RECLAMATION

Managing Water in the West

ANNUAL REPORT 2009

Collection of Rio Grande fishes using an Inflatable Electrofishing Boat below San Acacia Diversion, February 2009.

Rio Grande Fish Community Surveys

U.S. Department of the Interior
Bureau of Reclamation

ANNUAL REPORT-2009

RIO GRANDE FISH COMMUNITY SURVEYS

December 29, 2009

U.S. BUREAU OF RECLAMATION
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INTRODUCTION

The U.S. Bureau of Reclamation developed an Aquatic Resource Monitoring Program for the Rio Grande to monitor the effects of Reclamation Rio Grande maintenance projects on the fish community and to monitor native fish species proximate to Reclamation facilities and operations. These annual surveys of the fish community on the Rio Grande document trends in fish community structure, evaluate the effects of river maintenance and water operations, and other project-related commitments. The data collected supplements surveys conducted by the U.S. Fish and Wildlife Service, New Mexico Department of Game and Fish, and the American Southwest Ichthyological Research Center. These surveys are conducted primarily using electrofishing and seining techniques. This information, as well as the nursery habitat study (Reclamation 2009), may also be used by the Middle Rio Grande Endangered Species Act Collaborative Program (Collaborative Program) participants for guidance of habitat restoration projects.

METHODS

Similar to previous years (and for comparability between years), surveys were scheduled for the 2 last weeks in February, immediately before the irrigation diversions started on March 1, and for a period around September 1.

Both survey periods are summarized with sampling site and plans in Table 1. August sampling was focused as a reconnaissance effort near the temporary channel at the "sediment plug" near Bosque del Apache so information could be used to develop a more structured monitoring plan in response to the latest Biological Opinion.

Data Collection and Analysis

Fish surveys conducted by Reclamation (Permit #TE813088-0) use standard electrofishing gear (inflatable boat and backpack), and seining in the Middle Rio Grande, New Mexico. Fish collected during electrofishing were enumerated for all surveys, identified to species, measured in total length (mm), weighed (g), and released. GPS coordinates were recorded of as many Rio Grande Silvery Minnows as possible when collected and positively identified in dip nets and seines. Data was recorded using HanDBase (DDH software) on a Hewlett Packard handheld computer or on printed datasheets. Electronic data was downloaded onto workstations frequently and exported into Excel for summarization. Digital images of fish and habitat were often collected. The total number of species and individuals for each species were tabulated by site. Total species composition, catch per unit of effort (fish per minute), and length frequency of Rio Grande Silvery Minnows are calculated per survey.

Electrofishing surveys

Surveys were conducted by Reclamation biologists along several reaches of the Middle Rio Grande (Appendices A and B) as part of monitoring project plans. Within each reach, electrofishing was conducted at sites selected from previous studies. Surveys sampled a range of habitat types, including natural (defined as unaltered), backwater, riprap and jetty areas. Data were recorded by sample reach, with some specific "high "priority locations more intensively sampled (Bernalillo Restoration, Temporary Channel/"sediment plug" locations). All fish netted were identified, measured, and returned to the river.

February sampling was conducted using a Smith-Root 1.5 kV pulsed-DC electrofisher system mounted on a rowed inflatable raft was used to sample designated segments along the study reaches. In February 2009, this raft mounted system using two steel sphere anodes, a stainless cable bundle cathode and was operated to produce 2.0-4.0 amps at 30 pulses per second for sampling in reaches with 400+ cfs (cubic feet per second) flows and higher. Water conductance varied from 300 to 600 us/cm, upstream to downstream. Sampling effort was measured by time (seconds). Water quality measures were usually recorded upon arrival at the raft launch site. Data for water temperature, conductivity, dissolved oxygen and pH were recorded using a Eureka or Hydrolab multiparameter probe and handheld computer. Operation of the raft shocker consisted of an oarsman and 2 netters (equipped with polarized sunglasses) on the bow netting platform. The raft was directed bow first into a bank of habitat area and the anodes energized (foot switch) electricity applied. The bow into the bank position places the fish attracting anodes closest to the habitat, and as the raft begins to drift down and out, the electricity turned on and left on as the bow of the boat was backed out into the river current. Total shock time (energized electrodes) of each section surveyed was approximately 500 seconds. Each reach generally consisted of 5 to 8 shocking runs thru a 3-5 mile section. Netted fish were placed into an onboard live well with fresh river water added at each electrofishing section.

In August 2009, a backpack electrofisher was used with dual net wands and a "rattail" cathode. Shocking time was recorded for each pass and this time was used in a catch per unit of effort. Seine sampling used a 1/8" or ¼" inch mesh, 3 meter wide, 1.5 meter high seine. Seining in 2009 was only conducted on surveys at the temporary channel sites. The temporary channel surveys were concentrated above, directly in front of, and below the sediment plug area at River Mile 48.0, and in the braided off channel areas that were formed where the Rio had left the main channel at the sediment plug. These lower middle Grande surveys were to provide further information to the the Temporary Channel River Maintenance Project.

RESULTS AND DISCUSSION

FEBRUARY 2009 Electrofishing Surveys

The raft shocking results from February are presented in Table 2. Seven reaches were sampled, collecting 16 species, and a total of 463 fish. Approximately, 41% (191) of the fish collected in February were RGSM. They were the dominant species collected in San Acacia and Escondida (Figure 1). Common Carp (16.8%) and channel catfish (12.1%) made up a considerable percentage of the remaining fish collected. Average size of the RGSM was 62mm, with the largest over 100mm (Figure 4). Sloping bank lines in within water depths of up to one meter were the most productive habitat for RGSM collection in both the San Acacia and Escondida reaches. White suckers and longnose dace were the dominant species collected in Santa Clara. Santa Clara reaches had different substrate than the Middle Rio Grande, primarily consisting of rock and cobble substrates.

The San Acacia electro fishing produced the highest diversity, the highest catch, and the highest total CPUE with 5.3 fish per minute collected and a CPUE of 3.477 fish per minute for RGSM.

AUGUST 2009 Backpack Electrofishing and Seining Surveys

Quantitative comparison between opportunistic seining and backpack shocking was impossible and generally fish numbers are presented for these August surveys. Table 3 shows the results of the fish seining surveys performed in August of 2009. Silvery Minnows made up a considerable 32.6% (n=105) of all fish collected out of the total 721 fish. Red shiners (34.5%) made up the largest taxa collected in the sampling. Flathead chub were collected in only a few seines and seemed to be localized in only a few places below the sediment plug. Backwaters at the downstream edge of point bars, sloping sand backline, and some braided streams out from the main channel appear to provide habitat for silvery minnows. Some of these habitats are probably resulting from channel natural geomorphic activities, and these could change with removing the "plug". Eight log perch were collected below the RM 48 sediment plug.

CONCLUSIONS

Silvery minnows utilize the Temporary Channel area, but higher numbers were collected in upstream areas below San Acacia Diversion and the Bernalillo Restoration site. Sampling with the shocking raft continues to collect RGSM in main channel habitats and efforts with this technique have a good comparable catch per unit effort with previous year's surveys. Differences in RGSM length frequencies between sampling periods trips is difficult to resolve and reasons for the differences include differing times of year of collection, differing sections of the river, and variable types collection gear having of different fish size selectivity. GIS, aerial photography, and GPS positioning of collected RGSM has great potential in providing illustrative and quantitative data that would assist in decisions that could potentially reduce impacts of operation and river maintenance on RGSM and other native fishes.

ACKNOWLEDGMENTS

Product names in this report are provided to illustrate examples of techniques, and do not imply endorsement of commercial equipment or software used during these studies. Funding for these surveys was provided by Reclamation's Albuquerque Area Office. We appreciate the cooperation of the Middle Rio Grande Conservancy District, Sandia Pueblo, City of Albuquerque Open Space and Sevilleta National Wildlife Refuge in providing access to study sites. Map coordinates and GIS work was professionally done by Vicky Johanson, Denver TSC.

Literature Cited

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Table 1. Sampling sites and reaches

Study Area	Objectives	Sampling Approach
Bernalillo Reach (Includes Sandia Priority site)	Priority Sites construction	Electrofishing
Montano Reach	Habitat and Population Status	Electrofishing
Rio Bravo Bridge	Habitat Characterization, Construction, and Restoration	Electrofishing
Los Lunas Reach and Site	Habitat Characterization and Restoration	Electrofishing, Seine
San Acacia Reach	Priority Sites and Baseline	Electrofishing
Escondida Reach	Priority Site construction and Baseline	Electrofishing
Temp channel Sites	Channel Maintenance	Electrofishing, Seine
River Mile 48 “sediment plug”	Priority Site Investigation and Baseline	Electrofishing, Seine

Table 2. Results from February 2009 electrofishing surveys.

Species	Total	Santa Clara	Sandia	Bernalillo Priority	Sandia priority Raft	Montano	Rio Bravo	Los Lunas	San Acacia	Escondida
		2/26/2009	2/25/2009	2/25/09	2/25/2009	2/17/2009	2/20/2009	2/19/2009	2/24/2009	2/18/2009
Brown trout	3	3	0	0	0	0	0	0	0	0
Common Carp	78	11	1	15	16	5	5	5	14	6
Channel Catfish	56	0	0	2	10	14	7	16	6	1
Flathead Chub	24	2	0	0	5	5	0	0	11	1
Walleye	1	0	0	0	0	0	0	0	1	0
Fathead minnow	6	0	0	0	0	0	4	2	0	0
Silvery Minnow	191	0	1	2	1	22	4	20	100	41
Largemouth Bass	1	0	0	0	1	0	0	0	0	0
Longnose dace	12	11	0	1	0	0	0	0	0	0
Northern Pike	1	0	0	0	0	0	0	0	1	0
Pumpkin Seed	1	1	0	0	0	0	0	0	0	0
River carp sucker	31	0	3	2	1	1	5	4	13	2
Smallmouth Buffalo	4	0	0	0	0	0	0	0	0	3
White Crappie	1	0	0	1	0	0	0	0	0	0
White Bass	3	0	0	0	0	1	1	0	1	0
White sucker	31	25	1	0	0	1	2	1	1	0
Total Fish	463	53	6	23	34	50	29	60	154	54
Site Composition	100	11.4	1.3	5.0	7.3	10.8	6.3	13.0	33.3	11.7

Table 3. Results from August 2009 Seining and backpack electrofishing seine sampling.

Species	Total	Bernalillo Restoration	Bernardo	Rio Above Sed. plug	Rio At Sed. Plug	RIO out of Channel (braided)	Backwater Below	RIO Below Sed. plug
Channel Catfish	10	0	1	0	1	4	4	0
Common Carp	2	0	1	0	0	0	1	0
Flathead Chub	67	51	10	0	0	0	0	6
Fathead minnow	19	1	10	0	0	0	7	1
Gambusia	116	3	14	0	0	14	9	76
Gizzard Shad	3	0	0	0	0	0	2	1
Silvery Minnow	**235**	**73**	**54**	**88**	**0**	**11**	**1**	**8**
Log Perch	6	0	0	0	0	0	3	3
Red Shiner	249	79	142	0	0	17	3	8
White Bass	2	0	0	0	0	0	0	2
Yellow Bullhead	2	0	0	0	0	1	0	1
Bluegill	2	1	1	0	0	0	0	0
Flathead Catfish	1	0	0	0	0	1	0	0
Longnose Dace	5	5	0	0	0	0	0	0
White Sucker	1	1	0	0	0	0	0	0
Smallmouth Bass	1	0	1	0	0	0	0	0
Total Fish	721	214	234	88	1	48	30	106

Table 4. **CPUE Results from February 2009 fish monitoring surveys**.

Site section	Fish per Minute	RGSM per minute
Santa Clara	1.129	0
Sandia	0.675	0.112
Bernalillo Priority	2.438	0.212
Sandia Priority	1.298	0.037
Montano Bridge	0.983	0.432
Rio Bravo	0.920	0.130
Los Lunas	1.216	0.404
San Acacia	5.350	3.472
Escondida	1.443	1.075

Table 5. Rio Grande fish species

Common Name	**Species Name**
Black Bullhead	Ameiurus melas
Yellow Bullhead	Ameiurus natalis
River Carpsucker	Carpoides carpio
White Sucker	Catostomus commersoni
Red Shiner	Cyprinella lutrensis
Common Carp	Cyprinus carpio
Gizzard Shad	Dorosoma cepedianum
Mosquito Fish	Gambusia affinis
Silvery Minnow	Hybognathus amarus
Blue Catfish	Ictalurus furcatus
Channel Catfish	Ictalurus punctatus
Small Mouth Buffalo	Ictiobus bubalus
Green Sunfish	Lepomis cyanellus
Bluegill Sunfish	Lepomis macrochirus
Smallmouth Bass	Micropterus dolomeiui
Largemouth Bass	Micropterus salmoides
White Bass	Morone chrysops
Striped Bass	Morone saxatilis
Rainbow Trout	Oncorhynchus mykiss
Yellow Perch	Perca flavescens
Fathead Minnow	Pimephales promelas
Flathead Chub	Platygobio gracilis
White Crappie	Pomoxis annularis
Black Crappie	Pomoxis nigromaculatus
Flathead Catfish	Pylodictis olivaris
Longnose Dace	Rhinichthys cataractae
Brown Trout	Salmo trutta

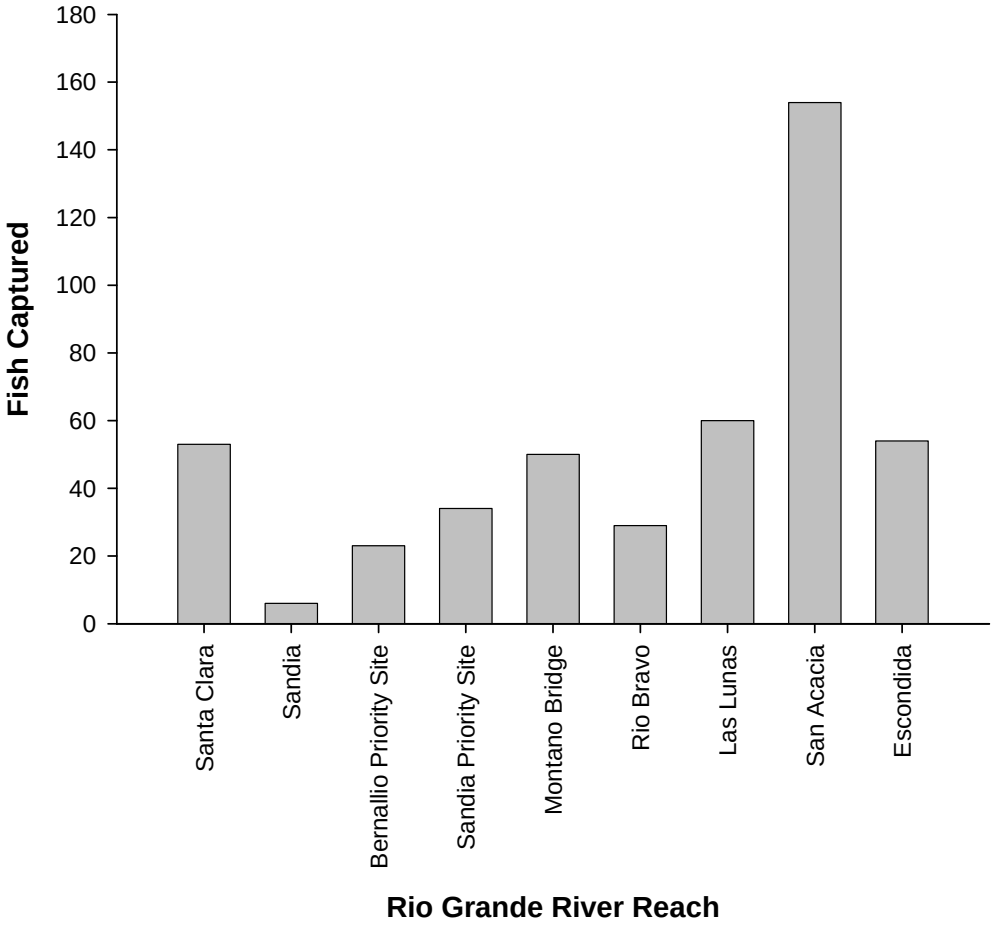


Figure 1. Comparison of fish collected by River Reach during the February 2009 monitoring.

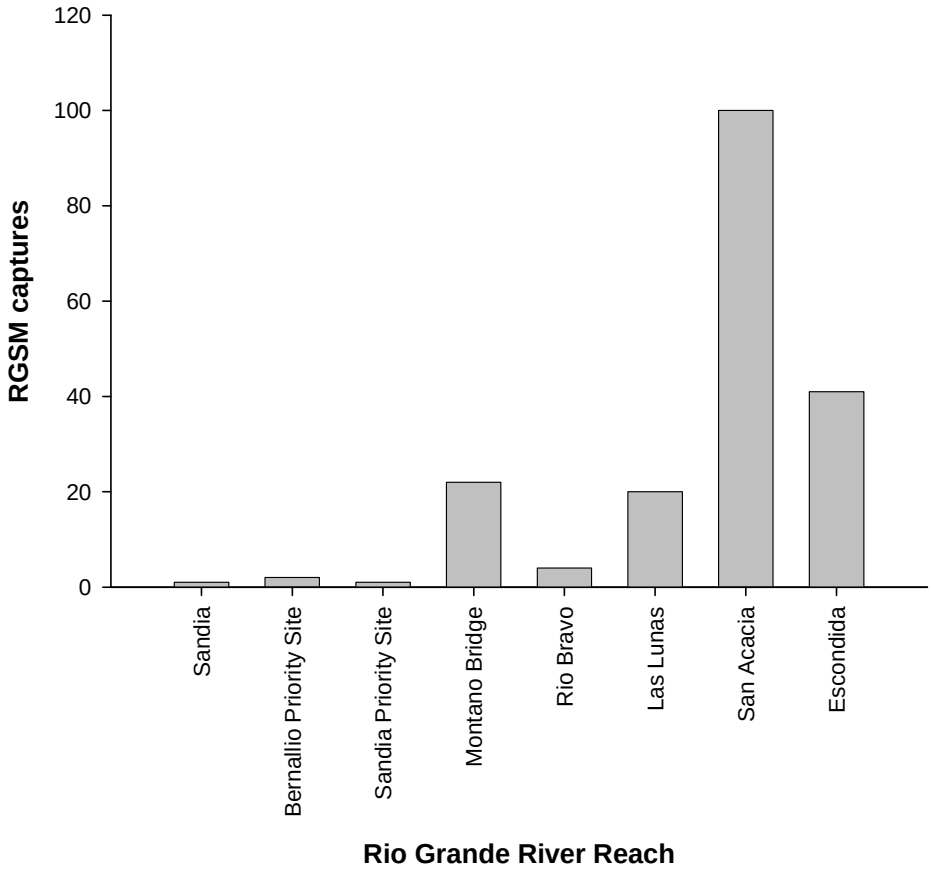


Figure 2. Rio Grande Silvery Minnow collection by sites in February 2009

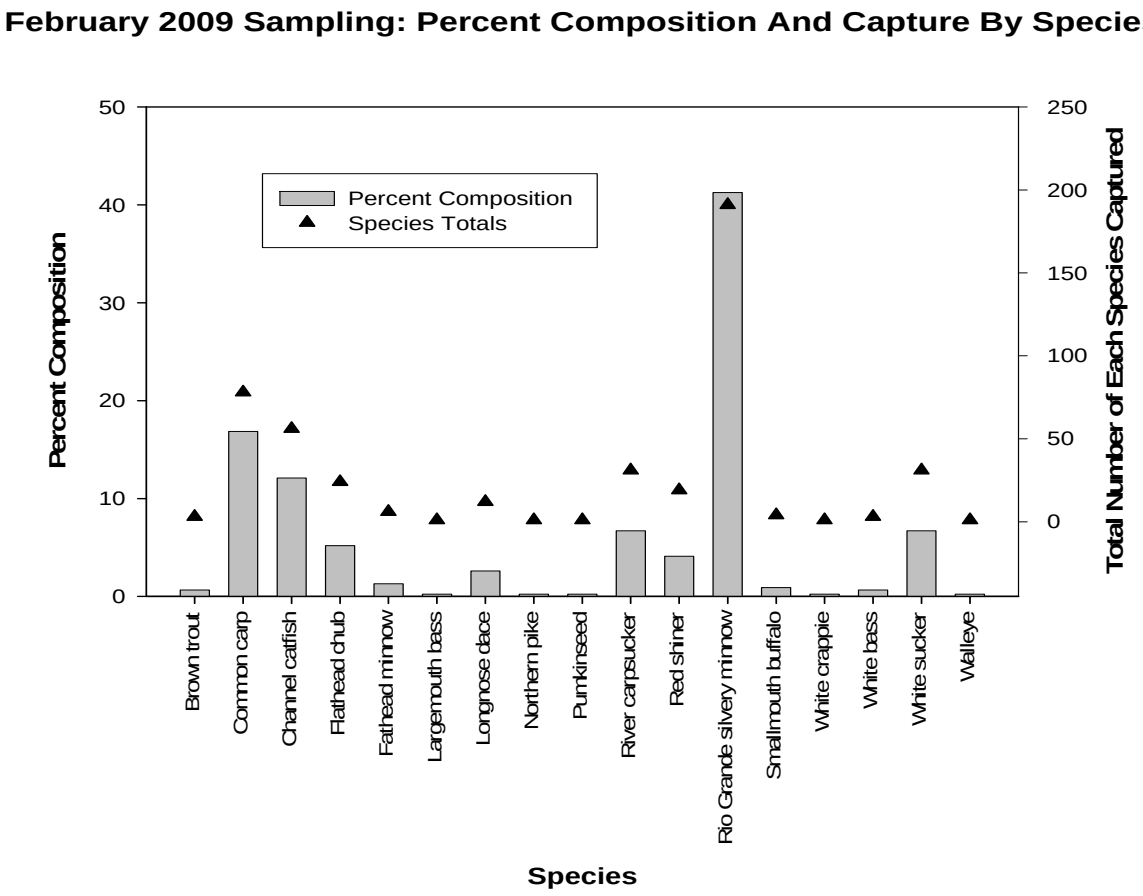


Figure 3. Composition of all collected fish during February 2009.

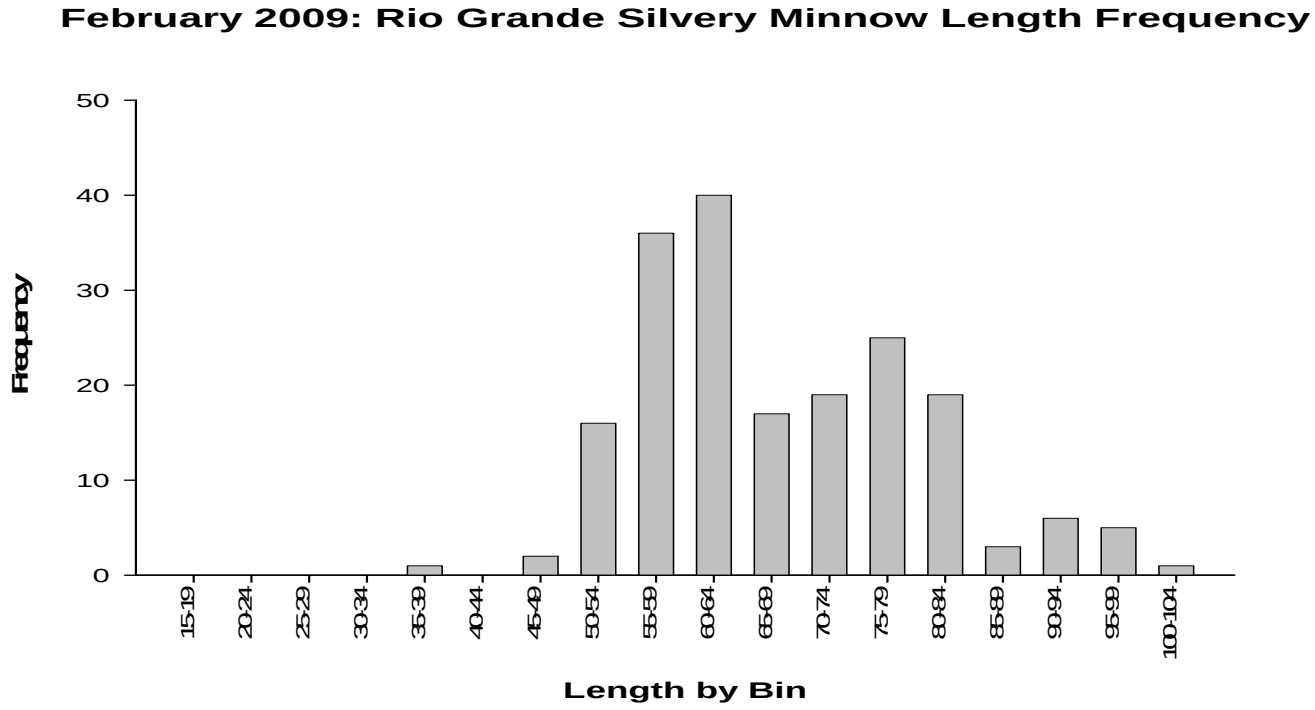


Figure 4 Length frequency of the RGSM collected by raft electrofishing in February 2009. Fish measured in Total Length.

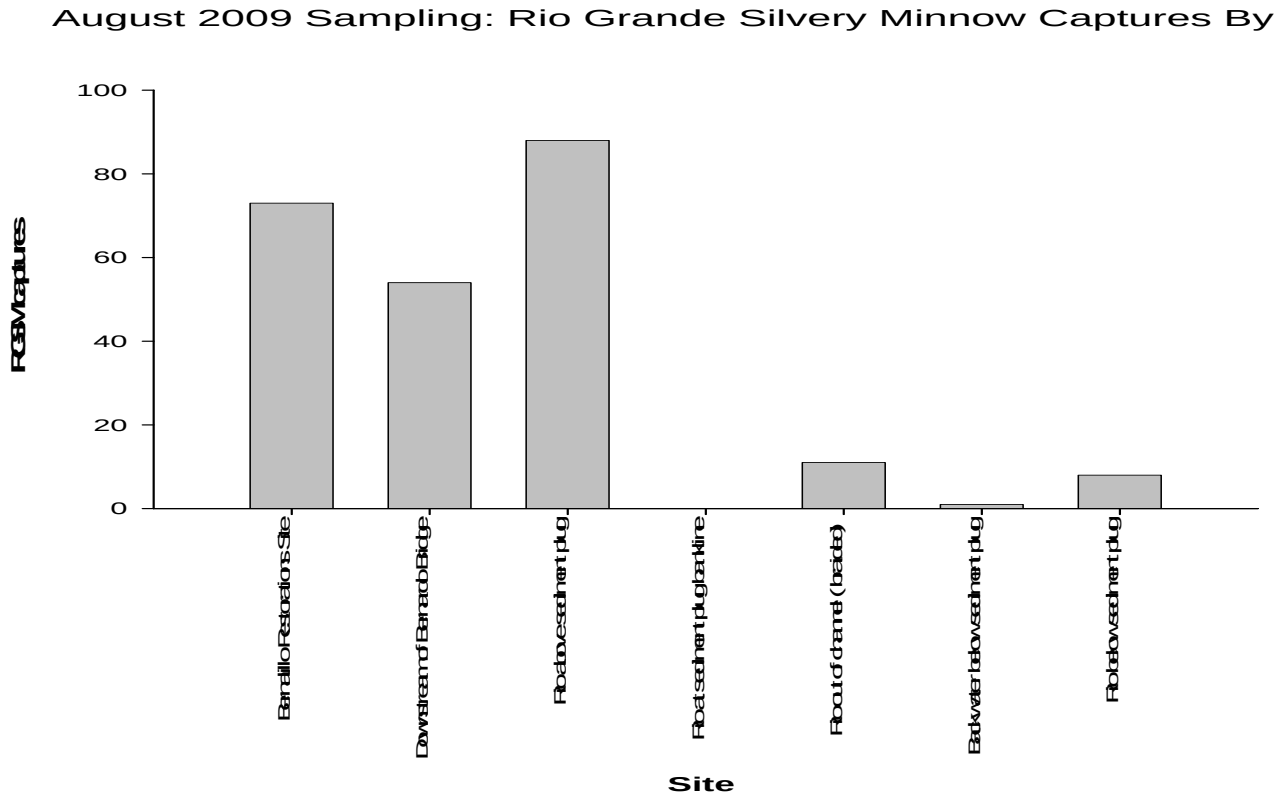


Figure 5. Rio Grande Silvery Minnows collected in August 2009 surveys from the Rio Grande.

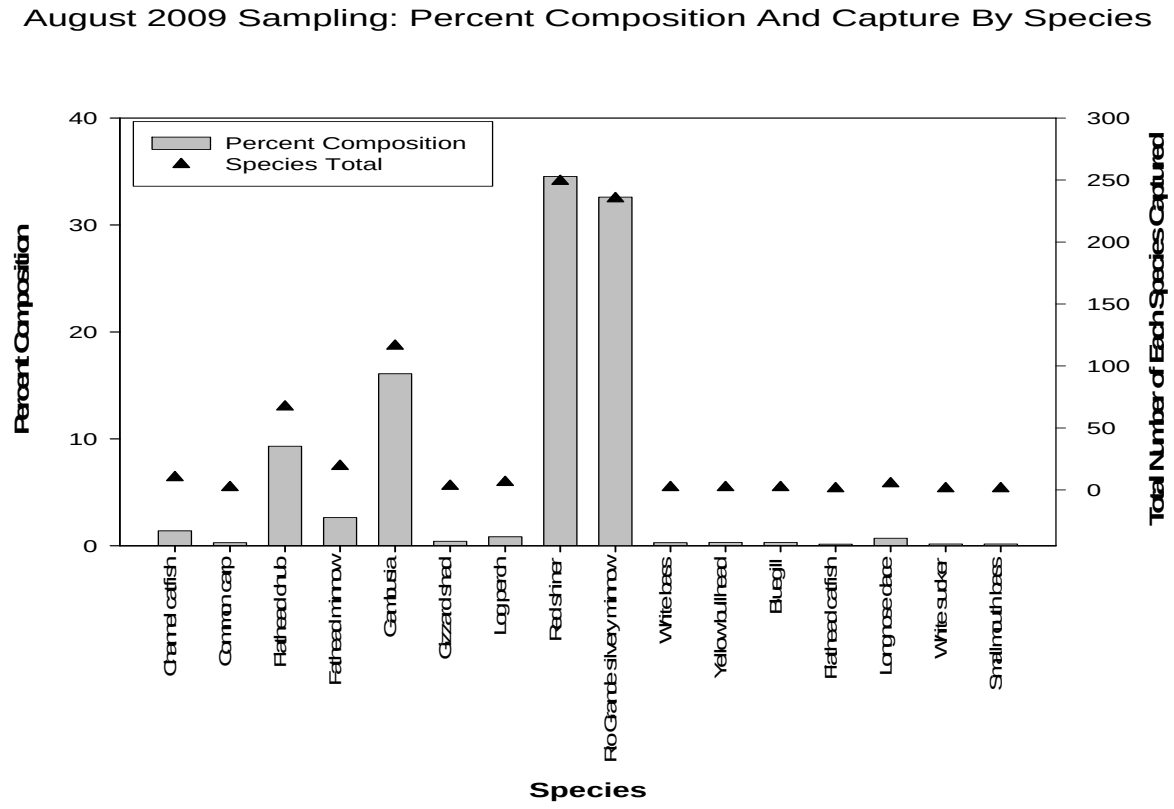


Figure 6. Composition comparison of all species collected in August 2009 monitoring.

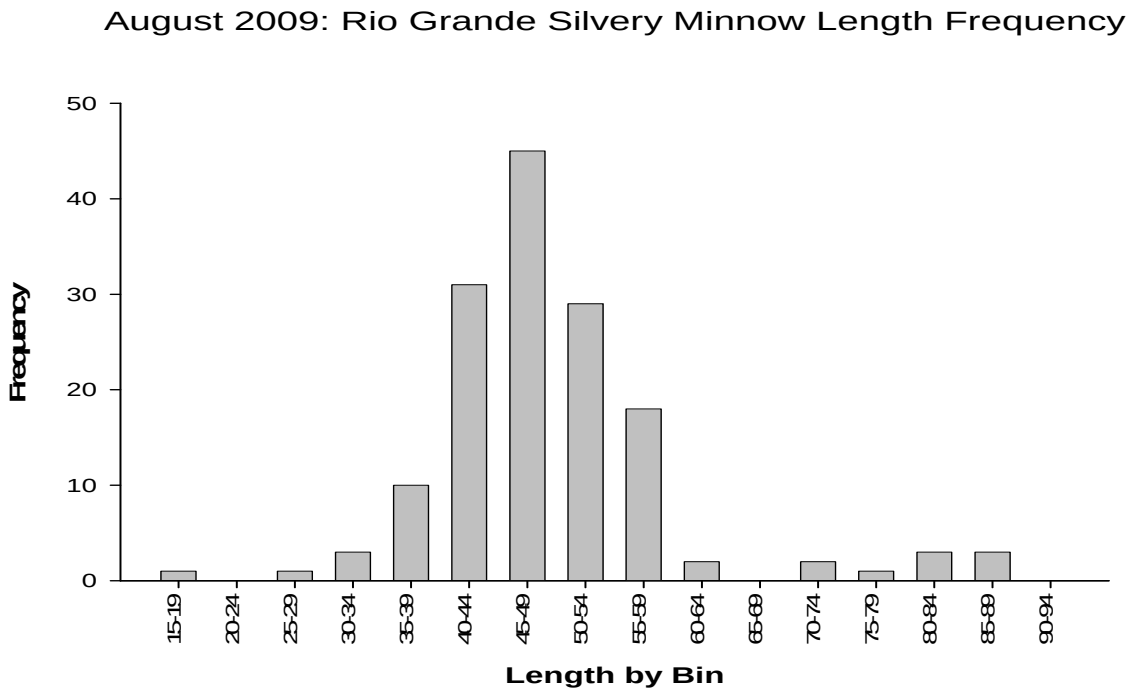
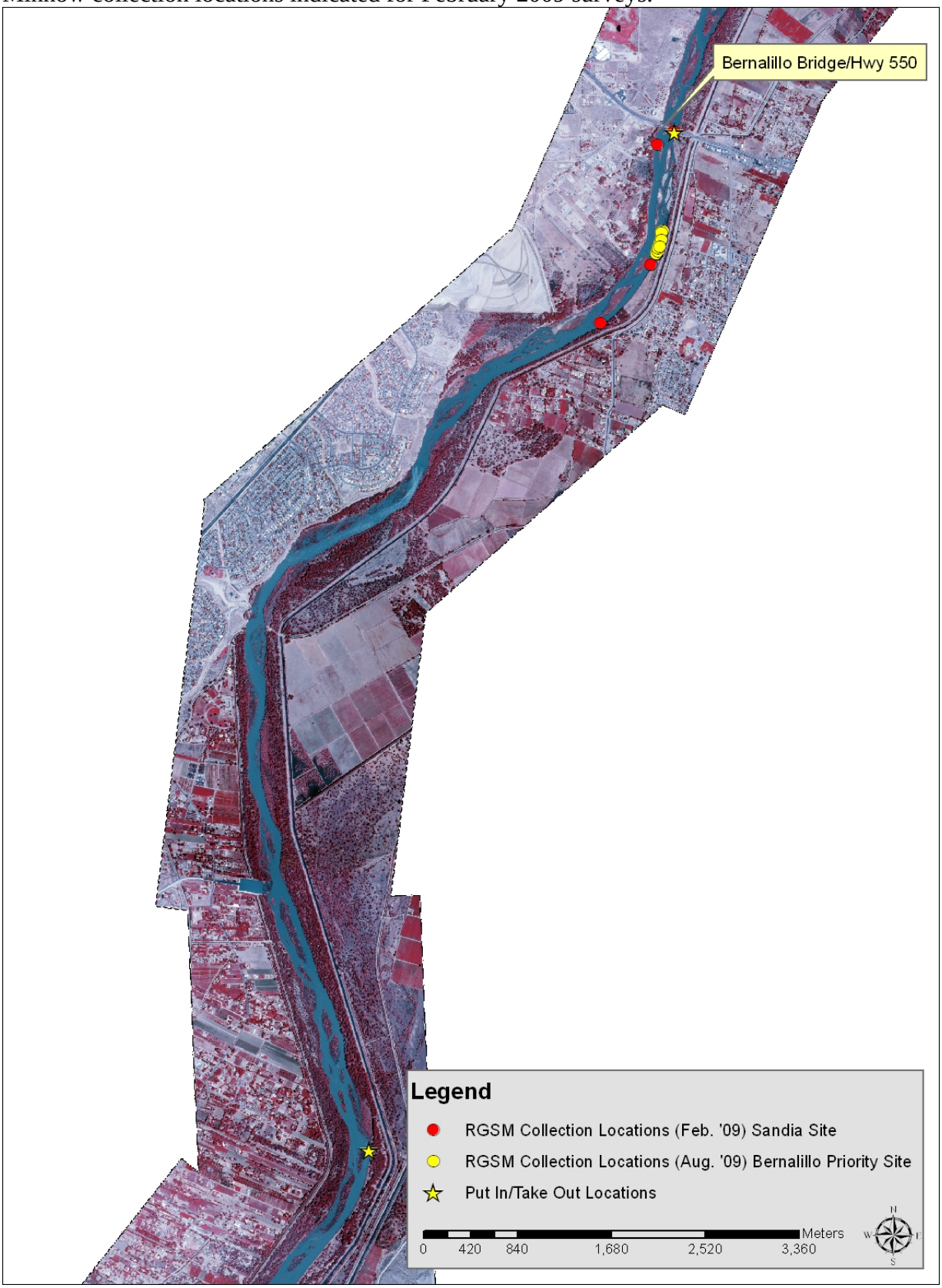


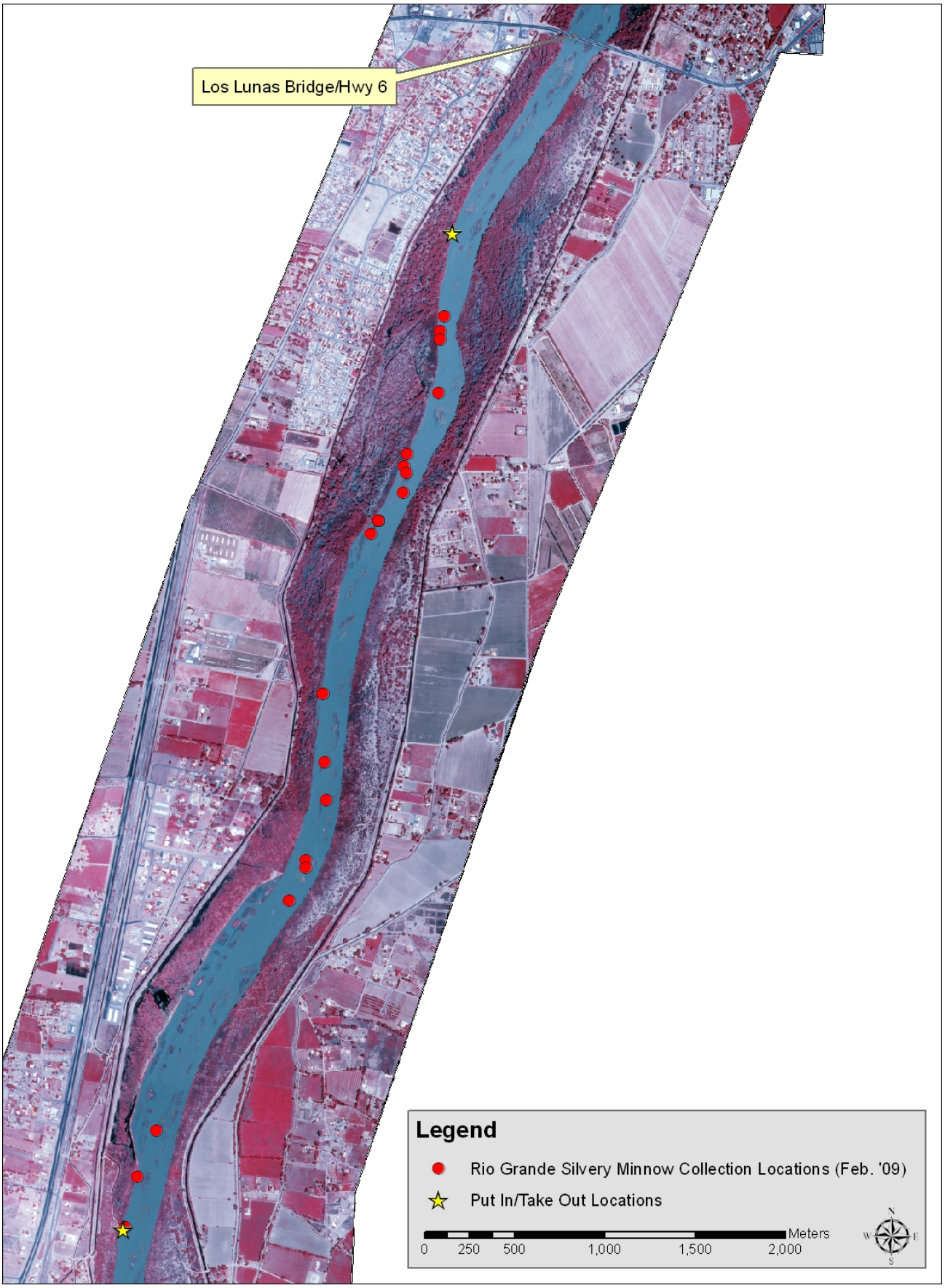
Figure 7 Length frequency of the RGSM collected by seining and backpack electrofishing in August 2009

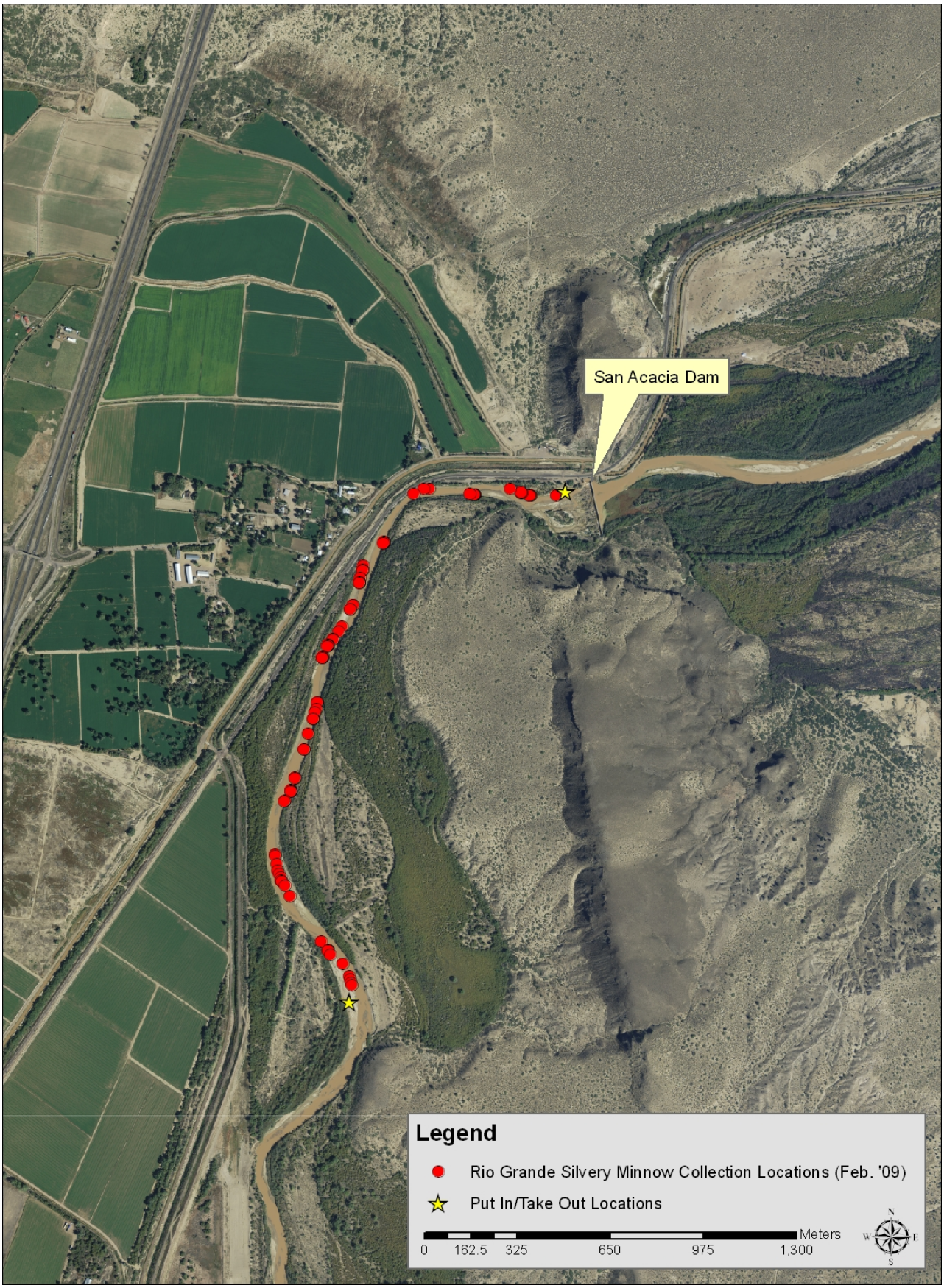
APPENDIX A. Aerial photographs of Rio Grande sampling locations with Rio Grande Silvery Minnow collection locations indicated for February 2009 surveys.

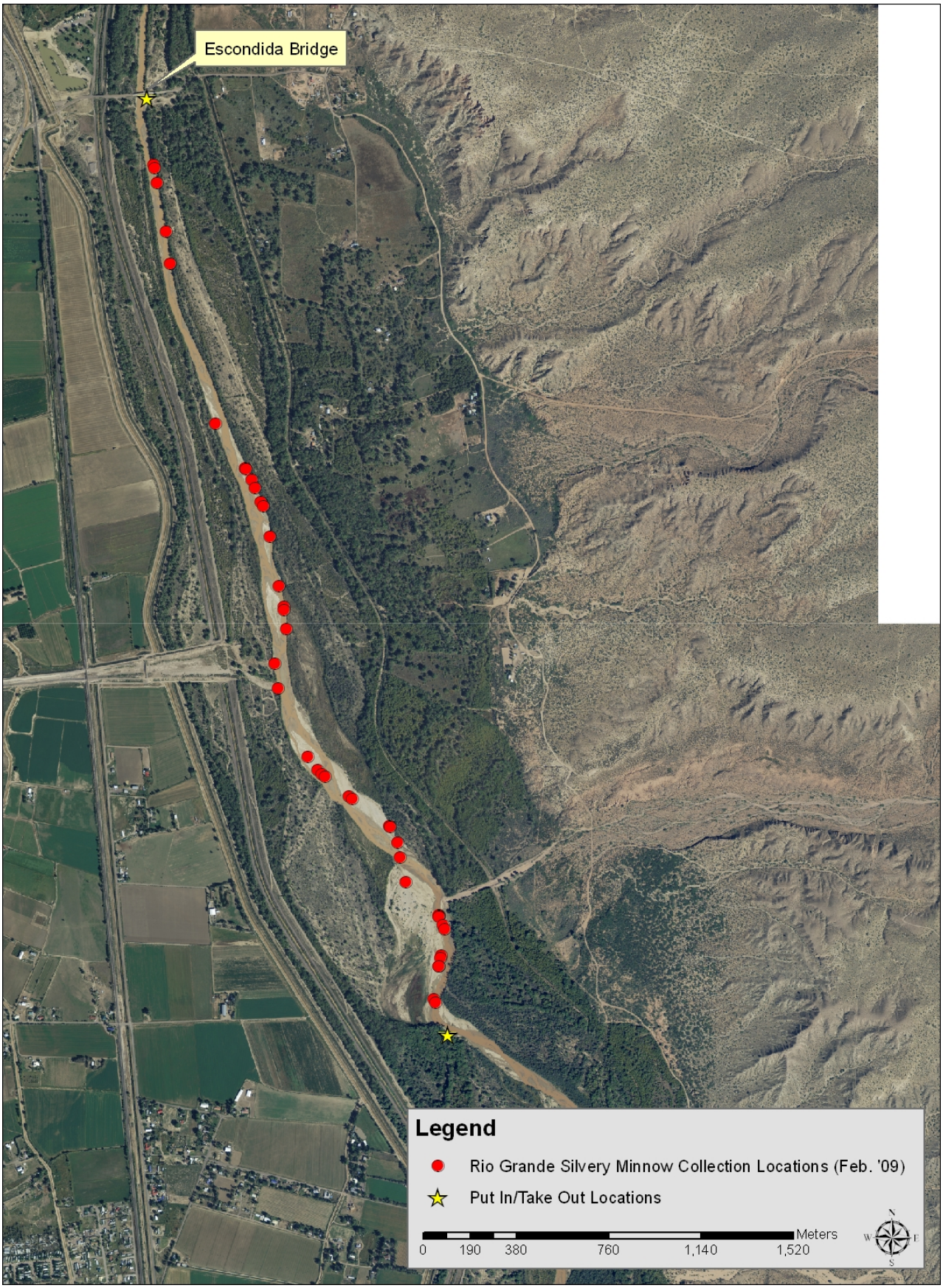



Montano Bridge
Interstate 40
Legend
Rio Grande Silvery Minnow Collection Locations (Feb. '09)
Put In/Take Out Locations
Meters
0
200
400
800
1,200
1,600
N
W
E
S

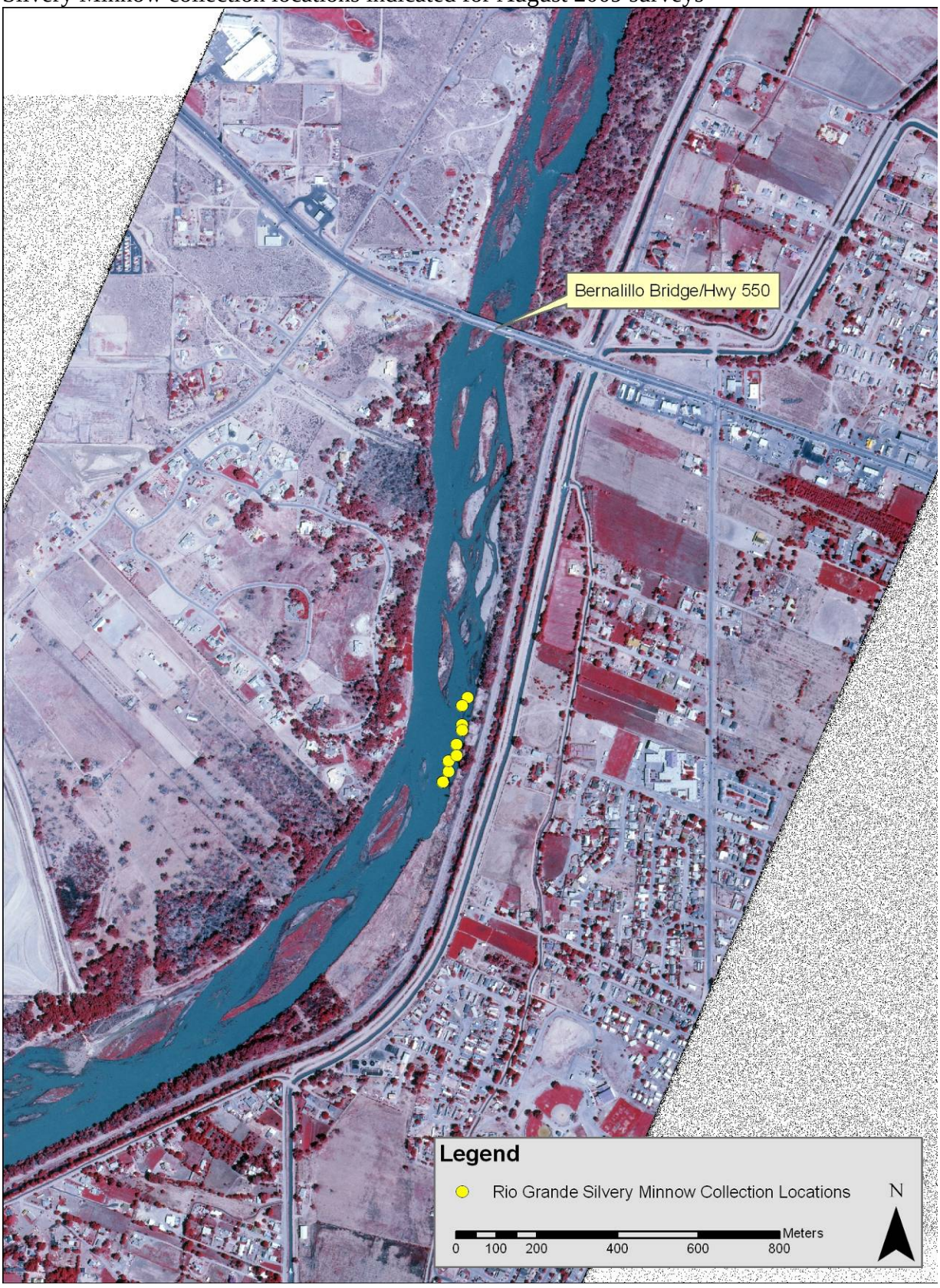

Rio Bravo Blvd Bridge/Hwy 500
Legend
Rio Grande Silvery Minnow Collection Locations (Feb. '09)
Put In/Take Out Locations
Meters
0
165
330
660
990
1,320
N
W
E
S

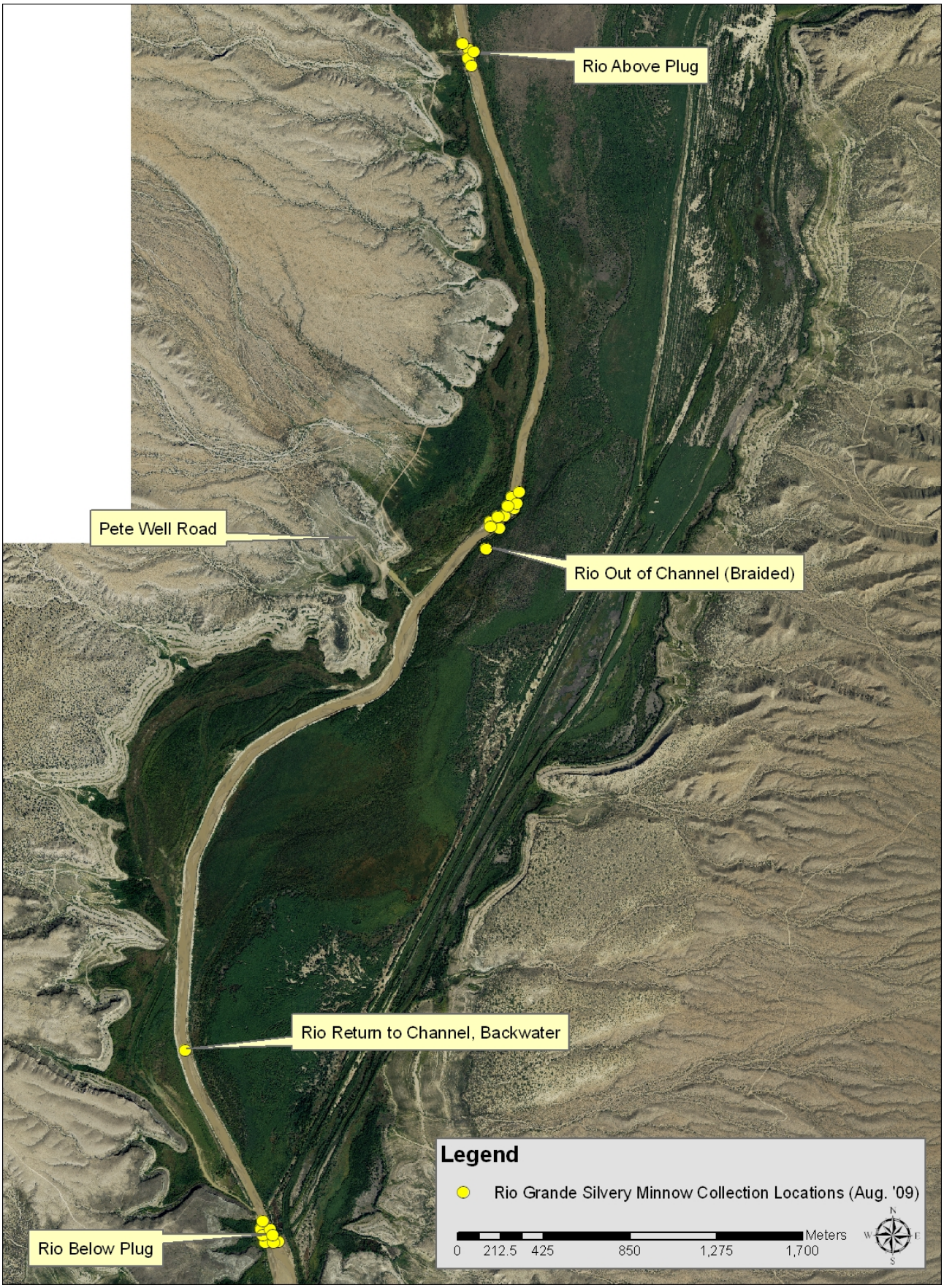

Los Lunas Bridge/Hwy 6
Legend
Rio Grande Silvery Minnow Collection Locations (Feb. '09)
Put In/Take Out Locations
Meters
0
250
500
1,000
1,500
2,000
N
W
E
S


San Acacia Dam
Legend
Rio Grande Silvery Minnow Collection Locations (Feb. '09)
Put In/Take Out Locations
Meters
0
162.5
325
650
975
1,300
N
W
E
S


Escondida Bridge
Legend
Rio Grande Silvery Minnow Collection Locations (Feb. '09)
Put In/Take Out Locations
Meters
0
190
380
760
1,140
1,520
N
W
E
S

APPENDIX B. Aerial photographs of Rio Grande sampling locations with Rio Grande Silvery Minnow collection locations indicated for August 2009 surveys




Rio Above Plug
Pete Well Road
Rio Out of Channel (Braided)
Rio Return to Channel, Backwater
Rio Below Plug
Legend
Rio Grande Silvery Minnow Collection Locations (Aug. '09)
Meters
0 212.5 425 850 1,275 1,700
N
W
E
S

APENDIX C

All RGSM collected in February