

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

2012

Annual Report



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April 23, 2013

To:
The San Juan River Basin Recovery Implementation Program

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Executive Summary

- PNM fish passage was operated for 71 days between April 2 and July 8, 2012
- 9480 fish were captured in the fish passage
 - 9338 native fish were captured and transported upstream of the weir
 - 19 Colorado pikeminnow ranging in size from 185-550 mm TL
 - 26 razorback suckers ranging in size from 290-490 mm TL
 - 25 razorbacks were recaptures, two of which were captured in Lake Powell in 2011
 - 137 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 $\frac{3}{4}$ ” 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, 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 fish 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 fish are only enumerated and recorded. When all native fish 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 3/4” sieve by the current. Non-native fish 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

The passage was operated for a total of 71 days between April 2, 2012 and July 8, 2012. From April 21st to May 1st the passage was operated non-selectively. During that period the capture gates and water control gates were left open to accommodate the flushing of a sandbar that develops upstream of the inflow and within the capture basin. Funding issues also limited the ability of personnel to operate the passage daily. The passage was closed from May 26 to June 5 under direction from the SJRIP. The passage was not operated from July 3rd to July 5th

in order to make repairs to the inflow gate. The passage was closed early on July 8th due to lack of personnel and lack of funding and remained closed for the remainder of the season.

Table 1. Native and Non-native species captured at the PNM fish passage by month in 2012.

Species	April	May	June	July	Total
<i>Native</i>					
Bluehead sucker	796	1895	2738	493	5922
Flannemouth sucker	1561	1045	480	285	3371
Razorback sucker	13	13	0	0	26
Colorado pikeminnow	0	4	14	1	18
			Native Total		9338
<i>Non-native</i>					
Yellow bullhead	1	49	3	5	58
Channel catfish	0	0	30	3	33
Black bullhead	0	0	13	0	13
Brown trout	8	2	0	1	11
Common carp	0	0	5	2	7
White sucker	2	3	0	1	6
Green sunfish	0	0	3	0	3
Rainbow trout	1	1	0	0	2
Largemouth bass	0	0	2	0	2
Bluegill	0	0	2	0	2
			Non-native Total		137

During operation of the fish passage, 9475 fishes were captured (Table 1). Of these, the majority were native (9338; 98.6%) and very few were non-native (137; 1.4%). Four species of native fishes were captured along with 10 non-native species. Bluehead suckers (5922) were the most abundant species captured followed closely by flannemouth suckers (3371). Flannemouth

suckers were captured in the highest densities as soon as the passage was opened in April, whereas bluehead suckers increase in abundance in May and June (Table 1). 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).

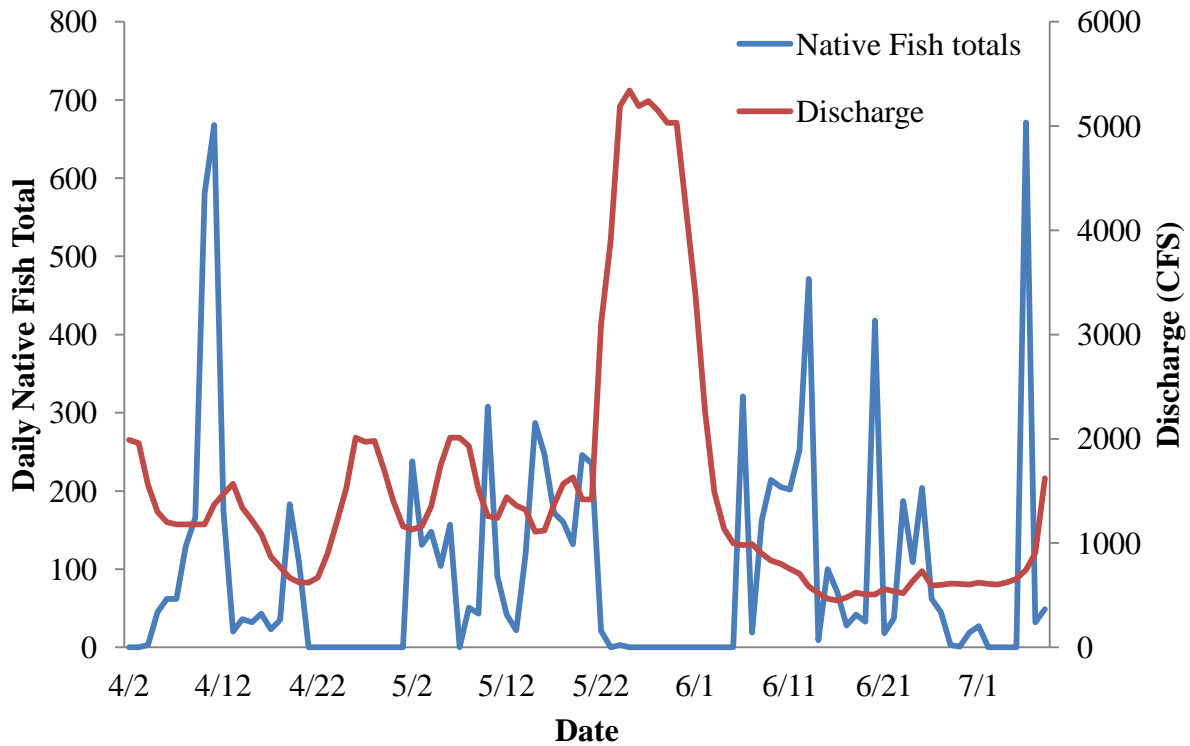


Figure 1. Daily total for native fishes captured in the PNM fish passage in 2012 along with the corresponding hydrograph for the San Juan River.

Of the non-native fishes captured, yellow bullheads (58), channel catfish (33), and black bullheads (13) were the most common (Table 1). All yellow bullheads were captured in May and all black bullheads were captured in June. Channel catfish were captured in highest frequency in June. Increased capture rates of non-native fishes were observed in May and June due to the high

capture of yellow bullhead and channel catfish. Neither high capture event seemed to correspond with the ascending or descending limb of a high flow event (Figure 2).

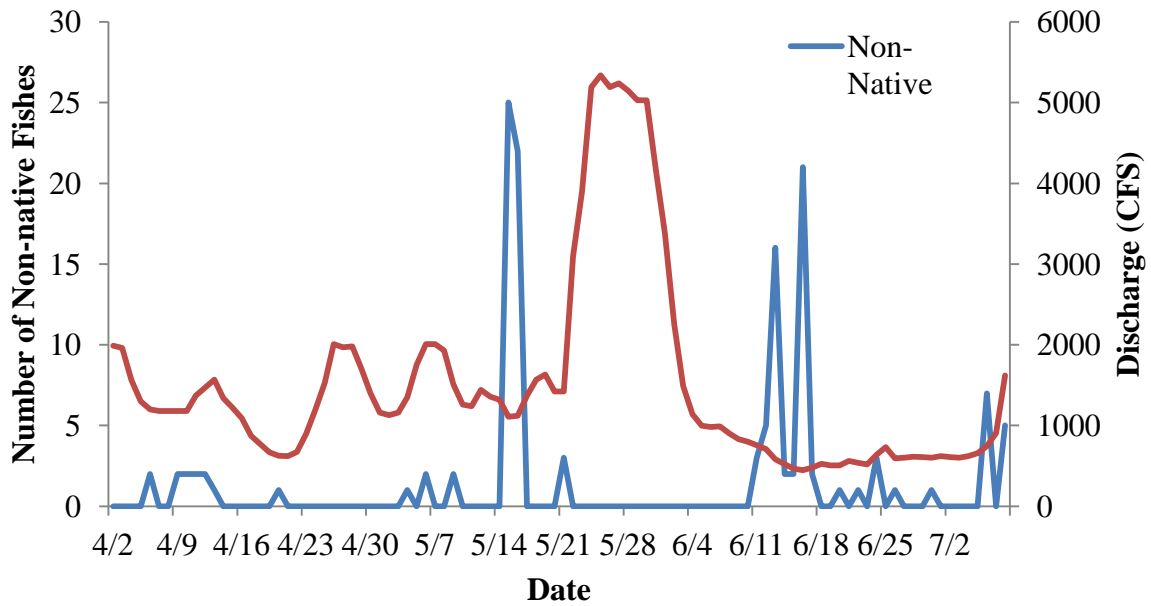


Figure 2. Daily total for non-native fishes captured in the PNM fish passage in 2012 along with the corresponding hydrograph for the San Juan River

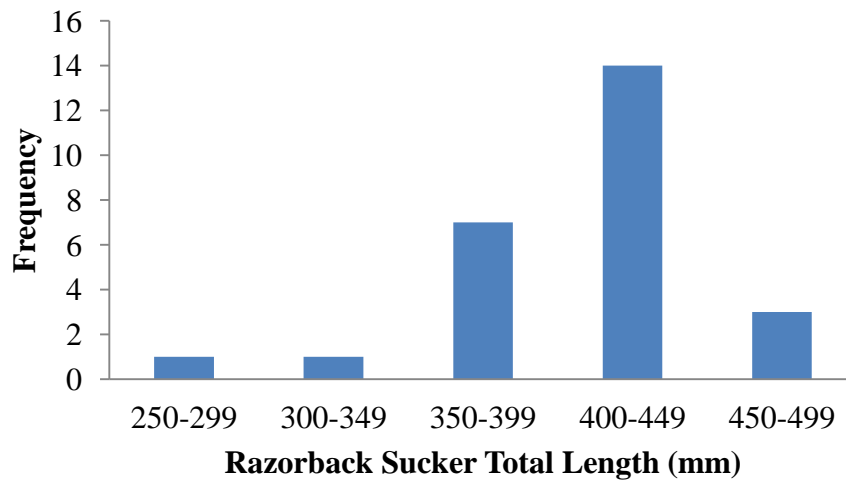


Figure 3. Length frequency histogram for razorback suckers captured at the PNM fish passage in 2012.

Razorback Suckers

There were 26 razorback suckers captured during the operation of the fish passage in 2012 and only one fish was not a recapture. The majority of the razorback suckers were between 350-449 mm TL (Figure 3). All razorbacks were captured in April and May (Table 1). The PIT tag data showed that all but one of the razorback suckers captured at the fish ladder in 2012 were from stocking that occurred in Reach 6 and 7 (Figure 5). The majority of stocked fish were part of the 2009 cohort stocked by Uvalde in October 2011 at the PNM weir (Figure 4). The only fish that was in the stocking records was first captured in Lake Powell at river mile -29.4 in June of 2011. The other razorback sucker was stocked in 2007 at the hogback diversion (RM 158.6), recaptured in Lake Powell in 2011, and passed through the fish passage in 2012. This individual traveled at least 538 km to make the trip to Lake Powell and back to the fish passage over a five year period.

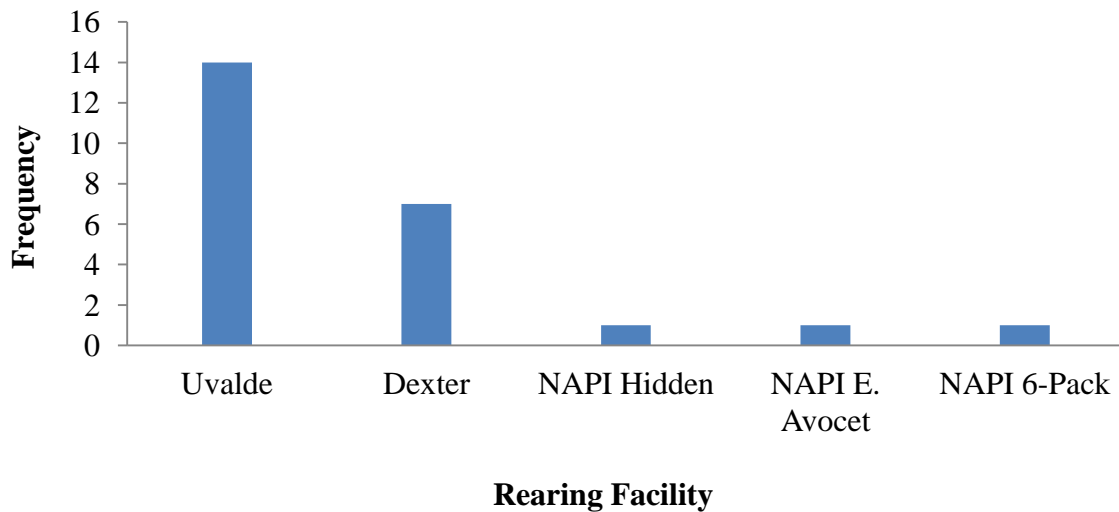


Figure 4. Rearing facility of origin and frequency razorback suckers captured at the PNM fish passage in 2012.

Colorado Pikeminnow

A total of 19 Colorado pikeminnow were captured during the 2012 season, of which 12 fish had not been previously captured. All untagged fish were implanted with P.I.T. tags. The majority of recaptured Colorado pikeminnow were first encountered in Reaches 5, 6, and 7, near the passage (Figure 5). Two individuals captured at the passage were first encountered in reach 2 and 3, moving upstream from river miles 22.5 and 103. Pikeminnow ranged in size from 185 mm to 550 mm TL. The majority of pikeminnow were between 250mm and 349 mm TL (Figure 6) and most were captured in June, with relatively few captures during the other months (Table 1).

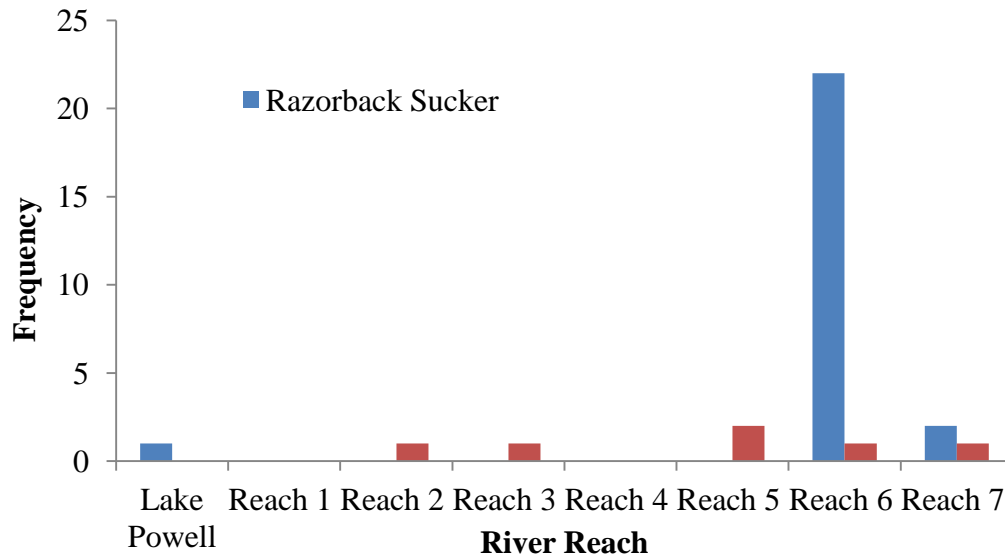


Figure 5. Frequency of endangered fish captured at the PNM fish passage and the corresponding river reach in which they were first encountered or stocked. PNM fish passage is located in Reach 6.

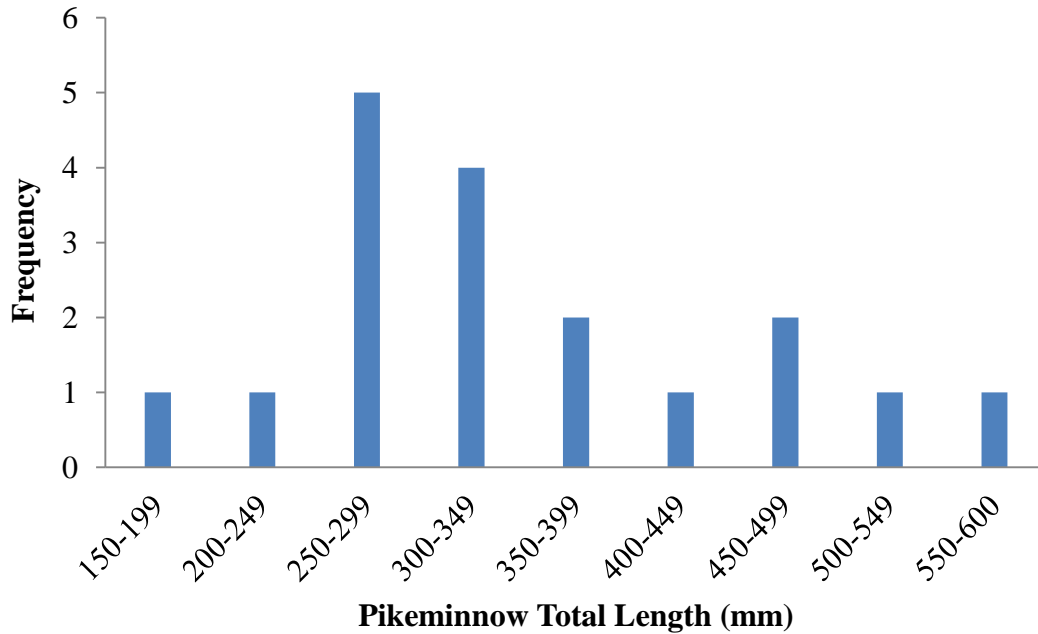


Figure 6. Length-frequency histogram for Colorado pikeminnow captured at the PNM fish passage in 2012

DISCUSSION

During its operation in 2012 the fish passage was successful in allowing upstream movement of native fishes. Fewer fishes were processed than in 2010 or 2011, primarily because of the lack of operation from July to October. With the limited data and varying effort from year to year it is difficult to find meaningful trends. It was encouraging that few non-native species were captured, although this may be a product of not operating during the late season when river temperatures increase and channel catfish are usually most abundant at the passage (Morel 2011; Morel 2012). For both pikeminnow and razorbacks it is encouraging to see multiple length classes including some large individuals (>450mm).

Both razorback suckers and Colorado pikeminnow were less abundant in 2012 than in the previous two years. In 2011, a record number (707) of Colorado pikeminnow passed through the facility, primarily in July and August. Closure of the passage on July 8th greatly lowered numbers

of Colorado pikeminnow (19) in 2012. Razorback sucker numbers were only slightly reduced in 2012 because they tend to be captured in highest frequency during the early months of operation (April and May) with few individuals being captured in later months.

The majority of the razorbacks recaptured at the fish passage in 2012 were stocked from Uvalde and Dexter at the PNM weir in fall of 2011. These fish showed some site fidelity as they were still in the same area the following spring. Two razorbacks suckers and two Colorado pikeminnow showed long distance movement patterns. The razorbacks moved upstream from Lake Powell traversing a waterfall that under normal conditions creates a barrier to fish movement. During a short period of 2011 the waterfall inundated allowing movement of these fish from the lake and back into the river. Movement of endangered fishes between Lake Powell and the San Juan River should continue to be investigated as well as possible ways to allow connection between lake and river populations.

There was a 10-day period in 2012 when the passage was operated “non-selectively” where both the capture gates and sieve were left open. It is impossible to know what data was missed during this period, but more importantly this may have allowed non-native fish to move upstream of the PNM weir. In the future the passage will not be operated in this manner in order to prevent any movement of non-natives through the passage. New protocols are in place that state the front sieve should not be raised while the water control gate is in the open position.

Overall the 2012 season shows 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 2013 season we will make the following adjustments:

1. Data will be digitally entered and backed up on a consistent basis to prevent loss
2. Environmental variables such as temperature, pH, turbidity, and dissolved oxygen will be collected
3. We will explore other types of data that can be collected at the passage and will aid in recovery efforts.

LITERATURE CITED

- Brooks, J.E., Buntjer, M.J., and Smith, J.R. 2000. Non-native species interactions: Management implications to aid in the recovery of the Colorado pikeminnow *Ptychocheilus lucius* and Razorback sucker *Xyrauchen texanus* in the San Juan River, CO-NM-UT. San Juan River Basin Recovery Implementation Program, USFWS, Albuquerque, NM.
- Bureau of Reclamation. 2001. PNM fish passage – Final environmental assessment. Endangered fish passage at the Public Service Company of New Mexico (PNM) diversion dam on the San Juan River. United States Department of Interior – Bureau of Reclamation. Upper Colorado Region, Western Colorado Area Office, Grand Junction Colorado
- Furr, W. D. 2009. San Juan River Razorback Sucker Augmentation 2009 Annual Report. San Juan River Basin Recovery Implementation Program, USFWS, Albuquerque, NM
- Holden, P.B. 2000. Program evaluation report for the 7-year research period (1991-1997). San Juan River Basin Recovery Implementation Program, USFWS, Albuquerque, NM.
- Morel, J. 2011. Public Service Company of New Mexico (PNM) fish passage facility 2010 annual report. San Juan River Recovery Implementation Program, Navajo Nation Department of Fish and Wildlife, Window Rock, AZ.
- Morel, J. 2012. Public Service Company of New Mexico (PNM) fish passage facility 2011 annual report. San Juan River Recovery Implementation Program, Navajo Nation Department of Fish and Wildlife, Window Rock, AZ.
- Ryden, D. R. 2010. Long-term monitoring of sub-adult and adult large bodied fishes in the San Juan River: 2009. San Juan River Basin Recovery Implementation Program, U.S. Fish and Wildlife Service, Albuquerque, New Mexico.
- San Juan River Basin Recovery Implementation Program. 2010. Long-range plan. San Juan River Basin Recovery Implementation Program, U.S. Fish and Wildlife Service, Albuquerque, New Mexico.