RIO GRANDE SILVERY MINNOW

EGG ENTRAINMENT IN

IRRIGATION CANALS DURING 2002

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BUREAU OF RECLAMATION
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INTRODUCTION

Monitoring of the reproductive effort of Rio Grande silvery minnow (silvery minnow) was a requirement of the 29 June 2001 Programmatic Biological Opinion for Water Management on the Middle Rio Grande, New Mexico (U.S. Fish and Wildlife Service, 2001) by the U. S. Fish and Wildlife Service (Service). This work is an effort to document entrainment of the federally endangered silvery minnow in irrigation canals. This study will provide a preliminary assessment of the amount of the silvery minnow entrainment at diversion structures and provide useful information for management decisions.

Spawning appears to occur over about a 1-month period in the late spring-early summer (May-June) (Platania 1995). Spawning coincides with spring runoff in May. Subsequent analysis by Reclamation indicates a narrow time frame for peak spawning of silvery minnows in mid-May (U.S. Bureau of Reclamation, 2002). The majority of spawning individuals are Age 1 fish (1-year old); older and larger Age 2 fish normally constitute less than 10% of the spawning population (Platania 1995). Reproductively mature females are typically larger than males; each female produces several clutches of eggs during spawning (Platania 1995). Age 2 females are more fecund than the smaller Age 1 fish and may ultimately release up to 6,000 eggs (Platania 1995). Following fertilization, the semi-buoyant, non-adhesive eggs drift with the current. Egg hatching time is temperature-dependent and appears to occur in 24-48 hours (more quickly in warmer water) (Platania 1995). Recently hatched larval fish are about 3.7 mm in length, and attempt to escape the river current by swimming vertically in the water column (Platania 1995).

METHODS

Silvery minnow eggs were collected by several agencies (Table 1) at the principal diversion canals, and in the Rio Grande floodway for comparison (Figure 1). Moore Egg Collectors (MEC) were used following the protocol described in Altenbach et al. (2000) to determine the catch rate of silvery minnow eggs passing the study sites. All sites were visited once a day but at different times (sequentially), sampling for two hours each day. If necessary, two MEC's were operated simultaneously to achieve the two-hour sampling time per station per day with less time spent on-site. Mechanical flow meters were attached to each of the MEC's so that volume of water filtered could be determined. Most eggs were returned alive to the Rio Grande or transported to the Albuquerque Aquarium (BioPark) for propagation. Eggs from several sites were preserved to facilitate careful separation from organic debris and hand counting of eggs.

Under Reasonable and Prudent Alternative B in the Biological Opinion (U.S. Fish and Wildlife Service, 2001), the Corps and Reclamation released a volume of Conservation Water to provide a one-time increase in flows (spawning spike) to cue spawning during the 2002 spawning season. The Middle Rio Grande Conservancy District (MRGCD) at the request of the Service increased the diversion at Isleta to facilitate creation of a surge flow below San Acacia Diversion Dam. This spike flow was designed to stimulate silvery minnow spawning in the absence of a normal spring runoff.

Table 1. Study sites for Rio Grande silvery minnow egg entrainment and reproductive effort.

Location	River Mile	Channel Type	Agency
Angostura canal	210	Diversion	US Fish and Wildlife Service
Bernalillo	204	Floodway	US Fish and Wildlife Service
Paseo del Norte	191	Floodway	US Fish and Wildlife Service
Rio Bravo bridge	178	Floodway	US Fish and Wildlife Service
Peralta Canal	169	Diversion	US Fish and Wildlife Service
Highline Canal	169	Diversion	US Fish and Wildlife Service
Socorro Canal	115	Diversion	US Bureau of Reclamation
San Marcial	58	Floodway	American Southwest Ichthyological Research Foundation (ASRIF)

RESULTS

Peak silvery minnow spawning occurred during the spike flow provided by Reclamation and the Corps. No silvery minnow eggs were collected at the Angostura canal (RM 210) or Bernalillo (RM 204) stations during May 2002 (Table 2). There was an increase in the number of silvery minnow eggs in the river in the Angostura to Isleta Reach at the Paseo del Norte (RM 191), and Rio Bravo (RM 178) stations. The Peralta and Highline Canals (RM 169) had higher numbers of silvery minnow eggs than the Socorro Canal (RM 115). Intensive salvage of silvery minnow eggs occurred on May 18th and 19th at San Marcial (RM 58). Eggs collected for reproductive effort study were preserved for later counting (~75,000). Additional samplers were used to collect minnow eggs for salvage, which were transferred to the Albuquerque Biopark for incubation and rearing. The number of eggs salvaged will be reported by the Albuquerque Biopark.

Figure 1. Location of Rio Grande silvery minnow egg sample sites.

Table 2. Number of Rio Grande silvery minnow eggs collected at the river and irrigation canals stations.

	Rio Grande Floodway				Irrigation Canals			
Date	Bernalillo	Paseo del Norte	Rio Bravo	San Marcial	Angostura	Peralta	Highline	Socorro
05/01/02	0	0	0	0	0	0	0	0
05/02/02	0	0	0	0	0	0	0	0
05/03/02	0	0	0	0	0	0	0	0
05/04/02	0	0	0	0	0	0	0	0
05/05/02	0	0	0	0	0	0	0	3
05/06/02	0	0	0	0	0	0	0	3
05/07/02	0	0	0	35	0	0	0	0
05/08/02	0	0	0	0	0	0	0	0
05/09/02	0	0	0	0	0	0	0	1
05/10/02	0	0	0	0	0	0	0	1
05/11/02	0	0	0	4	0	0	0	0
05/12/02	0	0	0	0	0	0	0	0
05/13/02	0	0	0	0	0	0	0	0
05/14/02	0	0	0	0	0	0	0	0
05/15/02	0	34	181	0	0	402	797	0
05/16/02	0	12	93	0	0	323	29	6
05/17/02	0	0	0	721	0	4	0	11
05/18/02	0	0	0	63306	0	0	0	1
05/19/02	0	0	0	11007	0	0	0	2
05/20/02	0	0	0	88	0	0	0	0
05/21/02	0	0	0	0	0	0	0	0
05/22/02	0	0	0	0	0	0	0	0
05/23/02	0	0	0	0	0	0	0	0
05/24/02	0	0	0	0	0	0	0	0
05/25/02	0	0	0	0	0	0	0	0
05/26/02	0	0	0	0	0	0	0	0
05/27/02	0	0	0	0	0	0	0	0
05/28/02	0	0	0	0	0	0	0	0
05/29/02	0	0	0	0	0	0	0	0
05/30/02	0	0	0	0	0	0	0	0
05/31/02	0	0	0	0	0	0	0	0
	0	46	274	75161	0	729	826	28
Egg disposition	N/A	preserved	preserved	preserved	N/A	preserved	preserved	Rio Grande

Literature Cited

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