

Public Service Company of New Mexico (PNM) Fish Passage Facility
2010
Annual Report



Submitted By:

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To:

The San Juan River Basin Recovery Implementation Program

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INTRODUCTION

Razorback sucker (*Xyrauchen texanus*) and Colorado pikeminnow (*Ptychocheilus lucius*) are the two endangered fishes found in the San Juan River. The decline in abundances of all native 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 these two endangered species have included large scale non-native fish removals, operation of Navajo dam to mimic a natural hydrograph, 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 at high flow events and when the Public Service Company of New Mexico (PNM), fish passage is in operation.

This river wide obstruction, a 3.25' diversion dam (weir) constructed in 1971, transects the entire width of the San Juan River, near Fruitland, NM at river mile (RM) 166.6. 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 that reach 7,000 cfs 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 fishes and other native fishes. Non-native species, particularly channel catfish, have lower densities in this reach than other reaches (Ryden 2009). These factors, along with increased efforts for recovery river-wide, provide increased opportunities for the overall recovery of the San Juan River endangered fishes.

METHODS

The NNDFW 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 fish 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 than 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 flow through the facility that the river is able to provide at any given flow. We try to maintain flow through the passage that consistently supplies enough volume to provide an adequate “cue” for fish to find the passage entry from the river. Once fishes move up the 400 foot artificial ladder, 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 $\frac{3}{4}$ ” 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, as to de-water the basin for ease of capture. A large crane-mounted net is lowered into the capture basin while fishes 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 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 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, of

potentially being swept into the upstream end of the passage and being held upon the $\frac{3}{4}$ " sieve by the current.

RESULTS

Prior to new management beginning in June 2010, electronic data entry was inconsistent and a loss of data prior to June does not allow for analysis over the first two months of operation. Currently, there is no synthesis of data from previous years to compare what we might have expected to catch. However, personal communication with technicians that have operated the passage in previous years indicates that low catch rates are typical in the first two months of operation compared to other months, especially for Colorado pikeminnow and channel catfish.

Native Species

Bluehead suckers moved through the passage at higher numbers earlier in the season (June and July), but flannelmouth suckers reached higher densities in the later part of the operating season (August and September) (Table 1). The catch for razorback suckers was relatively low (n=31) for confidently identifying seasonal trends, however, catch rates trended toward fewer captures from July through October. Colorado pikeminnow captures peaked in July and August, and only a relatively low number of individuals were caught in other months. Through personal communication with members of SJRRIP, the number of pikeminnow captured in 2010 (n=87) was much higher than any other year of passage operation, which is encouraging. Further analysis of previous years' data to verify this is forthcoming.

Speckled dace were initially counted and recorded at the fish passage, hence inclusion in Table 1; however, they are not selective to the passage as they have the ability to move in or out of the capture basin through grates. Therefore, it was concluded that speckled dace (and other small-bodied fish) would not be considered and enumerated during passage operation after June.

Non-native Species

Eight non-native species were captured over the 2010 operating season at the fish passage facility (Table 1). Essentially, all non-native captures (except for 2) occurred in June, July, and August, whereas the remaining months of operation show mostly native fish captures. The very

low total for non-natives fishes (n=105) is encouraging. Also, only a few channel catfish (n=26) and common carp (n=4) were captured. Brown trout occurred second most frequently (n=25) and were captured in June and July, presumably a function of being displaced downstream during spring run-off. Yellow bullhead and White sucker both occurred relatively frequently and personal communication with various SJRRIP members suggest the numbers of these two species are generally increasing in occurrence. Again, previous fish passage data will need to be analyzed to verify this. Other non-native fishes (largemouth bass, green sunfish, and black bullhead) were found in extremely low numbers, generally ≤ 10 individuals.

Table 1. 2010 PNM Fish Passage Captures by Species - June 1 through October 31

Species	June	July	Aug	Sept	Oct	TOTAL
<i>Native</i>						
Colorado Pikeminnow (<i>Ptychocheilus lucius</i>)	8	43	35	1	0	87
Razorback Sucker (<i>Xyrauchen texanus</i>)	16	3	5	4	3	31
Flannelmouth Sucker (<i>Catostomus latipinnis</i>)	1006	598	5649	1865	916	10034
Bluehead Sucker (<i>Catostomus discobolus</i>)	2162	1864	808	209	116	5159
Speckled Dace (<i>Rhinichthys osculus</i>)	201					201
					<i>Native Total</i>	15512
<i>Non-native</i>						
Channel Catfish (<i>Ictalurus punctatus</i>)	2	2	22	0	0	26
Common Carp (<i>Cyprinus carpio</i>)	2	0	1	1	0	4
Yellow Bullhead (<i>Ameiurus natalis</i>)	4	7	3	0	0	14
Black Bullhead (<i>Ameiurus melas</i>)	0	2	1	0	0	3
Green Sunfish (<i>Lepomis cyanellus</i>)	2	3	5	0	0	10
White Sucker (<i>Catostomus commersonii</i>)	6	5	4	0	0	15
Largemouth Bass (<i>Micropterus salmoides</i>)	2	5	0	1	0	8
Brown Trout (<i>Salmo trutta</i>)	16	9	0	0	0	25
					<i>Non-Native Total</i>	105

Razorback Sucker

There were 31 total captures of razorback suckers. Two individuals were “first encounters” and each individual was PIT tagged at the passage upon capture. These fish had a total length of 386 and 400. Twenty-six razorback suckers were “first captures” (first capture since stocking); and three were “recaptures” (captured in the river previously and recorded). Of the 26 “first captures” all fish were NAPI reared fish and had been stocked at river mile 166.6, except for one individual which had been stocked at river mile 147.9 (Table 2).

Table 2. Capture History of “First Captures” for 2010 PNM Fish Passage

NAPI Stocking Year	Year Class	Number of Fish
2010	2008	6
2009	2007	19
2008	2006	1

Of the three recaptures, two were NAPI reared fish that had been captured at RM 149.0 and 163.7 in March and April of the same year, respectively. The third was first captured (also first encounter) at RM 121 in July of 2007. There were no fish captured at the passage facility in 2010 that had been captured at the passage anytime previously. There were two fish that were captured at the passage and then subsequently captured downstream during removal and monitoring efforts.

Colorado Pikeminnow

There were 87 total Colorado pikeminnow captures; 55 individuals were “first encounters”, 1 “first capture”, and 31 recaptures. Of the 55 “first encounters”, TL ranged from 186 to 510mm and were broken up proportionately as: 186-300mm (n=38, 70%), 300-400mm (n=14, 25%), and >400mm (n=2, 4%). The “first capture” individual was stocked at RM 133.3 in March of 2009 (2006 year class) and captured at PNM in July 2010.

Recaptured individuals had no capture history of ever moving through and being detected at the passage previous to their capture in 2010. Twelve of the recaptures exhibited within-year movements of at least 130 to 145 miles, as they had previously been captured in the lower

reaches of the river in between RM 22 and 33. Very few recaptured individuals had been in the river for longer than one year and most had been in the river less than one year (Table 3). Additionally, the majority of recaptures were first time recaptures, though some exhibited up to six recapture histories (Table 3).

Table 3. Proportion of Recaptures Related to the Number of times Recaptured and Length of Time (Years) in the River.

Proportion of Recaptured fish	Number of Times Recaptured	Proportion of Recaptured fish	Years in River
18	1	22	< 1
8	2	7	> 1
4	3	1	> 2
1	6	1	> 3

DISCUSSION

The PNM fish passage is successful in allowing upstream movement for all native fishes encountered at the passage. The low number of non-native fish captures in 2010 is encouraging, as well as the higher than normal occurrences of endangered fishes. It is difficult to tease any meaningful trends from one season’s worth of data; however, we anticipate collecting additional data in 2011 and future operating seasons to further develop the capacity to identify important information aiding in recovery efforts.

The fish passage offers a unique opportunity to collect data and discover trends that otherwise may not be able to be identified by other methods. Having a constant spatial and temporal effort of sampling allows us to track capture trends as they relate to changes in other environmental variables such as water temperature, flow, turbidity, seasonality, etc., with much more confidence relative to data collected that require incorporation of spatial variability. During the 2011 operating season, we anticipate collecting these types of data to integrate into a broader and more detailed analysis, as well as re-visiting historic data that have been collected since initial operation of the passage facility.

Capture trends in 2010 indicate encouraging signs of success for overall recovery efforts and the Navajo Nation will continue to strive to aid in recovery efforts through operation of the fish passage. However, we do feel there is always room for improvement and under new NNDFW management we will make adjustments to current protocols and management, as well as exploring potential useful data to collect. Some of these to be included in the future are:

- 1) Consistency of data entry in electronic form, including a standard protocol for backing up data.
- 2) Develop a protocol for passage operation including:
 - a. Consistency in all data collection, controlling water moving through passage, and maintenance of day to day passage gates/sieves.
 - b. Develop fish key for technicians to accurately identify all species.
- 3) Develop new methods of analysis for relating capture trends to water temperature, turbidity, and flow.
- 4) Collect biological data on nonnative fishes, such as pectoral spines and otoliths for aging, gonadal samples for reproductive condition, and stomach content analysis for prey consumption.

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