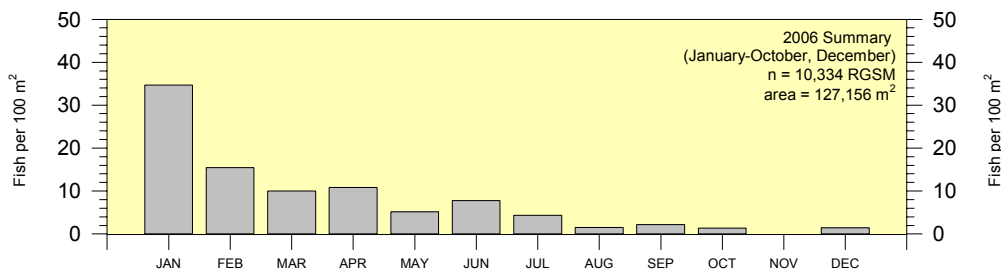
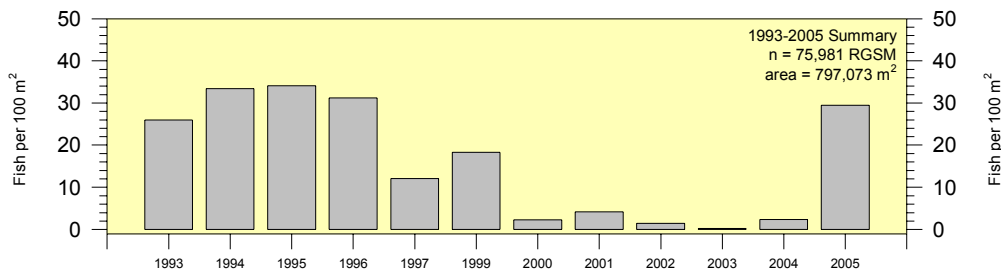


**SUMMARY OF THE RIO GRANDE SILVERY MINNOW
POPULATION MONITORING PROGRAM RESULTS FROM DECEMBER 2006**
(4-8 December 2006)

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



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23 January 2007

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prepared for:

MIDDLE RIO GRANDE ENDANGERED SPECIES ACT COLLABORATIVE PROGRAM

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SUMMARY OF OVERALL DECEMBER 2006 POPULATION MONITORING EFFORTS

The eleventh sampling effort of the 2006 Rio Grande silvery minnow population monitoring program was conducted between 4-8 December 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-1).

Adult and juvenile fish were obtained by rapidly drawing a 3.1 m x 1.8 m small mesh (5 mm) seine through discrete mesohabitats. Larval fish, normally collected with a 1.0 m x 1.0 m fine mesh (2 mm) seine, were not present. Rio Grande silvery minnow were counted and identified to age-class. Other fishes were identified to species and enumerated, but age-class was not determined. Figures illustrating catch rates (number of fish per 100 m² sampled) were prepared for the ten focal species, including Rio Grande silvery minnow, for the purpose of facilitating comparisons between reaches.

During December 2006, a total of 3,608 fish was captured in the 12,188.3 m² (surface area) of water sampled. This was notably less than the number of fish collected in June 2006 (N=14,058), shortly after spawning for most species, and somewhat less than was collected in September 2006 (N=4,413). Rio Grande silvery minnow was the second-most abundant taxon in December 2006 (N=173) and comprised 4.8% of the total catch; this was similar to values observed over the past several months. Rio Grande silvery minnow was present in 56 of the 203 seine hauls that yielded fish (27.6%) and was moderately abundant in low velocity mesohabitats (e.g., backwaters and debris pools). Cumulative fish catch rate during December 2006 was 29.6 individuals/100 m² sampled; a slight decrease from that recorded in September (35.7 fish/100 m²). The December cumulative catch of Rio Grande silvery minnow (N=173) was composed mostly of individuals from the Isleta and San Acacia reaches (N=27 and 136, respectively).

SUMMARY OF DECEMBER 2006 POPULATION MONITORING EFFORT BY RIVER REACH

Angostura Reach

Mean daily discharge in the Angostura Reach (USGS Gauge 08330000; Rio Grande at Albuquerque, NM) ranged between 548 cfs and 990 cfs during December. Changes in upstream water releases from dams throughout the month resulting in a mildly fluctuating hydrograph; peak mean daily discharge (990 cfs) was recorded on 15 December. Water temperatures were cold (range = 2.6 - 7.5 °C) during the Angostura Reach sampling efforts (1000 h to 1400 h); this was a notable drop (ca. 10 °C less) compared to temperatures observed in October. Sampling for fishes in the Angostura Reach during December 2006 yielded only 29 specimens of which 10 (34.5%) were Rio Grande silvery minnow. Catch rate in the Angostura Reach, for all fish species combined, ranged from 0.4 to 2.8 fish/100 m². The largest change in the ichthyofaunal composition compared to summer sampling was the decrease in the presence and abundance of larval/juvenile white sucker. Rio Grande silvery minnow was present at three of the five sampling sites and was most abundant at Site 3 in the Angostura Reach (seven individuals were collected from this site).

The Angostura Reach yielded four species of fish but only two species (red shiner and Rio Grande silvery minnow) dominated the catch. Rio Grande silvery minnow was most abundant in seine hauls taken in areas where there was little or no water velocity. Fish taken at the Central Avenue bridge site (Site 3) and Rio Bravo site (Site 4) accounted for 65.5% of the catch in this reach. Most of the Rio Grande silvery minnow collected in the Angostura Reach during December 2006 were age-0 individuals (70%). Catch rate of Rio Grande silvery minnow in the Angostura Reach ranged from 0.0 to 1.1 fish/100 m².

Isleta Reach

The Isleta Reach produced the highest number of fish in any given reach and the overall abundance of fish (N=2,638) was comparable to that recorded in July 2006 (N=2,882). Many of the

collections in the Isleta Reach produced low to moderate numbers of fish. Nine fish species were collected in the Isleta Reach during December 2006; only red shiner was represented by >100 individuals. Red shiner was very abundant (N=2,452), followed distantly by flathead chub (N=52) and western mosquitofish (N=52). Fish capture rates (all species combined) at the six sites ranged from 6.3 to 175.3 individuals per 100 m² sampled; this was a notable increase compared to October and can mostly be explained by the decreased water levels.

In December 2006, the La Joya sampling locality (Site 9) produced the highest capture rate of Rio Grande silvery minnow (1.5 individuals /100 m²) sampled. The majority of Rio Grande silvery minnow collected in the Isleta Reach during December were collected in low velocity habitats (e.g., shorelines and pools). Twenty six percent of silvery minnow collected in the Isleta Reach during December were taken at the Seviletta sampling site (Site 9.5); all of the individuals captured at that site were age-0. There was a notable decline in the abundance of silver minnow at the Jarales site (Site 7) between June (N=409) and December (N=6). Catch rates for Rio Grande silvery minnow in the Isleta Reach ranged from 0.0 to 1.5 fish/100 m².

San Acacia Reach

Discharge in the San Acacia Reach during the December 2006 sampling effort was moderately low throughout most of the month, data were not available for the San Acacia Gauge (USGS Gauge 08354900) but ranged between 559 cfs and 1,040 cfs at San Marcial (USGS Gauge 08358400). There were several brief increases in flow that resulted in elevated mean daily flows at San Acacia and San Marcial during December. Water temperatures in December for the San Acacia Reach were cooler than those recorded in the Angostura Reach and were generally 2-4 °C (1000 h to 1400 h). The water was relatively clear throughout the reach and this was most likely a result of the stable flows during the sampling period. Fish catch rates (all species combined) ranged from 1.0 to 73.8 individuals per 100 m² sampled in the San Acacia Reach.

The catch rates of Rio Grande silvery minnow increased between October and December; this could have been caused, in part, by the reduced volume of water during sampling in December. The catch rates of Rio Grande silvery minnow in December for the San Acacia Reach were higher than those recorded in the Isleta Reach. In December 2006, Rio Grande silvery minnow was present in 36 of 92 seine hauls (39%) that contained fish in the San Acacia Reach; a marked increase compared to September (14%). Most of the 136 Rio Grande silvery minnow collected in the San Acacia Reach in December 2006 were age-1 individuals (69%). Rio Grande silvery minnow was present at all of the San Acacia Reach sites and catch rates for this species ranged from 0.1 to 13.3 fish/100 m².

Conclusion

During the December 2006 sampling effort, Rio Grande silvery minnow (N=173) was present at 17 out of 20 sampling sites in the Middle Rio Grande, New Mexico. The most notable change from October to December 2006 was the decreased volume of water and the increased abundance of red shiner. There was no evidence of declining populations of Rio Grande silvery minnow from August to December 2006. However, the lack of spring runoff apparently resulted in low spawning activity and limited recruitment success during 2006. Despite heavy summer rains and minimal river drying, the abundance of Rio Grande silvery minnow declined steadily from June to August 2006. Spring runoff continues to be a valuable indicator of silvery minnow recruitment success. Monthly monitoring efforts have proven to be extremely valuable in documenting the rapid decline of silvery minnow populations during 2006. If spring runoff conditions improve (or can be augmented through management) during 2007, it is expected that populations will increase from currently moderate levels. The key factors that determine an improved spring runoff appear to be timing, magnitude, and duration. Ichthyofaunal monitoring efforts indicate that these three factors have a synergistic effect on fish populations and may greatly influence the distribution and abundance of Rio Grande silvery minnow over time.

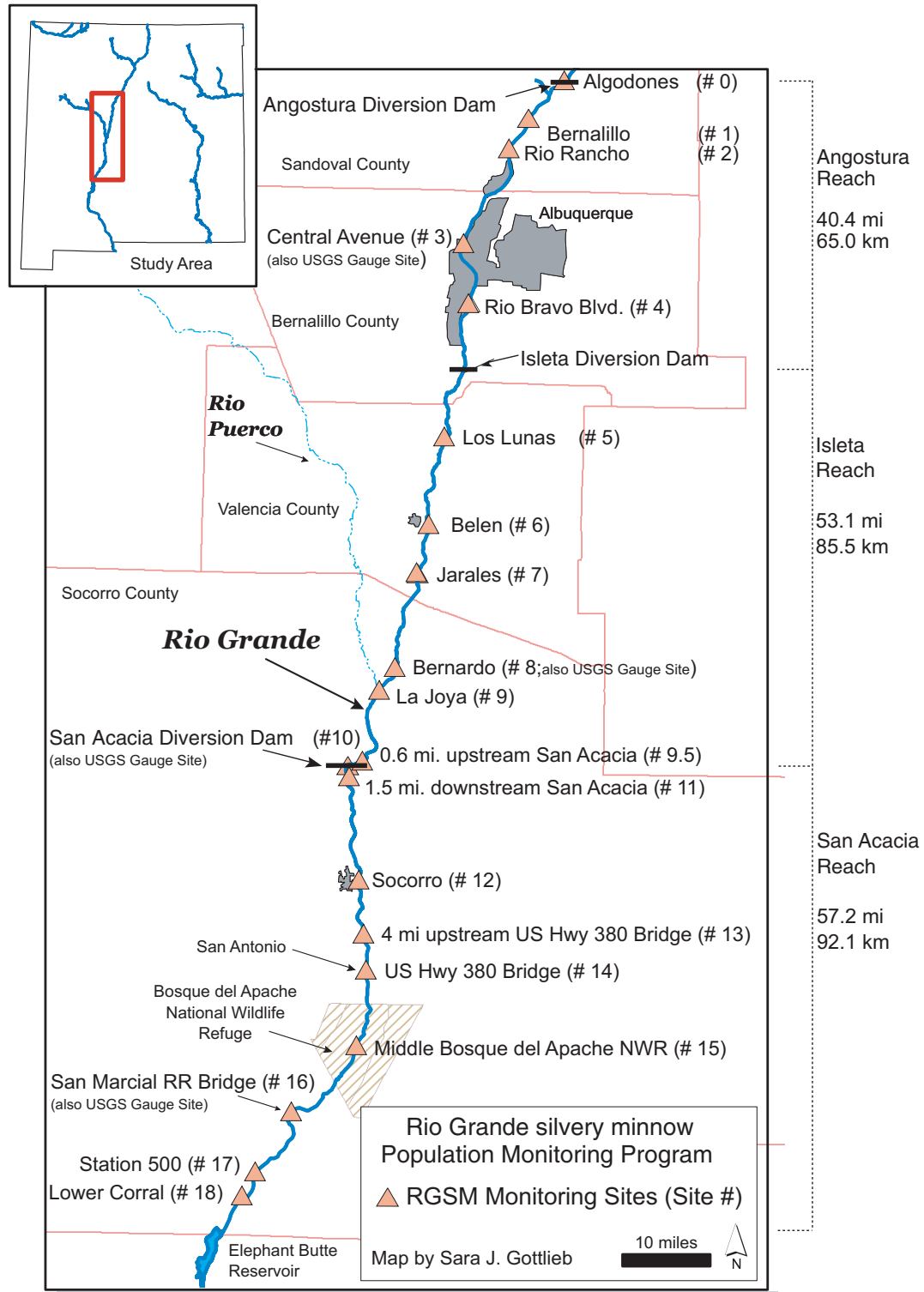


Figure 1. Map of the study area and sampling localities (numbered) for the 2006 Rio Grande silvery minnow population monitoring program. Sampling locality information that correspond with the numbered localities are provided in Appendix A (Table A-1).

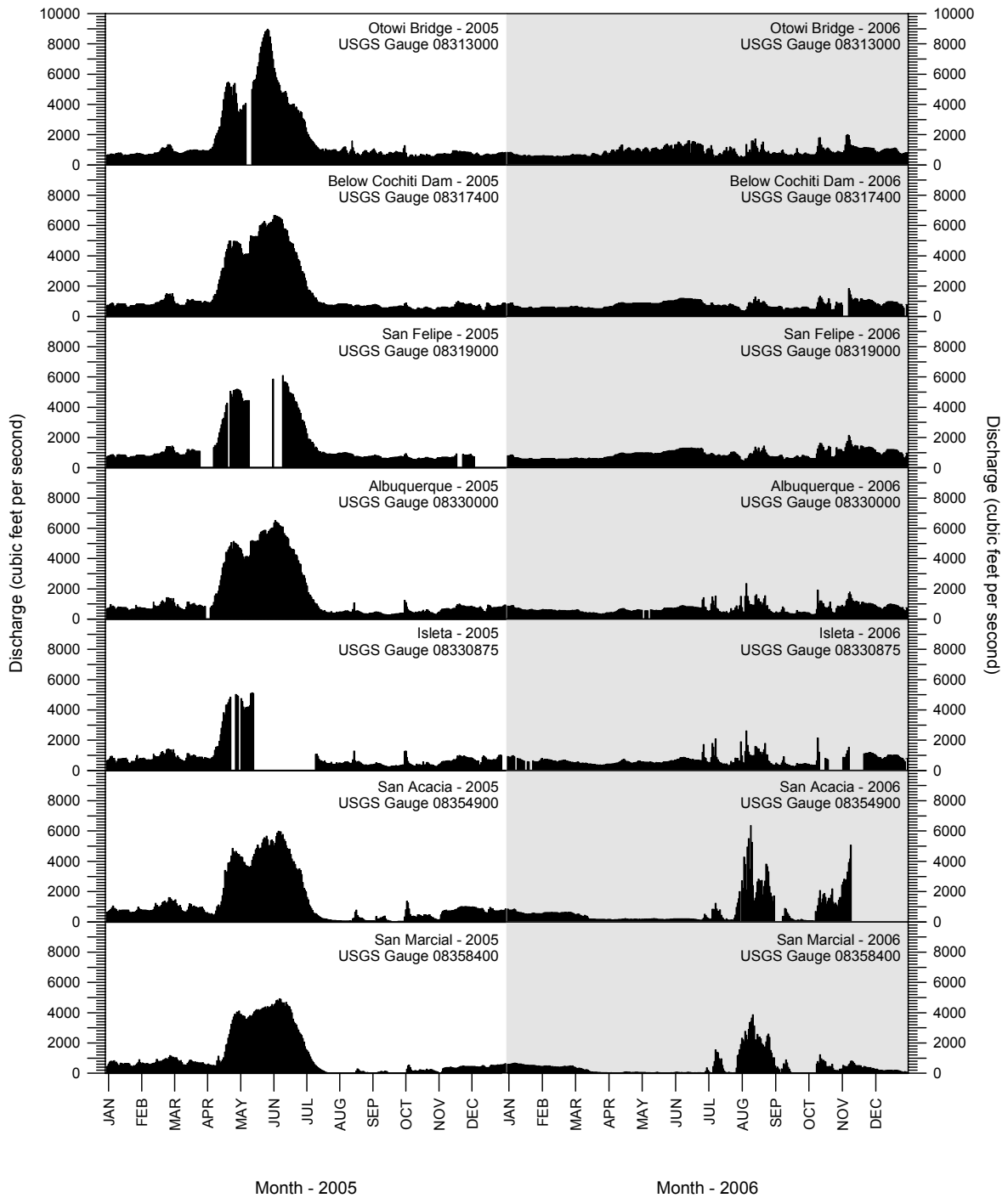


Figure 2. Discharge in the Rio Grande from January 2005 through December 2006 as recorded at seven U. S. Geological Survey (USGS) gauge stations. The Otowi Bridge gauge site is outside of the study area (ca. 25.5 river miles upstream of Cochiti Dam) and provided for reference. **Discharge data are provisional and subject to change.

Table 1. Scientific and common names and species codes of fish collected in the Middle Rio Grande during the 1999-2006 Rio Grande silvery minnow population monitoring program.

Scientific Name	Common Name	Code
Order Clupeiformes		
Family Clupeidae		
	herrings	
<i>Dorosoma cepedianum</i>	gizzard shad	(GZS)
Order Cypriniformes		
Family Cyprinidae		
	carps and minnows	
<i>Cyprinella lutrensis</i>	red shiner ¹	(RDS)
<i>Cyprinus carpio</i>	common carp ¹	(CCA)
<i>Gila pandora</i>	Rio Grande chub	(RGC)
<i>Hybognathus amarus</i>	Rio Grande silvery minnow ¹	(RGM)
<i>Pimephales promelas</i>	fathead minnow ¹	(FHM)
<i>Pimephales vigilax</i>	bullhead minnow	(BHM)
<i>Platygobio gracilis</i>	flathead chub ¹	(FHC)
<i>Rhinichthys cataractae</i>	longnose dace ¹	(LND)
Family Catostomidae		
	suckers	
<i>Carpiodes carpio</i>	river carpsucker ¹	(RCS)
<i>Catostomus commersonii</i>	white sucker ¹	(WHS)
<i>Ictiobus bubalus</i>	smallmouth buffalo	(SMB)
Order Siluriformes		
Family Ictaluridae		
	North American catfishes	
<i>Ameiurus melas</i>	black bullhead	(BBH)
<i>Ameiurus natalis</i>	yellow bullhead	(YBH)
<i>Ictalurus punctatus</i>	channel catfish ¹	(CCT)
<i>Pylodictis olivaris</i>	flathead catfish	(FCT)
Order Salmoniformes		
Family Salmonidae		
	trouts and salmons	
<i>Salmo trutta</i>	brown trout	(BNT)
Order Cyprinodontiformes		
Family Poeciliidae		
	livebearers	
<i>Gambusia affinis</i>	western mosquitofish ¹	(MOS)

¹ focal taxa represent the most abundant species present in recent Middle Rio Grande collections and species illustrated in monthly plots of data.

Table 1. Scientific and common names and species codes of fish collected in the Middle Rio Grande during the 1999-2006 Rio Grande silvery minnow population monitoring program (continued).

Scientific Name	Common Name	Code
Order Perciformes		
Family Percichthyidae	temperate basses	
<i>Morone chrysops</i>	white bass	(WHB)
Order Perciformes		
Family Centrarchidae	sunfishes	
<i>Lepomis cyanellus</i>	green sunfish	(GNS)
<i>Lepomis macrochirus</i>	bluegill	(BGL)
<i>Micropterus salmoides</i>	largemouth bass	(LMB)
<i>Pomoxis annularis</i>	white crappie	(WCR)
<i>Pomoxis nigromaculatus</i>	black crappie	(BCR)
Family Percidae	perches	
<i>Perca flavescens</i>	yellow perch	(YWP)
<i>Sander vitreus</i>	walleye	(WLE)

Table 2. Summary of the December 2006 Rio Grande silvery minnow population monitoring program results (species list is based on fish collected from 1999-2006).

SPECIES	RESIDENCE STATUS ¹	TOTAL NUMBER OF SPECIMENS	PERCENT (%) OF TOTAL	FREQUENCY OF OCCURRENCE ²	% FREQUENCY OF OCCURRENCE ²
HERRINGS					
gizzard shad	I	—	0.00	—	—
CARPS AND MINNOWS					
red shiner	N	3,188	88.36	17	85
common carp	I	—	0.00	—	—
Rio Grande chub	N	—	0.00	—	—
Rio Grande silvery minnow	N	173	4.79	17	85
fathead minnow	N	40	1.11	7	35
bullhead minnow	I	—	0.00	—	—
flathead chub	N	121	3.35	12	60
longnose dace	N	—	0.00	—	—
SUCKERS					
river carpsucker	N	14	0.39	7	35
white sucker	I	1	0.03	1	5
smallmouth buffalo	N	—	0.00	—	—
BULLHEAD CATFISHES					
black bullhead	I	—	0.00	—	—
yellow bullhead	I	—	0.00	—	—
channel catfish	I	14	0.39	9	45
flathead catfish	I	—	0.00	—	—
TROUTS					
rainbow trout	I	—	0.00	—	—
brown trout	I	—	0.00	—	—
LIVEBEARERS					
western mosquitofish	I	54	1.50	5	25
TEMPERATE BASSES					
white bass	I	—	0.00	—	—
SUNFISHES					
green sunfish	I	—	0.00	—	—
bluegill	N	—	0.00	—	—
largemouth bass	I	1	8.20	1	5
white crappie	I	2	1.64	2	10
black crappie	I	—	0.00	—	—
PERCHES					
yellow perch	I	—	0.00	—	—
bigscale logperch	I	—	0.00	—	—
walleye	I	—	0.00	—	—
TOTAL		3,608			

Table 3. Summary of the monthly 2006 Rio Grande silvery minnow population monitoring program results (species list based on fish collected from 1999-2006).

SPECIES	J A N	F E B	M A R	A P R	M A Y	J U N	J U L	A U G	S E P	O C T	N O V	D E C	T O T A L
HERRINGS													
gizzard shad	—	—	—	1	3	56	—	—	—	1	—	—	61
CARPS AND MINNOWS													
red shiner	41	80	53	405	766	5,661	2,327	1,629	3,093	1,669	—	3,188	18,912
common carp	13	17	5	10	217	975	36	13	11	1	—	—	1,298
Rio Grande chub	—	—	—	—	—	—	—	—	—	—	—	—	—
Rio Grande silvery minnow	3,375	1,620	1,148	1,404	654	920	463	160	251	166	—	173	10,334
fathead minnow	13	13	11	13	1,282	2,935	874	69	261	76	—	40	5,587
bullhead minnow	—	1	—	—	—	—	—	—	—	—	—	—	1
flathead chub	24	8	17	25	132	413	301	155	174	204	—	121	1,574
longnose dace	6	2	4	3	67	93	46	119	35	23	—	—	398
SUCKERS													
river carpsucker	5	5	2	8	158	1,243	189	11	9	3	—	14	1,647
white sucker	—	—	1	1	760	1,276	32	8	5	3	—	1	2,087
smallmouth buffalo	—	—	—	—	3	39	—	—	1	—	—	—	43
BULLHEAD CATFISHES													
black bullhead	—	—	—	—	—	—	—	—	10	—	—	—	10
yellow bullhead	1	7	—	—	2	1	12	—	2	1	—	—	26
channel catfish	—	6	25	23	12	16	461	268	129	160	—	14	1,114
flathead catfish	—	—	—	—	—	—	—	—	—	—	—	—	—
TROUTS													
rainbow trout	—	—	—	—	—	—	—	—	—	—	—	—	—
brown trout	—	—	—	—	—	—	—	—	—	—	—	—	—
LIVEBEARERS													
western mosquitofish	6	5	8	7	91	399	277	106	427	192	—	54	1,572
TEMPERATE BASSES													
white bass	—	1	2	5	1	2	—	—	—	—	—	—	11
SUNFISHES													
green sunfish	—	—	—	—	—	—	4	—	4	—	—	—	8
bluegill	—	—	—	1	—	—	—	—	1	—	—	—	2
largemouth bass	—	—	1	—	—	1	1	—	—	—	—	1	4
white crappie	1	1	—	—	1	3	—	—	—	—	—	2	8
black crappie	—	—	—	—	—	—	—	—	—	—	—	—	—
PERCHES													
yellow perch	—	—	—	—	—	—	—	—	—	—	—	—	—
bigscale logperch	—	—	—	1	—	—	—	—	—	—	—	—	1
walleye	—	—	—	—	—	25	2	—	—	—	—	—	27
TOTAL	3,485	1,766	1,277	1,907	4,149	14,058	5,025	2,538	4,413	2,499	—	3,608	44,725

Table 4. Summary of the monthly catch of Rio Grande silvery minnow, by site and reach, during the 2006 Rio Grande silvery minnow population monitoring program. Numerals in parenthesis are the number of silvery minnow in a site collection that were marked (subset of the total).

REACH	J	F	M	A	M	J	J	A	S	O	N	D	T
Site Number	A	E	A	P	A	U	U	U	E	C	O	E	O
Site Name	N	B	R	R	Y	N	L	G	P	T	V	C	A
ANGOSTURA REACH													
0 Angostura Dam	—	—	—	—	—	—	10	0	6	3	—	—	19
1 Bernalillo	—	—	1	—	1	2	6	9	2	38	—	—	59
2 Rio Rancho	—	2	3	36	17(3)	27(3)	11(2)	15(4)	38	7	—	1	157
3 Central Ave (Abq)	3	15(2)	4	5	—	1	34	38	1	7	—	7	115
4 Rio Bravo (Abq)	—	3	2	6	8(1)	—	3	1	—	18	—	2	43
Angostura Reach Total	3	20	10	47	26	30	64	63	47	73	—	10	393
ISLETA REACH													
5 Los Lunas	12	2	142	13	71	4	21	3	5	5	—	4	282
6 Belen	32	8	16	5	116	17	62	0	45	1	—	6	308
7 Jarales	1,994	32	21(1)	4	7	409	41	19	—	3	—	6	2,536
8 US Hwy 60 Bernardo	8	13	26	2	9	6	21	5	8	—	—	—	98
9 South of Bernardo	45	1	8	3	3	1	122	45	7	2	—	7	244
10 North of San Acacia	14(1)	9	62	1	—	27	1	3	3	13	—	4	137
Isleta Reach Total	2,105	65	275	28	206	464	268	75	68	24	—	27	3,605
SAN ACACIA REACH													
10 San Acacia Dam	—	27(1)	26	83(1)	139	102	44	1	—	1	—	1	424
11 S of San Acacia	6	8(1)	56(1)	204(1)	50(1)	17	5	1	2	5	—	4	358
12 Socorro	382(2)	481(2)	60	597(1)	141(1)	97	8	0	24	9	—	12	1,811
13 North of US Hwy 380	78(1)	15	439	127	34	21	13	14	7	4	—	8	760
14 US Hwy 380	163	51	38	286	33	34	37	0	12	1	—	6	661
15 Bosque del Apache	447	873	139	13	13	52	3	0	4	—	—	1	1,545
16 San Marcial	132	37	63	13	10	93	0	3	9	16	—	3	379
17 South of San Marcial	21	35	23	3	1	6	1	3	56	24	—	75	248
18 South of San Marcial	38	8	19	3	1	4	20	0	22	9	—	26	150
San Acacia Reach Total	1,267	1,535	863	1,329	422	426	131	22	136	69	—	136	6,336
MONTHLY TOTALS													
	3,375	1,620	1,148	1,404	654	920	463	160	251	166	—	173	10,334
	J	F	M	A	M	J	J	A	S	O	N	D	T
	A	E	A	P	A	U	U	U	E	C	O	E	O
	N	B	R	R	Y	N	L	G	P	T	V	C	A
													L

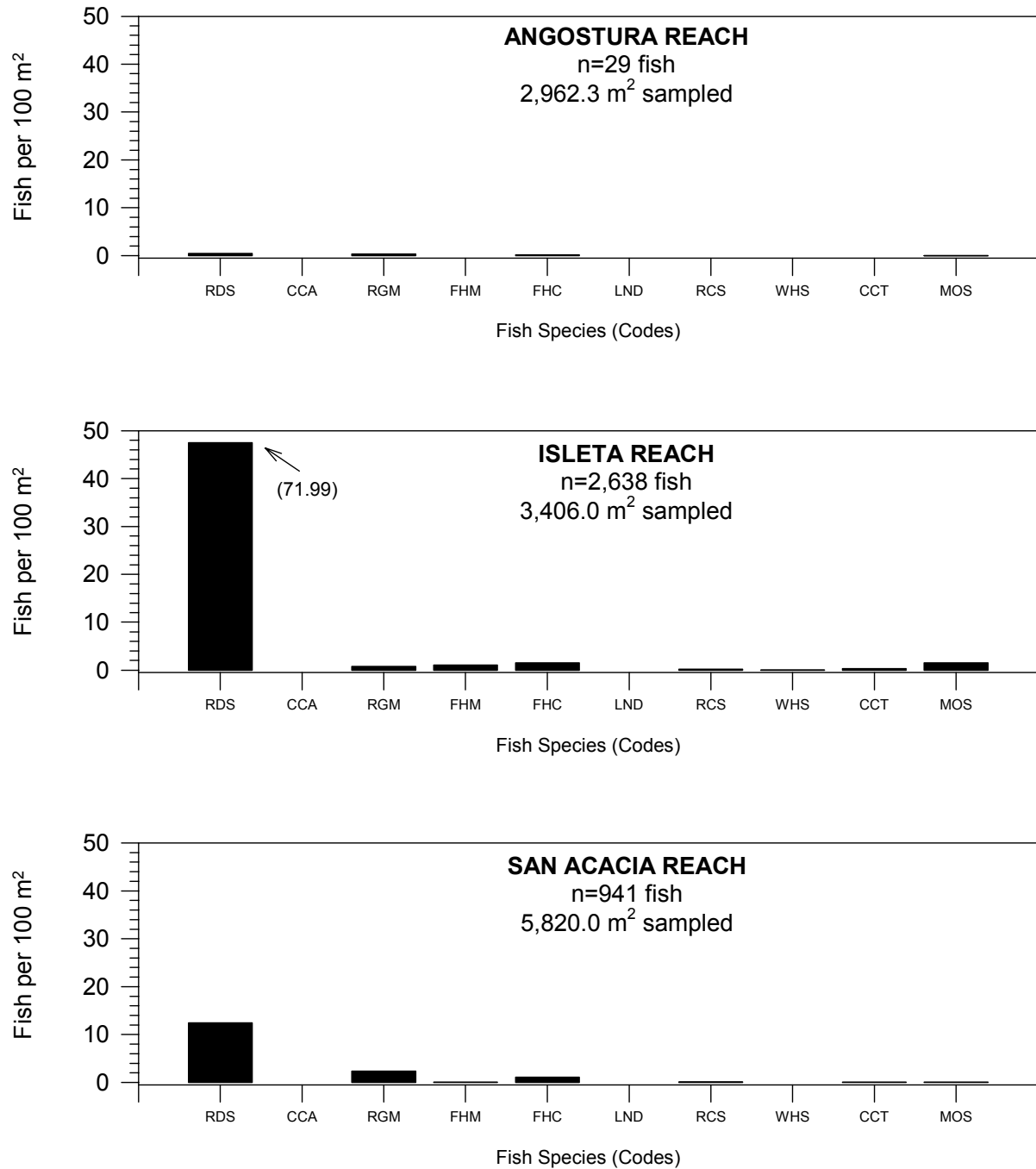


Figure 3. Catch rates, for the 10 focal species, by river reach during December 2006 at Rio Grande silvery minnow population monitoring program collection sites (see Table A-1 for fish species codes). An arrow indicates the Rio Grande silvery minnow (RGM) histogram bar.

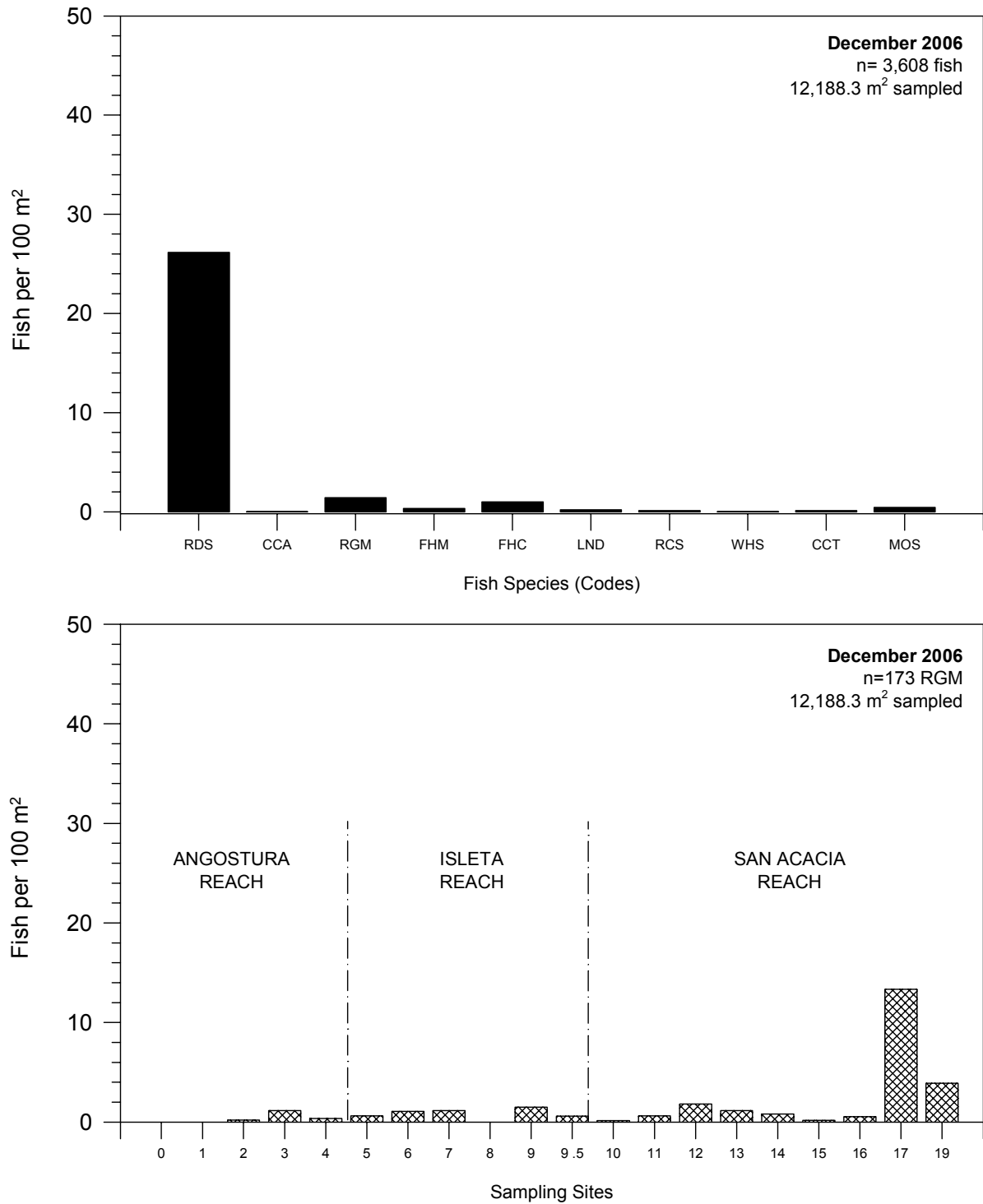


Figure 4. Catch rates for ten focal species (upper graph*), including Rio Grande silvery minnow, (RGM; lower graph*) during December 2006 at Rio Grande silvery minnow population monitoring program collection sites (see Table A-1 for fish species codes).

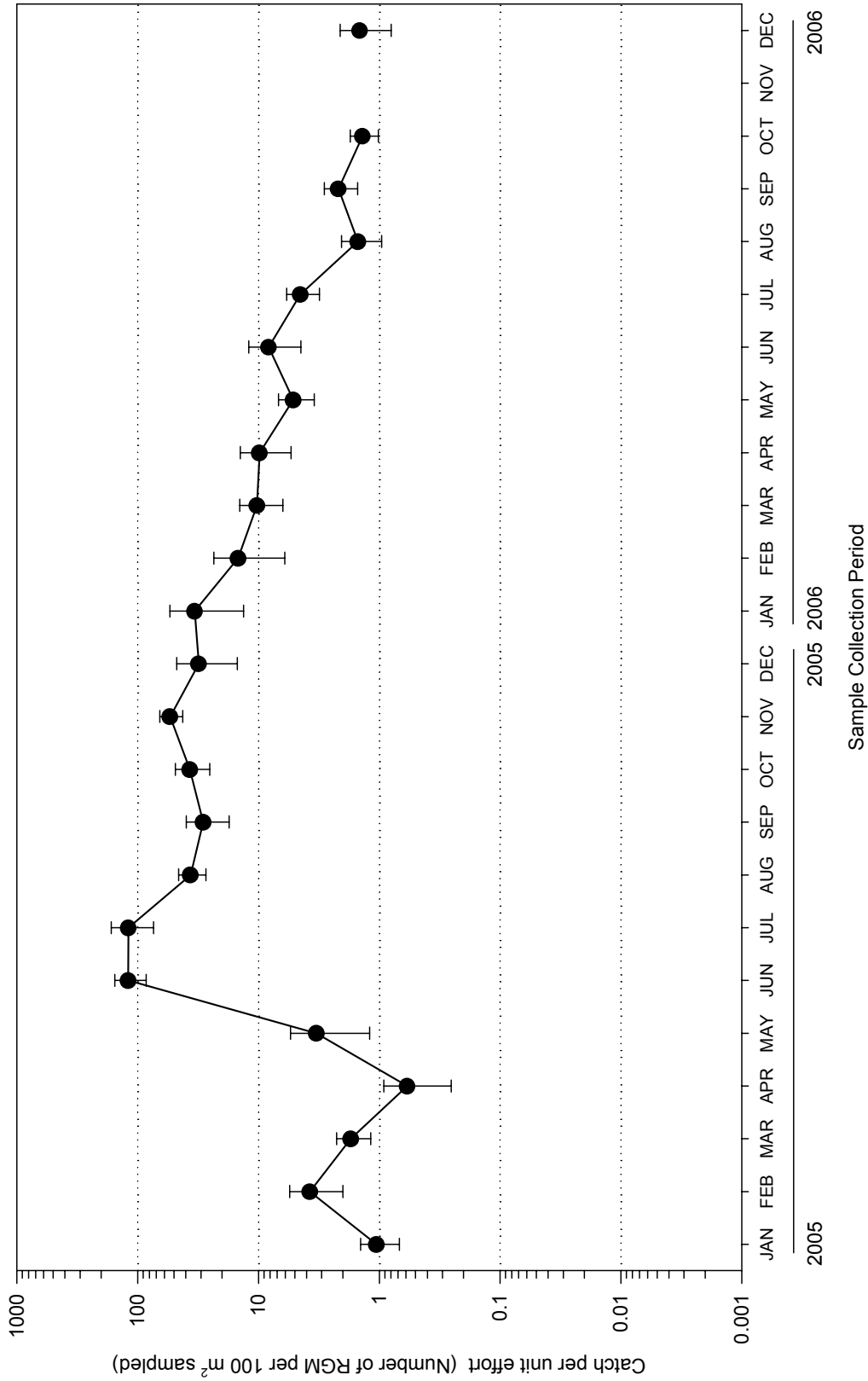


Figure 5. Monthly catch rates of Rio Grande silvery minnow during 2005 and 2006 (January-October, December) at Rio Grande silvery minnow population monitoring program collection sites. Solid circles indicate monthly means (n=20 site per month) and capped-bars represent the standard error of the mean.

APPENDIX A.

Collection localities of the 2006 Rio Grande silvery minnow population monitoring program.

Table A-1. Collection localities of the 2006 Rio Grande silvery minnow population monitoring program.

Site #	Site Locality
ANGOSTURA REACH SITES	
SITE #	
0	New Mexico, Sandoval County, Rio Grande, below Angostura Diversion Dam, Algodones. River Mile 209.7 SAN FELIPE PUEBLO QUADRANGLE 3916006 N 363811 E
1	New Mexico, Sandoval County, Rio Grande, at US Highway 550 bridge crossing, (formerly NM State Highway 44 bridge crossing), Bernalillo. River Mile 203.8 BERNALILLO QUADRANGLE 3909722 N 358543 E
2	New Mexico, Sandoval County, Rio Grande, ca. 4 miles downstream of US Highway 550 bridge crossing, at Rio Rancho Wastewater Treatment Plant, Rio Rancho. River Mile 200.0 BERNALILLO QUADRANGLE 3905355 N 354772 E
3	New Mexico, Bernalillo County, Rio Grande, at Central Avenue (US Highway 66) bridge crossing, Albuquerque. River Mile 183.4 ALBUQUERQUE WEST QUADRANGLE 3884094 N 346840 E
4	New Mexico, Bernalillo County, Rio Grande, at Rio Bravo Boulevard bridge crossing, Albuquerque. River Mile 178.3 ALBUQUERQUE WEST QUADRANGLE 3877163 N 347554 E
ISLETA REACH SITES	
SITE #	
5	New Mexico, Valencia County, Rio Grande, at Los Lunas (NM State Highway 49) bridge crossing, Los Lunas. River Mile 161.4 LOS LUNAS QUADRANGLE 3852531 N 342898 E
6	New Mexico, Valencia County, Rio Grande, ca. 1.0 miles upstream of NM State Highway 309/6 bridge crossing, Belen. River Mile 151.5 TOME QUADRANGLE 3837061 N 339972 E
7	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. River Mile 143.2 VEGUITA QUADRANGLE 3827329 N 338136 E

Table A-1. Collection localities of the 2006 Rio Grande silvery minnow population monitoring program (continued).

Site #	Site Locality
ISLETA REACH SITES (continued)	
SITE #	
8	New Mexico, Socorro County, Rio Grande, at US Highway 60 bridge crossing, Bernardo. River Mile 130.6 ABEYTAS QUADRANGLE 3809726 N 334604 E
9	New Mexico, Socorro County, Rio Grande, ca. 3.5 miles downstream of US Highway 60 bridge crossing, La Joya. River Mile 127.0 ABEYTAS QUADRANGLE 3805229 N 331094 E
9.5	New Mexico, Socorro County, Rio Grande, ca. 0.6 miles upstream of San Acacia Diversion Dam, San Acacia. River Mile 116.8 LA JOYA QUADRANGLE 3792603 N 327902 E
SAN ACACIA REACH SITES	
SITE #	
10	New Mexico, Socorro County, Rio Grande, directly below San Acacia Diversion Dam, San Acacia. River Mile 116.2 SAN ACACIA QUADRANGLE 3791977 N 326162 E
11	New Mexico, Socorro County, Rio Grande, ca. 1.5 miles downstream of San Acacia Diversion Dam, San Acacia. River Mile 114.6 LEMITAR QUADRANGLE 3790442 N 325263 E
12	New Mexico, Socorro County, Rio Grande, 0.5 miles upstream of the Low Flow Conveyance Channel bridge, east and upstream of Socorro Wastewater Treatment Plant, Socorro. River Mile 99.5 LOMA DE LAS CANAS QUADRANGLE 3771043 N 327097 E
13	New Mexico, Socorro County, Rio Grande, ca. 4.0 miles upstream of US Highway 380 bridge crossing, San Antonio. River Mile 91.7 SAN ANTONIO QUADRANGLE 3761283 N 328140 E
14	New Mexico, Socorro County, Rio Grande, at US Highway 380 bridge crossing, San Antonio. River Mile 87.1 SAN ANTONIO QUADRANGLE 3754471 N 328914 E

Table A-1. Collection localities of the 2006 Rio Grande silvery minnow population monitoring program (continued).

Site #	Site Locality
SAN ACACIA REACH SITES (continued)	
SITE #	
15	New Mexico, Socorro County, Rio Grande, directly east of Bosque del Apache National Wildlife Refuge headquarters, San Antonio. River Mile 79.1 SAN ANTONIO, SE QUADRANGLE 3740839 N 327055 E
16	New Mexico, Socorro County, Rio Grande, at the San Marcial railroad crossing, San Marcial. River Mile 68.6 SAN MARCIAL QUADRANGLE 3728347 N 315284 E
17	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. River Mile 60.5 PARAJE WELL QUADRANGLE 3718178 N 309487 E
18	New Mexico, Socorro County, Rio Grande, ca. 10 miles downstream of the San Marcial Railroad Bridge crossing, San Marcial. River Mile 58.8 PARAJE WELL QUADRANGLE 3716150 N 307846 E

APPENDIX B.

Ichthyofaunal composition of the December 2006
Rio Grande silvery minnow population monitoring efforts

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

**Rio Grande silvery minnow Population Monitoring
December 2006**

New Mexico: Sandoval Co., Rio Grande Drainage

Rio Grande, at US HWY 550 (formerly NM State HWY 44) bridge crossing, Bernalillo.
08 December 2006 **RKD06-311**

Site Number: 1

River Mile: 203.8

UTM Easting: 358543 UTM Northing: 3909722 Zone: 13 Quad: Bernalillo

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Effort: 614.3 sq. m

FAMILY		N
76	<i>Platygobio gracilis</i>	3

New Mexico: Sandoval Co., Rio Grande Drainage

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: 2

River Mile: 200.0

08 December 2006

RKD06-312

UTM Easting: 354772 UTM Northing: 3905355 Zone: 13 Quad: Bernalillo

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Effort: 513.7 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	5
76	<i>Hybognathus amarus*</i>	1
212	<i>Gambusia affinis</i>	1

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

age-0:

age-1: 1

age-2:

**Rio Grande silvery minnow Population Monitoring
December 2006**

New Mexico: Bernalillo Co., Rio Grande Drainage

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

Site Number: 3

07 December 2006

RKD06-308

River Mile: 183.4

UTM Easting: 346840 UTM Northing: 3884094 Zone: 13 Quad: Albuquerque West

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Effort: 617.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	8
76	<i>Hybognathus amarus*</i>	7
76	<i>Platygobio gracilis</i>	2

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

age-0: 5

age-1: 2

age-2:

New Mexico: Bernalillo Co., Rio Grande Drainage

Rio Grande, at Rio Bravo Blvd. Bridge crossing (NM State HWY 500) crossing,
Albuquerque.

Site Number: 4

07 December 2006

RKD06-307

River Mile: 178.3

UTM Easting: 347554 UTM Northing: 3877163 Zone: 13 Quad: Albuquerque West

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Effort: 563.0 sq. m

FAMILY		N
76	<i>Hybognathus amarus*</i>	2

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

age-0: 2

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
December 2006**

New Mexico: Valencia Co., Rio Grande Drainage

Rio Grande, at Los Lunas Bridge crossing (NM State HWY 49), Los Lunas.

Site Number: 5

07 December 2006

RKD06-306

River Mile: 161.4

UTM Easting: 342898 UTM Northing: 3852531 Zone: 13 Quad: Los Lunas

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Effort: 655.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	32
76	<i>Hybognathus amarus*</i>	4
76	<i>Platygobio gracilis</i>	4
93	<i>Ictalurus punctatus</i>	1

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

age-0:

age-1: 4

age-2:

New Mexico: Valencia Co., Rio Grande Drainage

Rio Grande, ca. 1.0 miles upstream of NM State HWY 309/6 bridge crossing, Belen.

Site Number: 6

07 December 2006

RKD06-305

River Mile: 151.5

UTM Easting: 339972 UTM Northing: 3837061 Zone: 13 Quad: Tome

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Effort: 563.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	414
76	<i>Hybognathus amarus*</i>	6
76	<i>Pimephales promelas</i>	10
76	<i>Platygobio gracilis</i>	2
81	<i>Carpoides carpio</i>	1
81	<i>Catostomus commersoni</i>	1
93	<i>Ictalurus punctatus</i>	3
212	<i>Gambusia affinis</i>	6

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

age-0: 3

age-1: 3

age-2:

**Rio Grande silvery minnow Population Monitoring
December 2006**

New Mexico: Valencia Co., Rio Grande Drainage

Rio Grande, ca. 2.2 miles upstream of NM State HWY 346 bridge crossing, Jarales.

07 December 2006

RKD06-304

UTM Easting: 338136 UTM Northing: 3827329 Zone: 13 Quad: Veguita

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Site Number: 7

River Mile: 143.2

Effort: 522.7 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	650
76	<i>Hybognathus amarus*</i>	6
76	<i>Pimephales promelas</i>	16
81	<i>Carpionodes carpio</i>	1
93	<i>Ictalurus punctatus</i>	3
212	<i>Gambusia affinis</i>	25

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

age-0: 4

age-1: 2

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, at US HWY 60 bridge crossing, Bernardo.

06 December 2006

RKD06-303

UTM Easting: 334604 UTM Northing: 3809726 Zone: 13 Quad: Abeytas

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Site Number: 8

River Mile: 130.6

Effort: 509.9 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	879
76	<i>Pimephales promelas</i>	8
76	<i>Platygobio gracilis</i>	2
81	<i>Carpionodes carpio</i>	3
93	<i>Ictalurus punctatus</i>	1
294	<i>Pomoxis annularis</i>	1

**Rio Grande silvery minnow Population Monitoring
December 2006**

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, ca. 3.5 miles downstream of the US HWY 60 bridge crossing, Bernardo. Site Number: 9

06 December 2006

RKD06-302

River Mile: 127.0

UTM Easting: 331094 UTM Northing: 3805229 Zone: 13 Quad: Abeytas

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Effort: 468.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	426
76	<i>Hybognathus amarus*</i>	7
76	<i>Pimephales promelas</i>	3
81	<i>Carpionodes carpio</i>	1
93	<i>Ictalurus punctatus</i>	2
212	<i>Gambusia affinis</i>	21

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

age-0: 7

age-1:

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, ca. 0.6 miles upstream of San Acacia Diversion Dam, San Acacia

Site Number: 9.5

06 December 2006

RKD06-301

River Mile: 116.8

UTM Easting: 327902 UTM Northing: 3792603 Zone: 13 Quad: La Joya

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Effort: 686.9 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	51
76	<i>Hybognathus amarus*</i>	4
76	<i>Platygobio gracilis</i>	44

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

age-0: 4

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
December 2006**

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, directly below San Acacia Diversion Dam, San Acacia.

06 December 2006

RKD06-300

UTM Easting: 326162 UTM Northing: 3791977 Zone: 13 Quad: San Acacia

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Site Number: 10

River Mile: 116.2

Effort: 700.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	20
76	<i>Hybognathus amarus*</i>	1
76	<i>Platygobio gracilis</i>	7
81	<i>Carpoides carpio</i>	1
294	<i>Micropterus salmoides</i>	1

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

age-0:

age-1: 1

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, ca. 1.5 miles downstream of San Acacia Diversion Dam, San Acacia.

05 December 2006

RKD06-299

UTM Easting: 325263 UTM Northing: 3790442 Zone: 13 Quad: Lemitar

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Site Number: 11

River Mile: 114.6

Effort: 641.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	14
76	<i>Hybognathus amarus*</i>	4
76	<i>Platygobio gracilis</i>	21
81	<i>Carpoides carpio</i>	6

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

age-0: 3

age-1: 1

age-2:

**Rio Grande silvery minnow Population Monitoring
December 2006**

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, east of Socorro, 0.5 miles upstream of Socorro Low Flow Conveyance Site Number: 12

Channel bridge and east just upstream of Socorro Wastewater Treatment Plant, River Mile: 99.5

05 December 2006

RKD06-298

UTM Easting: 327097 UTM Northing: 3771043 Zone: 13 Quad: Loma de las Canas

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Effort: 670.7 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	452
76	<i>Hybognathus amarus*</i>	12
76	<i>Platygobio gracilis</i>	31

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

age-0: 10

age-1: 2

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

Site Number: 13

05 December 2006

RKD06-297

River Mile: 91.7

UTM Easting: 328140 UTM Northing: 3761283 Zone: 13 Quad: San Antonio

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Effort: 699.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	51
76	<i>Hybognathus amarus*</i>	8
76	<i>Platygobio gracilis</i>	1
81	<i>Carpoides carpio</i>	1

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

age-0: 3

age-1: 5

age-2:

**Rio Grande silvery minnow Population Monitoring
December 2006**

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, at US HWY 380 bridge crossing, San Antonio.

Site Number: 14

05 December 2006

RKD06-296

River Mile: 87.1

UTM Easting: 328914 UTM Northing: 3754471 Zone: 13 Quad: San Antonio

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Effort: 747.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	21
76	<i>Hybognathus amarus*</i>	6
76	<i>Pimephales promelas</i>	1
93	<i>Ictalurus punctatus</i>	1

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

age-0:

age-1: 6

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, directly east of Bosque del Apache National Wildlife Refuge

Site Number: 15

04 December 2006

RKD06-295

River Mile: 79.1

UTM Easting: 327055 UTM Northing: 3740839 Zone: 13 Quad: San Antonio SE

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Effort: 580.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	3
76	<i>Hybognathus amarus*</i>	1
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	1

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

age-0:

age-1: 1

age-2:

**Rio Grande silvery minnow Population Monitoring
December 2006**

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, at San Marcial Railroad Bridge, San Marcial.

Site Number: 16

04 December 2006

RKD06-294

River Mile: 68.6

UTM Easting: 315284 UTM Northing: 3728347 Zone: 13 Quad: San Marcial

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Effort: 550.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	143
76	<i>Hybognathus amarus*</i>	3
76	<i>Pimephales promelas</i>	1
294	<i>Pomoxis annularis</i>	1

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

age-0:

age-1: 3

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, at (former) confluence with the Low Flow Conveyance Channel, 16.0 miles downstream of the southern end of Bosque del Apache National Wildlife Refuge; ca. 8 miles downstream of the San Marcial Railroad Bridge crossing.

Site Number: 17

River Mile: 60.5

04 December 2006

RKD06-293

UTM Easting: 309487 UTM Northing: 3718178 Zone: 13 Quad: Paraje Well

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Effort: 562.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	12
76	<i>Hybognathus amarus*</i>	75
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	2
93	<i>Ictalurus punctatus</i>	1

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

age-0: 13

age-1: 62

age-2:

**Rio Grande silvery minnow Population Monitoring
December 2006**

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, ca. 10 mi downstream of the San Marcial railroad bridge crossing

Site Number: 18

04 December 2006

RKD06-292

River Mile: 58.8

UTM Easting: 307846 UTM Northing: 3716150 Zone: 13 Quad: Paraje Well

R.K. Dudley, L.E. Renfro, N.B. Zerbe

Effort: 667.7 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	7
76	<i>Hybognathus amarus*</i>	26
76	<i>Platygobio gracilis</i>	2
93	<i>Ictalurus punctatus</i>	1

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

age-0: 13

age-1: 13

age-2: