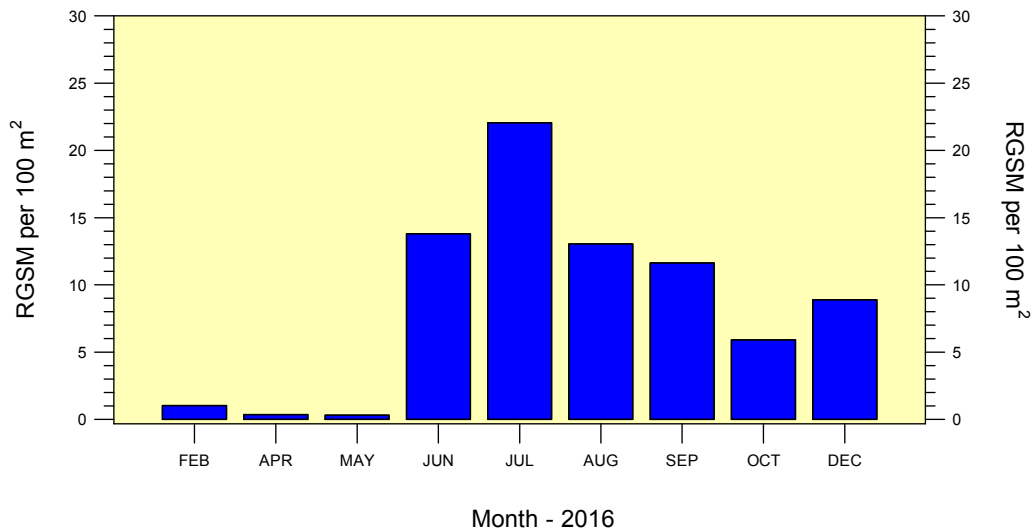
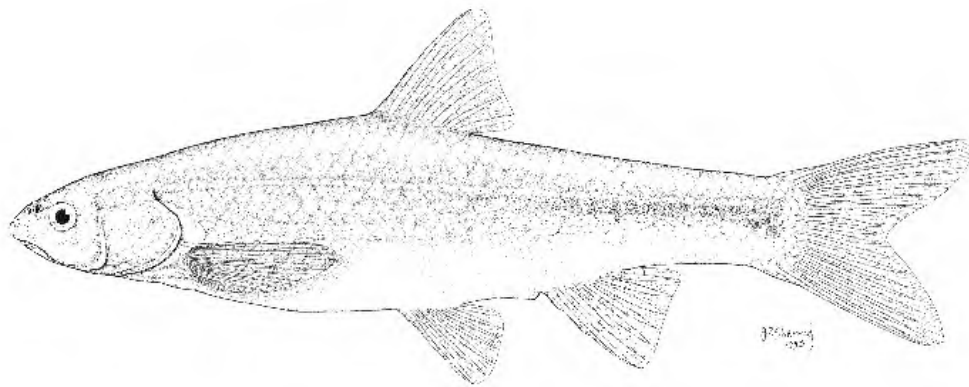


**RIO GRANDE SILVERY MINNOW POPULATION MONITORING RESULTS FROM
DECEMBER 2016**

**A MIDDLE RIO GRANDE ENDANGERED SPECIES
COLLABORATIVE PROGRAM FUNDED RESEARCH PROJECT**



Robert K. Dudley and Steven P. Platania
American Southwest Ichthyological Researchers, L.L.C.
800 Encino Place, NE; Albuquerque, NM 87102-2606

17 January 2017

***RIO GRANDE SILVERY MINNOW POPULATION MONITORING RESULTS FROM
DECEMBER 2016***

***A MIDDLE RIO GRANDE ENDANGERED SPECIES
COLLABORATIVE PROGRAM FUNDED RESEARCH PROJECT***

Contract GS-10F-0249X:

Order R15PD00171

U.S. Bureau of Reclamation
Albuquerque Area Office
555 Broadway NE, Suite 100
Albuquerque, NM 87102-2352

submitted to:

U. S. Bureau of Reclamation
Albuquerque Area Office
555 Broadway NE, Suite 100
Albuquerque, NM 87102-2352

Robert K. Dudley and Steven P. Platania
American Southwest Ichthyological Researchers, L.L.C.
800 Encino Place, NE; Albuquerque, NM 87102-2606

17 January 2017

SUMMARY OF DECEMBER 2016 POPULATION MONITORING

The December population monitoring efforts were conducted at 20 sites throughout the Middle Rio Grande. Five sites were located in the Angostura Reach, six sites in the Isleta Reach, and nine sites in the San Acacia Reach. A list of collection localities is appended (Table A). Adult and juvenile fish were obtained by rapidly drawing a 3.1 m x 1.8 m small mesh (3/16th inch) seine through discrete mesohabitats. Larval fish were also collected with a 1.0 m x 1.0 m fine mesh (1/16th inch) seine in all seasons except winter. All fishes were identified to species and enumerated. We used length-age relationships to assign ages (i.e., age-0, age-1, and age-2+) to all Rio Grande Silvery Minnow collected. Age-0 individuals are, however, only present after annual spring spawning occurs (ca. May–June). Figures illustrating fish densities (i.e., fish per 100 m²) were prepared for the ten focal species to facilitate comparisons across reaches.

During December, sampling covered 11,928.5 m² (surface area) of water and yielded 2,042 fish. Cumulative fish density during December was 17.1 individuals/100 m² sampled. The three most common species were Rio Grande Silvery Minnow (n = 1,061), Red Shiner (n = 648), and Flathead Chub (n = 124). The 20 sampling sites yielded a total of 11 fish species. Rio Grande Silvery Minnow was present in 170 of the 220 seine hauls that yielded fish. We collected Rio Grande Silvery Minnow at 19 of the 20 sampling sites, and its overall density was 8.89 (n = 1,061) individuals/100 m² sampled. Densities of unmarked and marked individuals were 8.71 (n = 1,039) and 0.18 (n = 22) individuals/100 m² sampled, respectively. Densities of age-0, age-1, and age-2+ individuals were 8.50 (n = 1,014), 0.29 (n = 35), and 0.10 (n = 12) individuals/100 m² sampled, respectively.

Rio Grande Silvery Minnow that were stocked during autumn 2015 (ca. 200,000; Thomas P. Archdeacon, New Mexico Fish and Wildlife Conservation Office, pers. comm.) resulted in modest densities of this species during the winter of 2015/2016. However, the overwinter mortality of Rio Grande Silvery Minnow resulted in substantial losses of individuals from December 2015 to May 2016. The abundance of this species increased substantially in June and July, following elevated flows and spawning during spring. Densities of age-0 Rio Grande Silvery Minnow were much higher in December 2016 than in other December collections taken during recent years. Ensuring elevated and extended spring flows will be crucial for the successful survival of Rio Grande Silvery Minnow during 2017.

DECEMBER 2016 POPULATION MONITORING BY RIVER REACH

Angostura Reach

Mean daily discharge in the Angostura Reach (Rio Grande at Albuquerque, NM; USGS Gage 8330000) averaged 668.1 and ranged from 479 to 805 cfs from 16 November to 15 December. Water temperatures ranged from 4.4 to 6.0 °C during the Angostura Reach sampling efforts (ca. 0830–1530 h). Secchi disk measurements of water clarity ranged from 10 to 70 cm.

Sampling for fishes in the Angostura Reach during December yielded 381 individuals with a cumulative fish density of 12.8 individuals/100 m² sampled. The overall sampling effort in the Angostura Reach covered 2,967.3 m² (surface area) of water. Densities of all fish species combined ranged from 0.0 to 53.1 individuals per 100 m² at the five sampling sites. In December, there were 8 fish species collected in the Angostura Reach. Rio Grande Silvery Minnow was the most abundant taxon (n = 294), followed by Red Shiner (n = 51), and Flathead Chub (n = 20). Densities of Rio Grande Silvery Minnow ranged from 0.0 to 41.6 individuals per 100 m². Rio Grande Silvery Minnow (n = 294) was present in 28 of the 38 seine hauls that yielded fish during December.

Isleta Reach

In the Isleta Reach, mean daily discharge (Rio Grande at Isleta Lakes near Isleta, NM; USGS Gage 08354900) averaged 671.9 and ranged from 532 to 817 cfs from 16 November to 15 December. Water temperatures ranged from 7.8 to 9.4 °C throughout the sampling localities during the day (ca. 0930–1600 h). Secchi disk measurements ranged from 8 to 15 cm during sampling.

Isleta Reach population monitoring efforts produced 1,107 individuals in December with a cumulative fish density of 31.2 individuals/100 m² sampled. The total sampling effort in the Isleta Reach during December covered 3,548.8 m² (surface area) of water. Fish densities (all species combined) at the six sites ranged from 11.2 to 56.4 individuals per 100 m² sampled. There were 8 fish species collected in the Isleta Reach during December. Red Shiner was the most abundant taxon (n = 492), followed by Rio Grande Silvery Minnow (n = 471), and Western Mosquitofish (n = 77). Densities of Rio Grande Silvery Minnow ranged from 5.8 to 29.0 individuals per 100 m². Rio Grande Silvery Minnow (n = 471) was present in 72 of the 89 seine hauls that yielded fish during December.

San Acacia Reach

Mean daily discharge at San Acacia (Rio Grande Floodway at San Acacia, NM; USGS Gage 08354900) from 16 November to 15 December was generally higher (average = 701.7; range = 554–780 cfs) as compared to San Marcial (Rio Grande Floodway at San Marcial, NM; USGS Gage 08358400) during the same period (average = 452.3; range = 300–788 cfs). Water temperatures in December for the San Acacia Reach ranged from 4.0 to 8.2 °C (ca. 0930–1600 h). Water clarity was generally lower in this reach (Secchi disk range = 3–10 cm) compared to the two upstream reaches.

Population monitoring efforts in the San Acacia Reach during December yielded 554 individuals with a cumulative fish density of 10.2 individuals per 100 m² sampled. Sampling in the San Acacia Reach covered an area of 5,412.5 m² of water. Fish densities (all species combined) ranged from 2.7 to 30.5 individuals per 100 m² at the nine sites sampled in the San Acacia Reach. In December, there were 10 fish species collected in the San Acacia Reach. Rio Grande Silvery Minnow was the most abundant taxon (n = 296), followed by Red Shiner (n = 105), and Flathead Chub (n = 72). Densities of Rio Grande Silvery Minnow ranged from 0.2 to 12.6 individuals per 100 m². Rio Grande Silvery Minnow (n = 296) was present in 70 of the 93 seine hauls that yielded fish during December.

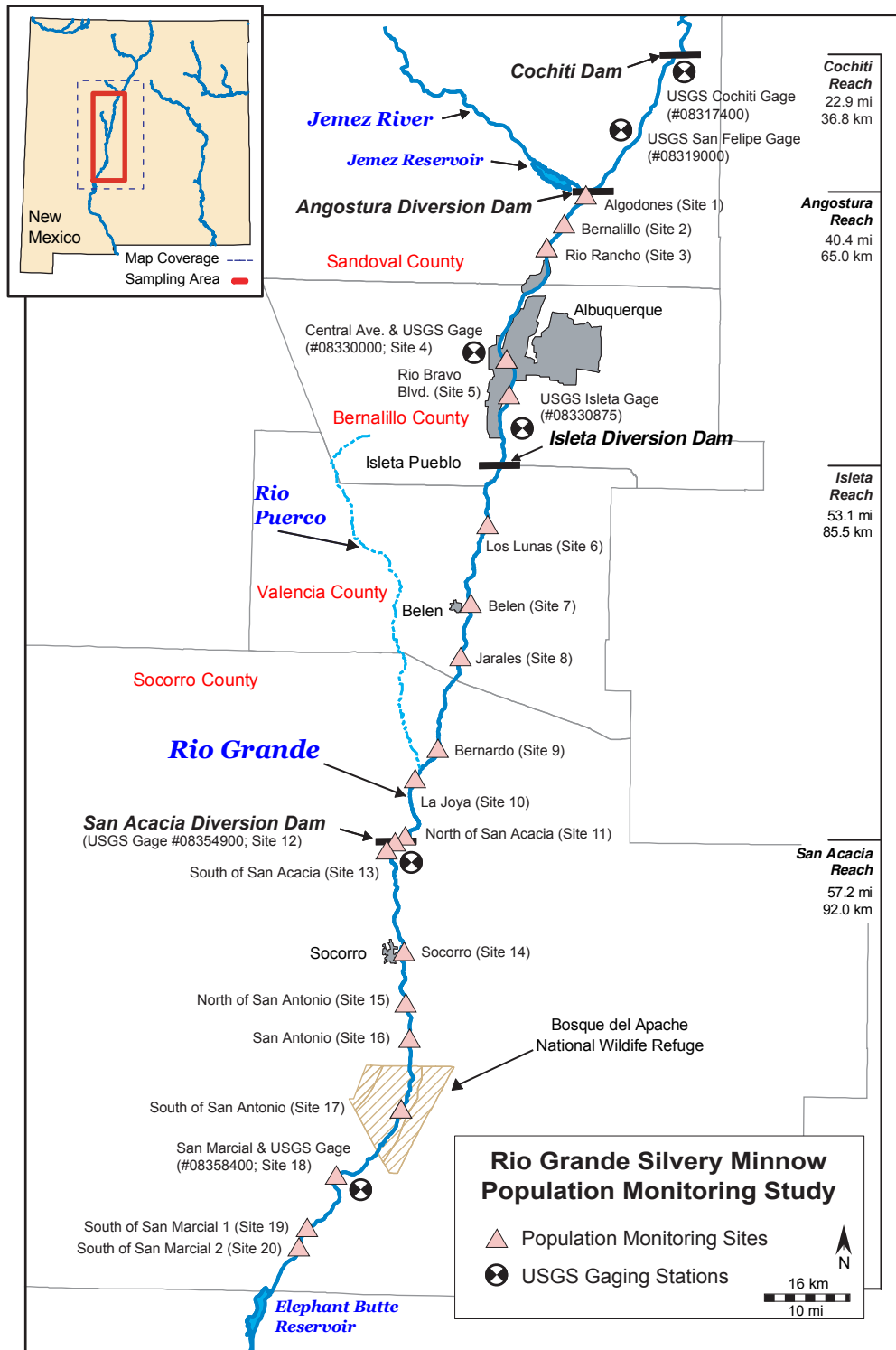


Figure 1. Map of the study area and sampling localities (numbered). Sampling locality information that corresponds with the numbered localities is provided in Appendix A (Table A).

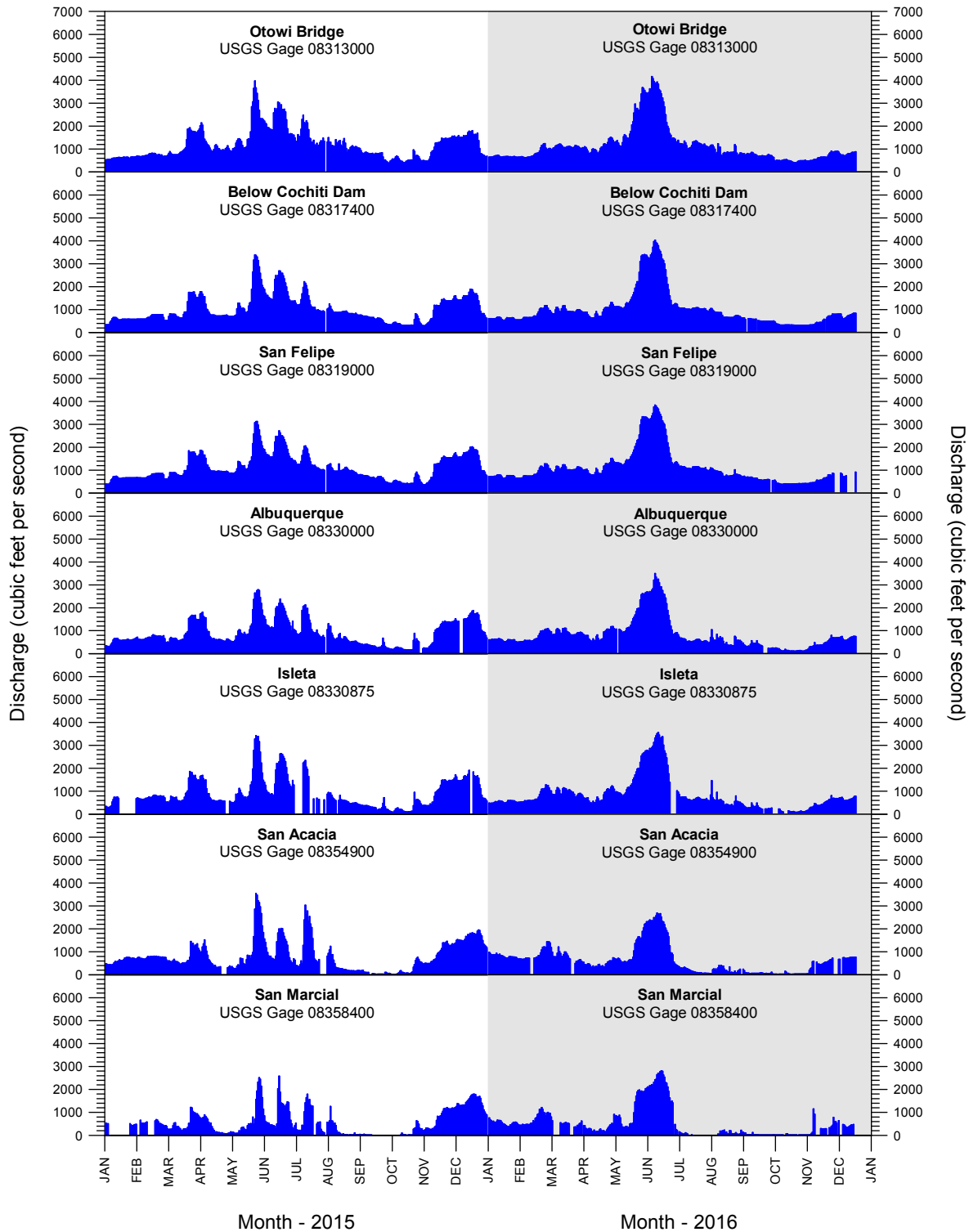


Figure 2. Rio Grande discharge from 1 January 2015 to 15 December 2016 at U.S. Geological Survey (USGS) gaging stations. The Otowi Bridge gage site is outside of the study area but is provided for reference. Discharge data are provisional and subject to change.

Table 1. Scientific and common names and species codes of fish collected in the Middle Rio Grande since 1993.

Scientific Name	Common Name	Code
Order Clupeiformes		
Family Clupeidae		
	herrings	
<i>Dorosoma cepedianum</i>	Gizzard Shad	(DORCEP)
<i>Dorosoma petenense</i>	Threadfin Shad	(DORPET)
Order Cypriniformes		
Family Cyprinidae		
	carps and minnows	
<i>Campostoma anomalum</i>	Central Stoneroller	(CAMANO)
<i>Carassius auratus</i>	Goldfish	(CARAUR)
<i>Cyprinella lutrensis</i>	Red Shiner ¹	(CYPLUT)
<i>Cyprinus carpio</i>	Common Carp ¹	(CYPCAR)
<i>Gila pandora</i>	Rio Grande Chub	(GILPAN)
<i>Hybognathus amarus</i>	Rio Grande Silvery Minnow ¹	(HYBAMA)
<i>Notemigonus crysoleucas</i>	Golden Shiner	(NOTCRY)
<i>Pimephales promelas</i>	Fathead Minnow ¹	(PIMPRO)
<i>Pimephales vigilax</i>	Bullhead Minnow	(PIMVIG)
<i>Platygobio gracilis</i>	Flathead Chub ¹	(PLAGRA)
<i>Rhinichthys cataractae</i>	Longnose Dace ¹	(RHICAT)
Family Catostomidae		
	suckers	
<i>Carpodes carpio</i>	River Carpsucker ¹	(CARCAR)
<i>Catostomus commersonii</i>	White Sucker ¹	(CATCOM)
<i>Ictiobus bubalus</i>	Smallmouth Buffalo	(ICTBUB)
Order Siluriformes		
Family Ictaluridae		
	North American catfishes	
<i>Ameiurus melas</i>	Black Bullhead	(AMEMEL)
<i>Ameiurus natalis</i>	Yellow Bullhead	(AMENAT)
<i>Ictalurus furcatus</i>	Blue Catfish	(ICTFUR)
<i>Ictalurus punctatus</i>	Channel Catfish ¹	(ICTPUN)
<i>Pylodictis olivaris</i>	Flathead Catfish	(PYLOLI)
Order Salmoniformes		
Family Salmonidae		
	trouts and salmons	
<i>Oncorhynchus mykiss</i>	Rainbow Trout	(ONCMYK)
<i>Salmo trutta</i>	Brown Trout	(SALTRU)
Order Cyprinodontiformes		
Family Poeciliidae		
	livebearers	
<i>Gambusia affinis</i>	Western Mosquitofish ¹	(GAMAFF)

Table 1. Scientific and common names and species codes of fish collected in the Middle Rio Grande since 1993 (continued).

Scientific Name	Common Name	Code
Order Perciformes		
Family Moronidae		
	temperate basses	
<i>Morone chrysops</i>	White Bass	(MORCHR)
<i>Morone saxatilis</i>	Striped Bass	(MORSAX)
Family Centrarchidae		
	sunfishes	
<i>Lepomis cyanellus</i>	Green Sunfish	(LEPCYA)
<i>Lepomis macrochirus</i>	Bluegill	(LEPMAC)
<i>Lepomis megalotis</i>	Longear Sunfish	(LEPMEG)
<i>Micropterus dolomieu</i>	Smallmouth Bass	(MICDOL)
<i>Micropterus salmoides</i>	Largemouth Bass	(MICSAL)
<i>Pomoxis annularis</i>	White Crappie	(POMANN)
<i>Pomoxis nigromaculatus</i>	Black Crappie	(POMNIG)
Family Percidae		
	perches	
<i>Perca flavescens</i>	Yellow Perch	(PERFLA)
<i>Percina macrolepida</i>	Bigscale Logperch	(PERMAC)
<i>Sander vitreus</i>	Walleye	(SANVIT)

¹ = Focal taxa were the most abundant species from recent Middle Rio Grande collections

Table 2. Summary of the December 2016 Rio Grande Silvery Minnow population monitoring results (species list is based on fish collected since 1993).

FAMILY	SPECIES COMMON NAME	RESIDENCE STATUS ¹	TOTAL NUMBER OF SPECIMENS	PERCENT (%) OF TOTAL	FREQUENCY OF OCCURRENCE ²	% FREQUENCY OCCURRENCE ²
Clupeidae	Gizzard Shad	N	-	-	-	-
Clupeidae	Threadfin Shad	I	-	-	-	-
Cyprinidae	Central Stoneroller	I	-	-	-	-
Cyprinidae	Goldfish	I	-	-	-	-
Cyprinidae	Red Shiner	N	648	31.73	16	80
Cyprinidae	Common Carp	I	32	1.57	10	50
Cyprinidae	Rio Grande Chub	N	-	-	-	-
Cyprinidae	Rio Grande Silvery Minnow	N	1,061	51.96	19	95
Cyprinidae	Golden Shiner	I	-	-	-	-
Cyprinidae	Fathead Minnow	N	12	0.59	6	30
Cyprinidae	Bullhead Minnow	I	10	0.49	3	15
Cyprinidae	Flathead Chub	N	124	6.07	14	70
Cyprinidae	Longnose Dace	N	2	0.10	2	10
Catostomidae	River Carpsucker	N	9	0.44	6	30
Catostomidae	White Sucker	I	1	0.05	1	5
Catostomidae	Smallmouth Buffalo	N	-	-	-	-
Ictaluridae	Black Bullhead	I	-	-	-	-
Ictaluridae	Yellow Bullhead	I	-	-	-	-
Ictaluridae	Blue Catfish	N	-	-	-	-
Ictaluridae	Channel Catfish	I	61	2.99	12	60
Ictaluridae	Flathead Catfish	N	-	-	-	-
Salmonidae	Rainbow Trout	I	-	-	-	-
Salmonidae	Brown Trout	I	-	-	-	-
Poeciliidae	Western Mosquitofish	I	82	4.02	7	35
Moronidae	White Bass	I	-	-	-	-
Moronidae	Striped Bass	I	-	-	-	-
Centrarchidae	Green Sunfish	I	-	-	-	-
Centrarchidae	Bluegill	N	-	-	-	-
Centrarchidae	Longear Sunfish	I	-	-	-	-
Centrarchidae	Smallmouth Bass	I	-	-	-	-
Centrarchidae	Largemouth Bass	I	-	-	-	-
Centrarchidae	White Crappie	I	-	-	-	-
Centrarchidae	Black Crappie	I	-	-	-	-
Percidae	Yellow Perch	I	-	-	-	-
Percidae	Bigscale Logperch	I	-	-	-	-
Percidae	Walleye	I	-	-	-	-
MONTHLY TOTALS			2,042	100.00		

¹ N = native; I = introduced

² Frequency of occurrence values were based on 20 sampling sites

Table 3. Summary of the monthly catch of all fish species during 2016 (species list is based on fish collected since 1993).

FAMILY	SPECIES COMMON NAME	F E B	A P R	M A Y	J U N	J U L	A U G	S E P	O C T	D E C	T O T A L
Clupeidae	Gizzard Shad	-	2	-	-	4	1	-	-	-	7
Clupeidae	Threadfin Shad	-	-	-	-	-	-	-	-	-	0
Cyprinidae	Central Stoneroller	-	-	-	-	-	-	-	-	-	0
Cyprinidae	Goldfish	-	-	-	-	-	-	-	-	-	0
Cyprinidae	Red Shiner	362	1,054	1,218	439	699	1,678	524	1,574	648	8,196
Cyprinidae	Common Carp	3	5	3	71	1,232	530	54	37	32	1,967
Cyprinidae	Rio Grande Chub	-	-	-	-	-	-	-	-	-	0
Cyprinidae	Rio Grande Silvery Minnow	120	36	32	1,437	2,178	1,222	1,149	584	1,061	7,819
Cyprinidae	Golden Shiner	-	-	-	-	-	-	-	-	-	0
Cyprinidae	Fathead Minnow	8	11	8	70	52	115	6	18	12	300
Cyprinidae	Bullhead Minnow	-	5	9	-	1	-	-	7	10	32
Cyprinidae	Flathead Chub	73	174	313	248	268	388	179	183	124	1,950
Cyprinidae	Longnose Dace	1	8	181	272	142	166	68	39	2	879
Catostomidae	River Carpsucker	1	3	3	55	304	178	26	9	9	588
Catostomidae	White Sucker	1	4	654	32	157	64	6	2	1	921
Catostomidae	Smallmouth Buffalo	-	-	-	-	-	-	-	-	-	0
Ictaluridae	Black Bullhead	-	-	-	-	-	-	2	-	-	2
Ictaluridae	Yellow Bullhead	-	-	-	1	26	28	4	-	-	59
Ictaluridae	Blue Catfish	-	-	-	1	9	1	-	-	-	11
Ictaluridae	Channel Catfish	34	52	127	82	137	1,085	305	135	61	2,018
Ictaluridae	Flathead Catfish	-	1	-	-	1	-	2	1	-	5
Salmonidae	Rainbow Trout	-	-	-	-	-	-	-	-	-	0
Salmonidae	Brown Trout	-	-	-	-	-	-	-	-	-	0
Poeciliidae	Western Mosquitofish	15	39	64	14	621	1,229	238	206	82	2,508
Moronidae	White Bass	-	-	-	-	-	-	-	-	-	0
Moronidae	Striped Bass	-	-	-	-	-	-	-	-	-	0
Centrarchidae	Green Sunfish	-	-	1	-	1	2	-	-	-	4
Centrarchidae	Bluegill	-	-	-	1	-	-	-	-	-	1
Centrarchidae	Longear Sunfish	-	-	-	-	-	-	-	-	-	0
Centrarchidae	Smallmouth Bass	-	-	-	-	-	-	-	-	-	0
Centrarchidae	Largemouth Bass	-	-	-	-	104	42	4	3	-	153
Centrarchidae	White Crappie	1	-	1	-	2	1	-	-	-	5
Centrarchidae	Black Crappie	-	-	-	-	-	-	-	-	-	0
Percidae	Yellow Perch	-	-	-	-	2	1	-	-	-	3
Percidae	Bigscale Logperch	-	-	-	-	1	-	-	-	-	1
Percidae	Walleye	-	-	-	-	-	-	-	-	-	0
MONTHLY TOTALS		619	1,394	2,614	2,723	5,941	6,731	2,567	2,798	2,042	27,429

Table 4. Summary of the monthly catch of Rio Grande Silvery Minnow, by site and reach, during 2016. All marked individuals at a site are shown in parentheses (subset of the total).

REACH	SITE	SITE NAME	F E B	A P R	M A Y	J U N	J U L	A U G	S E P	O C T	D E C	T O T A L
Angostura	1	Angostura Dam	-	-	-	-	-	15(0)	-	-	-	15
Angostura	2	Bernalillo	-	1(0)	-	-	144(0)	199(0)	4(0)	2(0)	6(0)	356
Angostura	3	Rio Rancho	-	-	4(0)	209(0)	49(1)	21(0)	47(0)	13(0)	3(0)	346
Angostura	4	Central Ave.	-	4(0)	-	2(0)	207(0)	127(0)	82(0)	25(0)	260(1)	707
Angostura	5	Rio Bravo Blvd.	-	2(0)	-	42(0)	69(0)	105(0)	55(0)	39(0)	25(0)	337
Angostura Totals			-	7	4	253	469	467	188	79	294	1,761
Isleta	6	Los Lunas	-	-	8(1)	844(0)	410(0)	107(0)	71(0)	139(0)	59(0)	1,638
Isleta	7	Belen	3(1)	1(0)	2(0)	-	224(0)	59(0)	132(0)	15(0)	42(0)	478
Isleta	8	Jarales	2(1)	-	-	228(0)	21(0)	40(0)	5(0)	1(0)	102(0)	399
Isleta	9	Bernardo	6(1)	3(2)	3(2)	65(0)	138(0)	88(0)	12(0)	12(0)	37(0)	364
Isleta	10	La Joya	22(16)	1(0)	-	-	49(2)	83(0)	72(0)	28(0)	167(0)	422
Isleta	11	North of San Acacia	1(0)	-	-	-	275(0)	137(0)	31(0)	1(0)	64(0)	509
Isleta Totals			34	5	13	1,137	1,117	514	323	196	471	3,810
San Acacia	12	San Acacia Dam	1(1)	10(2)	-	-	5(1)	38(0)	162(0)	46(0)	1(0)	263
San Acacia	13	South of San Acacia	7(4)	4(1)	2(1)	3(0)	29(0)	82(0)	33(0)	9(0)	74(0)	243
San Acacia	14	Socorro	37(34)	1(1)	-	-	42(0)	60(0)	194(0)	85(0)	64(0)	483
San Acacia	15	North of San Antonio	6(4)	7(5)	1(1)	43(1)	218(2)	1(0)	105(0)	98(0)	27(0)	506
San Acacia	16	San Antonio	10(10)	-	-	-	162(0)	-	51(0)	50(0)	16(0)	289
San Acacia	17	South of San Antonio	3(2)	1(1)	5(4)	-	84(0)	-	11(0)	-	11(1)	115
San Acacia	18	San Marcial	1(0)	-	5(4)	1(1)	25(0)	48(0)	49(0)	14(0)	3(2)	146
San Acacia	19	South of San Marcial 1	14(13)	1(1)	2(2)	-	24(0)	10(0)	17(0)	5(0)	51(5)	124
San Acacia	20	South of San Marcial 2	7(5)	-	-	-	3(0)	2(0)	16(0)	2(0)	49(13)	79
San Acacia Totals			86	24	15	47	592	241	638	309	296	2,248
MONTHLY TOTALS			120	36	32	1,437	2,178	1,222	1,149	584	1,061	7,819

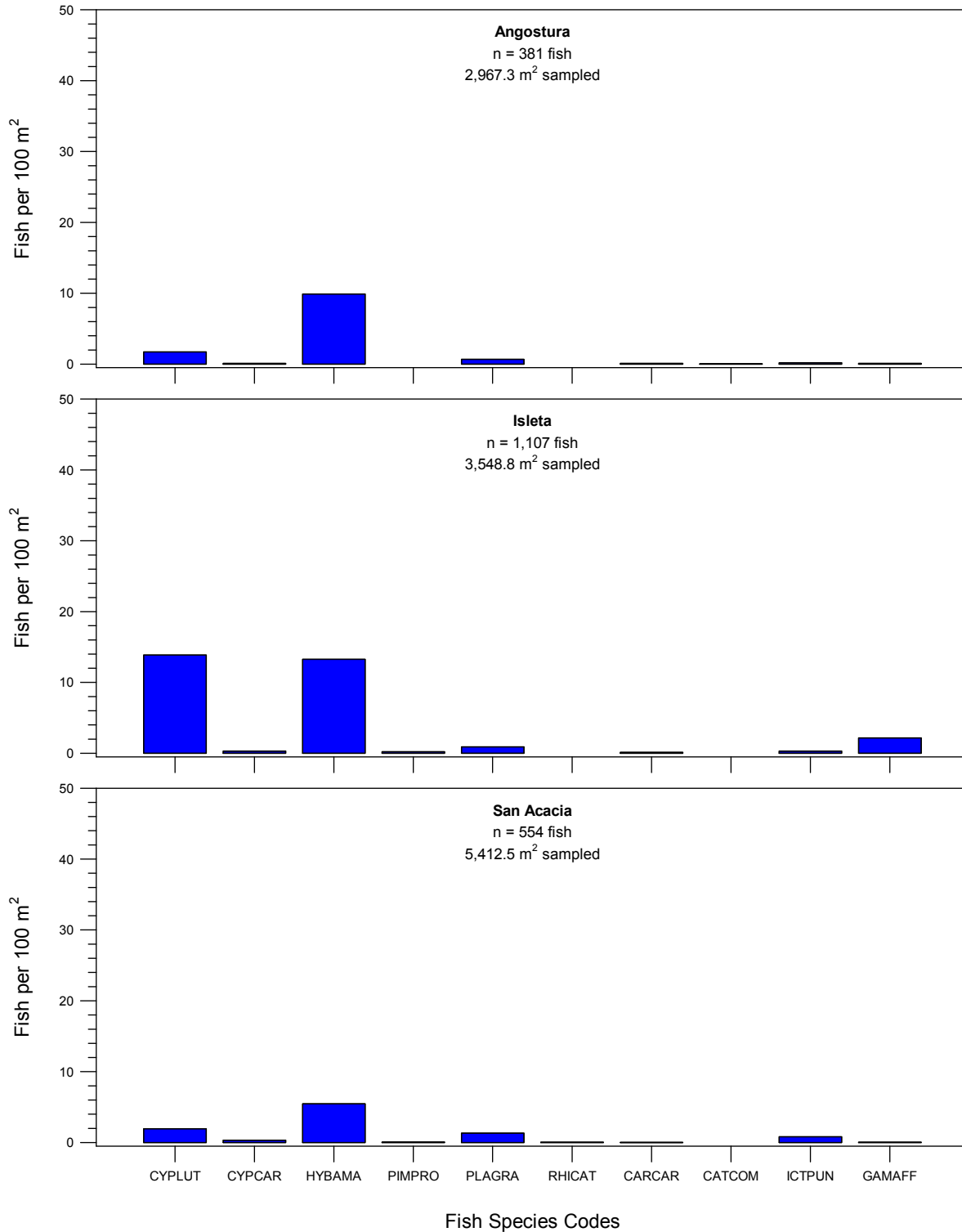


Figure 3. Fish densities from December 2016 for each focal species in the three reaches of the Middle Rio Grande (see Table 1 for fish species codes).

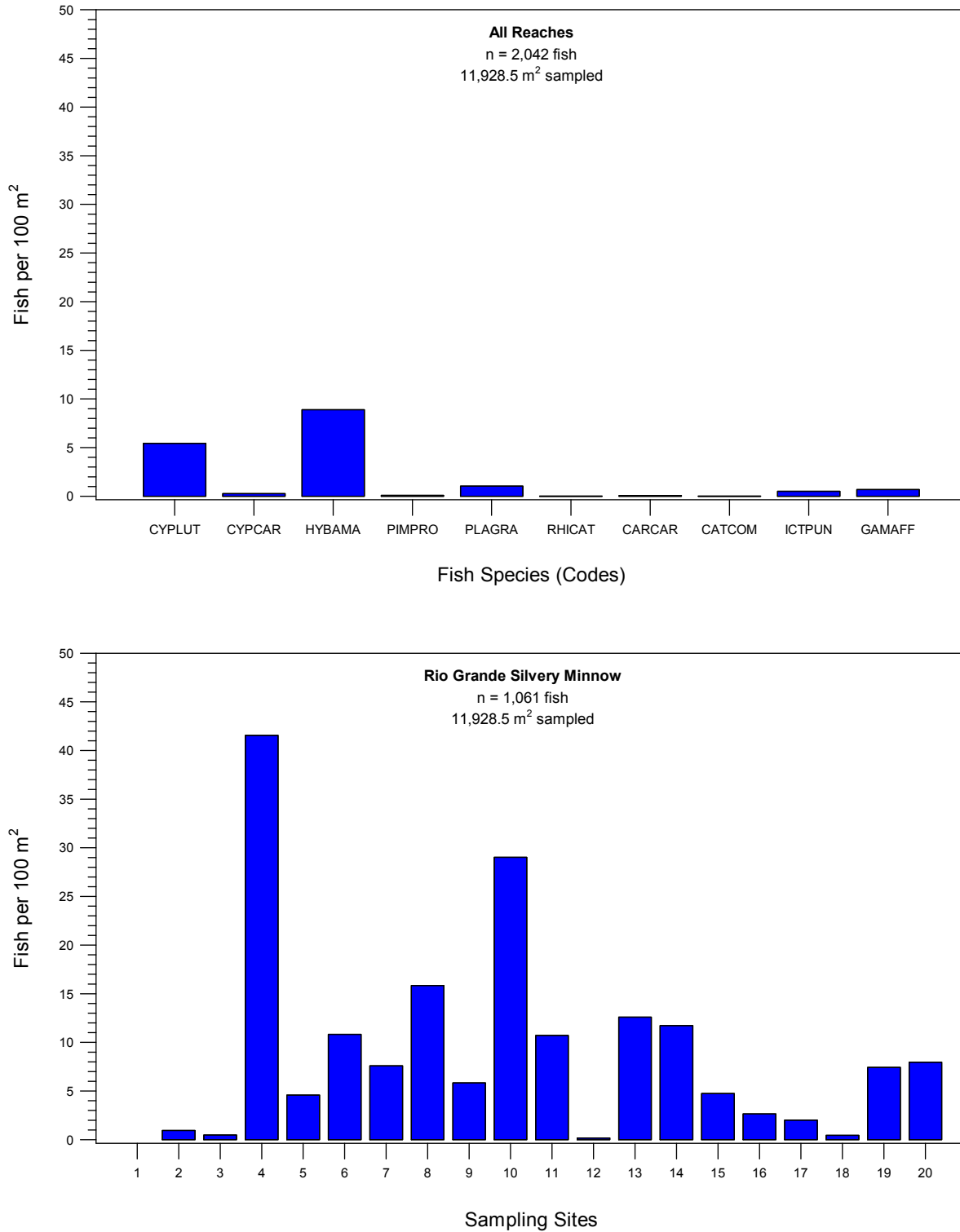


Figure 4. Catch rates for ten focal species from all reaches combined, and site-specific Rio Grande Silvery Minnow catch rates, during December 2016 (see Table 1 for fish species codes).

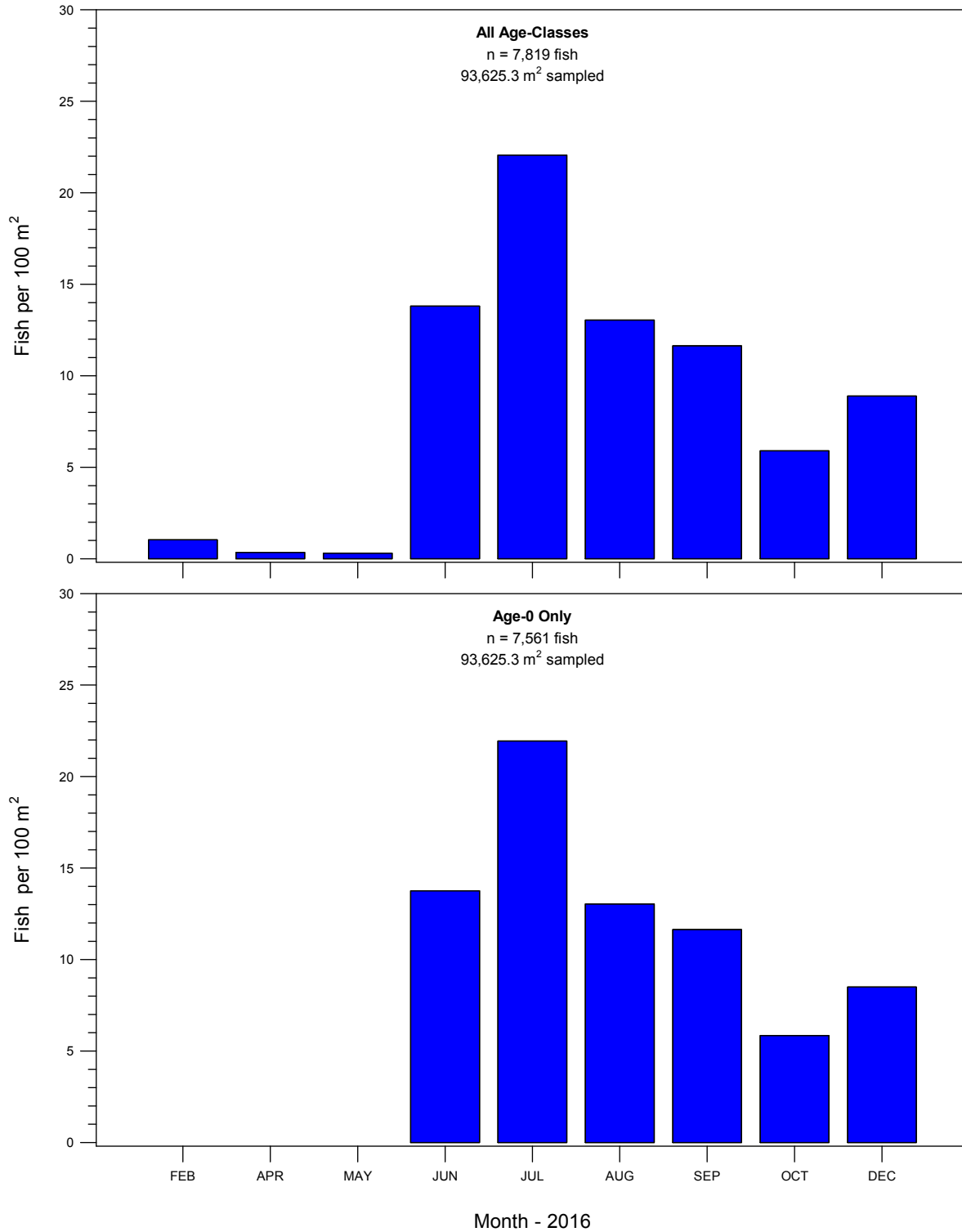


Figure 5. Inter-month fluctuations in densities of Rio Grande Silvery Minnow (all age-classes and age-0 only) during 2016.

APPENDIX A.

Collection localities of the Rio Grande Silvery Minnow population monitoring study

Table A. Fish collection localities, by reach, for the Rio Grande Silvery Minnow population monitoring study.

Site #	Site Locality
---------------	----------------------

ANGOSTURA REACH SITES

- 1 New Mexico, Sandoval County, Rio Grande, downstream of Angostura Diversion Dam, Algodones.
- 2 New Mexico, Sandoval County, Rio Grande, upstream of US Highway 550 bridge crossing, Bernalillo.
- 3 New Mexico, Sandoval County, Rio Grande, ca. 4.0 miles downstream of US Highway 550 bridge crossing, at Rio Rancho Wastewater Treatment Plant, Rio Rancho.
- 4 New Mexico, Bernalillo County, Rio Grande, upstream of Central Avenue (US Highway 66) bridge crossing, Albuquerque.
- 5 New Mexico, Bernalillo County, Rio Grande, upstream of Rio Bravo Boulevard bridge crossing, Albuquerque.

ISLETA REACH SITES

- 6 New Mexico, Valencia County, Rio Grande, ca. 0.3 miles upstream of Los Lunas (NM State Highway 49) bridge crossing, Los Lunas.
- 7 New Mexico, Valencia County, Rio Grande, ca. 1.0 miles upstream of NM State Highway 309/6 bridge crossing, Belen.
- 8 New Mexico, Valencia County, Rio Grande, ca. 2.2 miles upstream of NM State Highway 346 bridge crossing (near Transwestern Natural Gas Pipeline crossing), Jarales.
- 9 New Mexico, Socorro County, Rio Grande, upstream of US Highway 60 bridge crossing, Bernardo.
- 10 New Mexico, Socorro County, Rio Grande, ca. 3.5 miles downstream of US Highway 60 bridge crossing, La Joya.
- 11 New Mexico, Socorro County, Rio Grande, ca. 0.6 miles upstream of San Acacia Diversion Dam, San Acacia.

SAN ACACIA REACH SITES

- 12 New Mexico, Socorro County, Rio Grande, downstream of San Acacia Diversion Dam, San Acacia.
- 13 New Mexico, Socorro County, Rio Grande, ca. 1.5 miles downstream of San Acacia Diversion Dam, San Acacia.
- 14 New Mexico, Socorro County, Rio Grande, ca. 0.5 miles upstream of the Low Flow Conveyance Channel bridge, east and upstream of Socorro Wastewater Treatment Plant, Socorro.
- 15 New Mexico, Socorro County, Rio Grande, ca. 4.0 miles upstream of US Highway 380 bridge crossing, San Antonio.

Table A. Fish collection localities, by reach, for the Rio Grande Silvery Minnow population monitoring study (continued).

Site #	Site Locality
SAN ACACIA REACH SITES (continued)	
16	New Mexico, Socorro County, Rio Grande, upstream of US Highway 380 bridge crossing, San Antonio.
17	New Mexico, Socorro County, Rio Grande, directly east of Bosque del Apache National Wildlife Refuge headquarters, San Antonio.
18	New Mexico, Socorro County, Rio Grande, downstream of the San Marcial railroad crossing, San Marcial.
19	New Mexico, Socorro County, Rio Grande, at its former confluence with the Low Flow Conveyance Channel and 16 miles downstream of the southern end of the Bosque del Apache National Wildlife Refuge, San Marcial.
20	New Mexico, Socorro County, Rio Grande, ca. 10.0 miles downstream of the San Marcial Railroad Bridge crossing, San Marcial.

APPENDIX B.

Site-specific ichthyofaunal composition during the December 2016
Rio Grande Silvery Minnow population monitoring study

Monthly and annual reports are available at:
<http://mrgescp.dbstephens.com>

** Data are provisional and should be verified by direct inspection of field data **

**Rio Grande Silvery Minnow Population Monitoring
December 2016**

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage
Rio Grande, directly below Angostura Diversion Dam, Algodones.

RKD16-258

Site Number: 1 River Mile: 209.7 08 December 2016
UTM Easting: 363811 UTM Northing: 3916006 Zone: 13 Quad: San Felipe Pueblo
R.A. Reese, R.C. Keller, A. J. Schroeder Effort: 545.5 sq. m

FAMILY

N

No Fish Collected

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage
Rio Grande, at US HWY 550 (formerly NM State HWY 44) bridge crossing, Bernalillo.

RKD16-259

Site Number: 2 River Mile: 203.8 08 December 2016
UTM Easting: 358543 UTM Northing: 3909722 Zone: 13 Quad: Bernalillo
R.A. Reese, R.C. Keller, A. J. Schroeder Effort: 628.8 sq. m

FAMILY

N

76	<i>Cyprinella lutrensis</i>	2
76	<i>Hybognathus amarus*</i>	6
76	<i>Platygobio gracilis</i>	2

*** *Hybognathus amarus* by age class:**

age-0: 6
age-1:
age-2+:

**Rio Grande Silvery Minnow Population Monitoring
December 2016**

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage **RKD16-260**

Rio Grande, ca. 4.0 miles downstream of US HWY 550 (formerly NM State HWY 44) bridge crossing, at Rio Rancho Wastewater Treatment Plant, Rio Rancho.

Site Number: 3 River Mile: 200.0 08 December 2016
UTM Easting: 354772 UTM Northing: 3905355 Zone: 13 Quad: Bernalillo Effort: 621.3 sq. m
R.A. Reese, R.C. Keller, A. J. Schroeder

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	2
76	<i>Hybognathus amarus</i> *	3
76	<i>Platygobio gracilis</i>	5

*** *Hybognathus amarus* by age class:**

age-0: 3
age-1:
age-2+:

NEW MEXICO: BERNALILLO Co., RIO GRANDE Drainage **RKD16-257**

Rio Grande, at Central Avenue bridge crossing (US HWY 66), Albuquerque.

Site Number: 4 River Mile: 183.4 08 December 2016
UTM Easting: 346840 UTM Northing: 3884094 Zone: 13 Quad: Albuquerque West Effort: 625.5 sq. m
R.A. Reese, R.C. Keller, A. J. Schroeder

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	47
76	<i>Cyprinus carpio</i>	3
76	<i>Hybognathus amarus</i> *	260
76	<i>Platygobio gracilis</i>	12
81	<i>Carpionodes carpio</i>	2
81	<i>Catostomus commersonii</i>	1
93	<i>Ictalurus punctatus</i>	4
212	<i>Gambusia affinis</i>	3

*** *Hybognathus amarus* by age class:**

age-0: 227
age-1: 22
age-2+: 11

**Rio Grande Silvery Minnow Population Monitoring
December 2016**

NEW MEXICO: BERNALILLO Co., RIO GRANDE Drainage **RKD16-256**
Rio Grande, at Rio Bravo Blvd. Bridge crossing (NM State HWY 500) crossing, Albuquerque.

Site Number: 5 River Mile: 178.3 08 December 2016
UTM Easting: 347554 UTM Northing: 3877163 Zone: 13 Quad: Albuquerque West
R.A. Reese, R.C. Keller, A. J. Schroeder Effort: 546.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Hybognathus amarus</i> *	25
76	<i>Platygobio gracilis</i>	1
81	<i>Carpiodes carpio</i>	1
93	<i>Ictalurus punctatus</i>	2

* *Hybognathus amarus* by age class:
age-0: 24
age-1:
age-2+: 1

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage **RKD16-255**
Rio Grande, at Los Lunas Bridge crossing (NM State HWY 49), Los Lunas.

Site Number: 6 River Mile: 161.4 07 December 2016
UTM Easting: 342898 UTM Northing: 3852531 Zone: 13 Quad: Los Lunas
J.L. Kennedy, R.A. Reese, A.J. Schroeder Effort: 545.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	1
76	<i>Hybognathus amarus</i> *	59
76	<i>Platygobio gracilis</i>	1

* *Hybognathus amarus* by age class:
age-0: 59
age-1:
age-2+:

**Rio Grande Silvery Minnow Population Monitoring
December 2016**

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage
Rio Grande, ca. 1.0 miles upstream of NM State HWY 309/6 bridge crossing, Belen.

RKD16-254

Site Number: 7 River Mile: 151.5
UTM Easting: 339972 UTM Northing: 3837061 Zone: 13 Quad: Tome
J.L. Kennedy, R.A. Reese, A.J. Schroeder

07 December 2016

Effort: 553.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	142
76	<i>Cyprinus carpio</i>	5
76	<i>Hybognathus amarus*</i>	42
76	<i>Pimephales promelas</i>	3
76	<i>Platygobio gracilis</i>	3
93	<i>Ictalurus punctatus</i>	4
212	<i>Gambusia affinis</i>	5

*** *Hybognathus amarus* by age class:**

age-0: 41
age-1: 1
age-2+:

**Rio Grande Silvery Minnow Population Monitoring
December 2016**

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage
Rio Grande, ca. 2.2 miles upstream of NM State HWY 346 bridge crossing, Jarales.

RKD16-253

Site Number: 8 River Mile: 143.2 07 December 2016
UTM Easting: 338136 UTM Northing: 3827329 Zone: 13 Quad: Veguita
J.L. Kennedy, R.C. Keller, A.J. Schroeder Effort: 643.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	214
76	<i>Cyprinus carpio</i>	2
76	<i>Hybognathus amarus*</i>	102
76	<i>Pimephales promelas</i>	3
76	<i>Platygobio gracilis</i>	1
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	40

*** *Hybognathus amarus* by age class:**

age-0: 101
age-1: 1
age-2+:

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at US HWY 60 bridge crossing, Bernardo.

RKD16-252

Site Number: 9 River Mile: 130.6 07 December 2016
UTM Easting: 334604 UTM Northing: 3809726 Zone: 13 Quad: Abeytas
J.L. Kennedy, R.A. Reese, A.J. Schroeder Effort: 634.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	78
76	<i>Cyprinus carpio</i>	3
76	<i>Hybognathus amarus*</i>	37
76	<i>Pimephales promelas</i>	1
81	<i>Carpodes carpio</i>	2
212	<i>Gambusia affinis</i>	19

*** *Hybognathus amarus* by age class:**

age-0: 37
age-1:
age-2+:

**Rio Grande Silvery Minnow Population Monitoring
December 2016**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, ca. 3.5 miles downstream of the US HWY 60 bridge crossing, Bernardo.

RKD16-251

Site Number: 10 River Mile: 127.0 07 December 2016
UTM Easting: 331094 UTM Northing: 3805229 Zone: 13 Quad: Abeytas
J.L. Kennedy, R.A. Reese, A.J. Schroeder Effort: 575.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	50
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	167
76	<i>Pimephales promelas</i>	1
81	<i>Carpoides carpio</i>	1
93	<i>Ictalurus punctatus</i>	6
212	<i>Gambusia affinis</i>	10

*** Hybognathus amarus by age class:**

age-0: 163
age-1: 4
age-2+:

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, ca. 0.6 miles upstream of San Acacia Diversion Dam, San Acacia

RKD16-250

Site Number: 11 River Mile: 116.8 06 December 2016
UTM Easting: 327902 UTM Northing: 3792603 Zone: 13 Quad: La Joya
J.L. Kennedy, R.C. Keller, A.J. Schroeder Effort: 597.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	7
76	<i>Hybognathus amarus*</i>	64
76	<i>Platygobio gracilis</i>	27
81	<i>Carpoides carpio</i>	2
212	<i>Gambusia affinis</i>	3

*** Hybognathus amarus by age class:**

age-0: 64
age-1:
age-2+:

**Rio Grande Silvery Minnow Population Monitoring
December 2016**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, directly below San Acacia Diversion Dam, San Acacia.

RKD16-249

Site Number: 12 River Mile: 116.2 06 December 2016
UTM Easting: 326162 UTM Northing: 3791977 Zone: 13 Quad: San Acacia
J.L. Kennedy, R.C. Keller, A.J. Schroeder Effort: 594.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	2
76	<i>Hybognathus amarus*</i>	1
76	<i>Platygobio gracilis</i>	13
76	<i>Rhinichthys cataractae</i>	1
93	<i>Ictalurus punctatus</i>	1

*** Hybognathus amarus by age class:**

age-0: 1
age-1:
age-2+:

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, ca. 1.5 miles downstream of San Acacia Diversion Dam, San Acacia.

RKD16-248

Site Number: 13 River Mile: 114.6 06 December 2016
UTM Easting: 325263 UTM Northing: 3790442 Zone: 13 Quad: Lemitar
J.L. Kennedy, R.C. Keller, A.J. Schroeder Effort: 587.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	51
76	<i>Hybognathus amarus*</i>	74
76	<i>Pimephales promelas</i>	3
76	<i>Platygobio gracilis</i>	49
212	<i>Gambusia affinis</i>	2

*** Hybognathus amarus by age class:**

age-0: 74
age-1:
age-2+:

**Rio Grande Silvery Minnow Population Monitoring
December 2016**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage **RKD16-247**

Rio Grande, east of Socorro, 0.5 miles upstream of Socorro Low Flow Conveyance Channel
bridge and east just upstream of Socorro Wastewater Treatment Plant, Socorro.

Site Number: 14 River Mile: 99.5 06 December 2016
UTM Easting: 327097 UTM Northing: 3771043 Zone: 13 Quad: Loma de las Canas
J.L. Kennedy, R.C. Keller, A.J. Schroeder Effort: 545.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	3
76	<i>Hybognathus amarus*</i>	64
76	<i>Platygobio gracilis</i>	6
93	<i>Ictalurus punctatus</i>	1

*** *Hybognathus amarus* by age class:**

age-0: 64
age-1:
age-2+:

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage **RKD16-246**

Rio Grande, ca. 4.0 miles upstream of U.S. 380 bridge crossing.

Site Number: 15 River Mile: 91.7 06 December 2016
UTM Easting: 328140 UTM Northing: 3761283 Zone: 13 Quad: San Antonio
J.L. Kennedy, R.C. Keller, A.J. Schroeder Effort: 569.8 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Hybognathus amarus*</i>	27

*** *Hybognathus amarus* by age class:**

age-0: 27
age-1:
age-2+:

**Rio Grande Silvery Minnow Population Monitoring
December 2016**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at US HWY 380 bridge crossing, San Antonio.

RKD16-245

Site Number: 16 River Mile: 87.1 05 December 2016
UTM Easting: 328914 UTM Northing: 3754471 Zone: 13 Quad: San Antonio
J.L. Kennedy, R.C. Keller, A.J. Schroeder Effort: 601.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinus carpio</i>	6
76	<i>Hybognathus amarus*</i>	16
76	<i>Platygobio gracilis</i>	2
76	<i>Rhinichthys cataractae</i>	1
93	<i>Ictalurus punctatus</i>	16

*** Hybognathus amarus by age class:**

age-0: 16
age-1:
age-2+:

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, directly east of Bosque del Apache National Wildlife Refuge Headquarters.

RKD16-244

Site Number: 17 River Mile: 79.1 05 December 2016
UTM Easting: 327055 UTM Northing: 3740839 Zone: 13 Quad: San Antonio SE
J.L. Kennedy, R.C. Keller, A.J. Schroeder Effort: 549.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	1
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	11
93	<i>Ictalurus punctatus</i>	2

*** Hybognathus amarus by age class:**

age-0: 10
age-1: 1
age-2+:

**Rio Grande Silvery Minnow Population Monitoring
December 2016**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at San Marcial Railroad Bridge, San Marcial.

RKD16-243

Site Number: 18 River Mile: 68.6 05 December 2016
UTM Easting: 315284 UTM Northing: 3728347 Zone: 13 Quad: San Marcial
J.L. Kennedy, R.C. Keller, A.J. Schroeder Effort: 663.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	2
76	<i>Cyprinus carpio</i>	2
76	<i>Hybognathus amarus*</i>	3
76	<i>Pimephales vigilax</i>	2
93	<i>Ictalurus punctatus</i>	9

*** Hybognathus amarus by age class:**

age-0: 3
age-1:
age-2+:

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, ca. 8 miles downstream of the San Marcial railroad bridge crossing

RKD16-242

Site Number: 19 River Mile: 60.5 05 December 2016
UTM Easting: 309487 UTM Northing: 3718178 Zone: 13 Quad: Paraje Well
J.L. Kennedy, R.C. Keller, A.J. Schroeder Effort: 686.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	15
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	51
76	<i>Pimephales vigilax</i>	3
76	<i>Platygobio gracilis</i>	1
93	<i>Ictalurus punctatus</i>	1

*** Hybognathus amarus by age class:**

age-0: 46
age-1: 5
age-2+:

**Rio Grande Silvery Minnow Population Monitoring
December 2016**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, ca. 10 mi downstream of the San Marcial railroad bridge crossing

RKD16-241

Site Number: 20 River Mile: 58.8 05 December 2016
UTM Easting: 307846 UTM Northing: 3716150 Zone: 13 Quad: Paraje Well
J.L. Kennedy, R.C. Keller, A.J. Schroeder Effort: 615.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	31
76	<i>Cyprinus carpio</i>	8
76	<i>Hybognathus amarus*</i>	49
76	<i>Pimephales promelas</i>	1
76	<i>Pimephales vigilax</i>	5
76	<i>Platygobio gracilis</i>	1
81	<i>Carpiodes carpio</i>	1
93	<i>Ictalurus punctatus</i>	14

*** *Hybognathus amarus* by age class:**

age-0: 48
age-1: 1
age-2+: