect as much debris as possible. We will also retrofit the existing screens with punch plate which may limit the amount of debris that gets caught in the screen. Lastly, we will repair the west gate that has been out of operation since 2010. This will allow for the operation of two capture basins and increase the volume of water that flows through the facility.

In 2014, operation of the PNM fish passage will also include the use of a remote PIT tag antenna in the passage canal. The antenna will allow us to evaluate the efficiency and timing of the passage operation. In 2013, it was observed that razorback suckers were captured early in the season indicating that there may be some razorback suckers and other native fishes that are attempting to use the passage facility prior to the opening of the facility in April. The passive antenna will allow us to determine when the passage should be opened and how many fish are

using the channel but not captured in the basin and subsequently not being released upstream of the weir.

Overall the 2013 season showed some encouraging signs of success for the recovery efforts. In the future the Navajo Nation will work to aid in recovery efforts through operation of the fish passage and will continue to improve our operating procedures. In the 2014 season we will make the following adjustments:

1. Evaluate operation period and efficiency of the PNM fish passage with stationary PIT tag antennae
2. Replace gate lifts and explore options to minimize clogging of screens with debris.
3. Explore other types of data that can be collected at the passage that will aid in recovery efforts.
4. Attempt to locate data prior to 2010 to assess patterns in capture rate and spring peak flows.

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