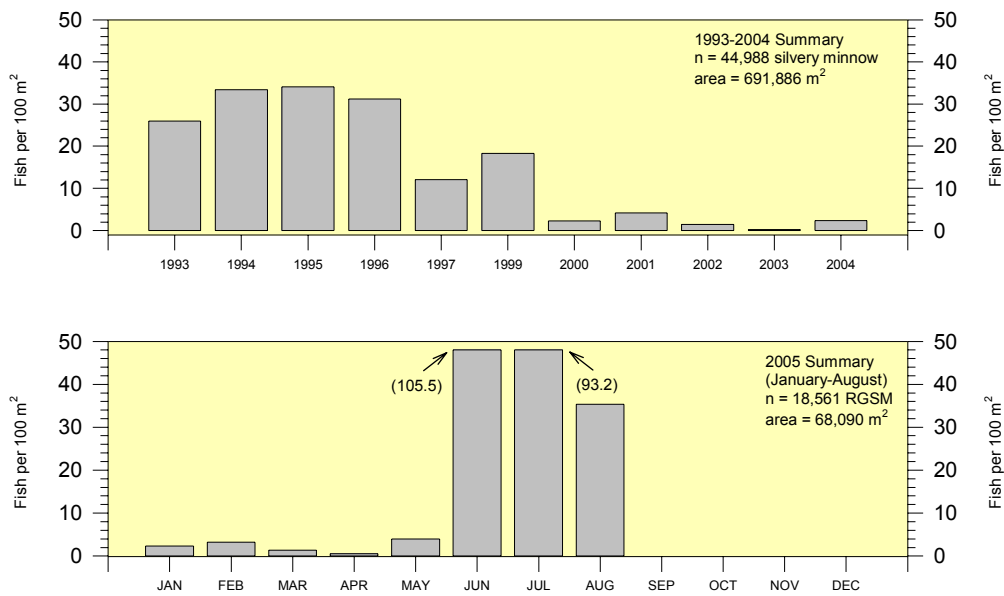


**SUMMARY OF THE RIO GRANDE SILVERY MINNOW  
POPULATION MONITORING PROGRAM RESULTS FROM AUGUST 2005**  
(22-26 August 2005)

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



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26 September 2005

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prepared for:

**MIDDLE RIO GRANDE ENDANGERED SPECIES ACT COLLABORATIVE PROGRAM**

under USBR contract:

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U.S. Bureau of Reclamation  
Upper Colorado Regional Office  
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## SUMMARY OF OVERALL AUGUST 2005 POPULATION MONITORING EFFORTS

The eighth sampling effort of the 2005 Rio Grande silvery minnow population monitoring program was conducted between 22-26 August 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. 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 m<sup>2</sup> sampled) were prepared for the ten focal species, including Rio Grande silvery minnow, for the purpose of comparisons between reaches.

During August 2005, a total of 7,086 fish were captured in the 9,311 m<sup>2</sup> (surface area) of water sampled. Rio Grande silvery minnow was the most abundant taxon (N=3,299) and comprised about 47% of the total catch. Rio Grande silvery minnow was present in 202 of 312 seine hauls with fish (ca. 65%) and was abundant in specific mesohabitats such as backwaters and pools. The majority of Rio Grande silvery minnow were found in the upper half of each sampling reach. Cumulative fish catch rate was 76.1 individuals per 100 m<sup>2</sup> sampled; less than one half of what it was in July (173.2 individuals per 100 m<sup>2</sup> sampled). The overall abundance of fish (N=7,086) was comprised mostly of fish (primarily Rio Grande silvery minnow) from the Isleta and San Acacia reaches (N=6,052).

## SUMMARY OF AUGUST 2005 POPULATION MONITORING EFFORT BY RIVER REACH

### Angostura Reach

Sampling in the Angostura Reach took place during a period of low stable flows on 22 and 26 August. While the discharge in the Rio Grande had increased greatly during May and June (peak was about 6,500 cfs), there was a gradual decline in flow throughout July that have stabilized by August. Discharge throughout the Angostura Reach peaked at >1,000 cfs following several rainstorm events but was generally <400 cfs during August. The low flows resulted in reduced wetted habitats and loss of the over-bank flooded areas. While the total discharge during May and June was higher than it had been in nearly ten years, the flows at the end of August 2005 were comparable to what they were in August 2003. However, there was no river drying in the Angostura Reach and a substantial portion of the channel width remained wetted during August 2005. Water clarity was highest in the uppermost portion of the Angostura Reach (Secchi depth ca. 20 cm) but there was little difference downstream of the confluence with the Jemez River as there had been in previous months. This is likely because to the decreased flows during August. Water temperatures recorded at the different sampling sites ranged from 22.6°C to 27.2°C and were warm enough to support rapid growth of larval and juvenile fish in appropriate low velocity habitats. The range of water temperatures was nearly identical to that recorded in July 2005. Several large backwaters and low velocity shoreline habitats with inundated terrestrial vegetation provided suitable nursery areas; many larval and juvenile fish were collected in these habitats. Rio Grande silvery minnow (N=398) was the most frequently collected taxon in the Angostura Reach during August 2005. The second most common species was red shiner (N=245). Western mosquitofish (N=202) were the third most numerous species were primarily found in pool and backwater habitats. Rio Grande silvery minnow was most numerous in the upper portion of the sampling reach. The Angostura Diversion Dam sampling site (Site #0) yielded nearly twice the number of Rio Grande silvery minnow as were collected in July 2005. The highest abundance of Rio Grande silvery minnow was recorded from Rio Rancho (Site #2) to the Angostura sampling site (Site #0). The increased water temperatures and elevated flows of late June and July apparently resulted in successful recruitment of Rio Grande silvery minnow and several of the other taxa. However, the impact of continued low flows during September could ultimately limit the population. A more appropriate time to assess the conservation status of Rio Grande silvery minnow in the Angostura Reach will be in October.

## Isleta Reach

While discharge in the Rio Grande was substantially higher during June 2005 than it had been in the past several years, flows had rapidly dropped back down low levels by July and August 2005. Discharge was generally <200 cfs and there were periods of very low or no flow in some portions of the reach. Decreased flows resulted in the formation of several isolated pools and had left large areas of the inundated floodplain isolated from the main river. Many fish (primarily larval and juvenile phases) were stranded in these off-channel habitats. Water temperatures in the Isleta Reach generally ranged from 22.1-29.8°C from morning (0900 h) to afternoon (1300 h); this was about a 2°C increase compared with July 2005. Water clarity varied greatly throughout the reach (Secchi depth 3-25 cm); the lowest values were recorded in the southern portion of the reach while the highest portions were recorded in the northern portion (upstream of the Rio Puerco confluence) of the reach. This difference was likely because of increased discharge from intermittent tributaries (rios Salado and Puerco). The Isleta Reach had the highest catch rate (119.4 fish/100 m<sup>2</sup>) of any of the sampling reaches in the Middle Rio Grande. However, the density of fish in this reach in August dropped in half compared to July 2005. Overall ichthyofaunal catch rates in the Angostura Reach (41.9 fish/100 m<sup>2</sup>) were lower compared to the Isleta Reach and had decreased markedly in the last month. The abundance of Rio Grande silvery minnow had dropped noticeably in both reaches during the past month.

## San Acacia Reach

Population monitoring was conducted in the San Acacia Reach (9 sites) of the Middle Rio Grande between 23-25 August 2005. Water levels had decreased markedly since the beginning of July but didn't reach their lowest levels until the beginning of August. Discharge was very low in areas and there was also river drying in some of the southern portions of the reach. The decreased flow combined with high ambient temperatures resulted in warm water temperatures in the San Acacia Reach in August 2005 (range=21.1-27.9.1°C), but lower than was recorded in July 2005 (range=27.6-35.1°C). These elevated water temperatures were recorded in the main channel, meaning that temperatures in static habitats (e.g., pools and backwaters) were even higher. Elevated water temperatures combined with declining water quality likely resulted in the loss of many fish in the San Acacia Reach. However, some of these losses are also probably caused by natural mortality following spawning. While the habitat was dominated by narrow main channel runs, some side channels and backwaters provided a variety of habitat conditions. The turbidity levels in the San Acacia Reach had increase since July and most sampling sites had a Secchi depth reading of <5 cm. The most commonly collected taxon during August 2005 in the San Acacia Reach was Rio Grande silvery minnow (N=1,535). Rio Grande silvery minnow were present at all sampling sites but were most abundant in the upper portion of the reach; the age-class structure was dominated by young-of-year individuals. The San Acacia Reach catch rate (69.0 fish/100 m<sup>2</sup>) was higher than the catch rate in the Angostura Reach but much lower than the catch rate in the Isleta Reach.

## Conclusion

Rio Grande silvery minnow (N=3,299) was widespread and abundant in the Middle Rio Grande during August 2005. This species was more than three times more numerous than the next most-abundant taxon (red shiner, N=968). Other common taxa included western mosquitofish (N=1,656), fathead minnow (N=383), and common carp (N=183). The abundance of Rio Grande silvery minnow during 2005, including August, indicates that the status of this species has improved markedly compared to spring of 2004. The high number of young-of-year silvery minnow in the San Acacia Reach (N=1,535) indicates that environmental conditions continue to be adequate for successful growth and survival. The duration and magnitude of the spring runoff for 2005 appears to be similar to 1993-1995 and 1997. Declining flows during July and August have resulted in a reduction in wetted habitats and river drying in areas (Isleta and San Acacia reaches) that currently support the most Rio Grande silvery minnow. However, it appears that this species is faring better in 2005 than it has in many years.

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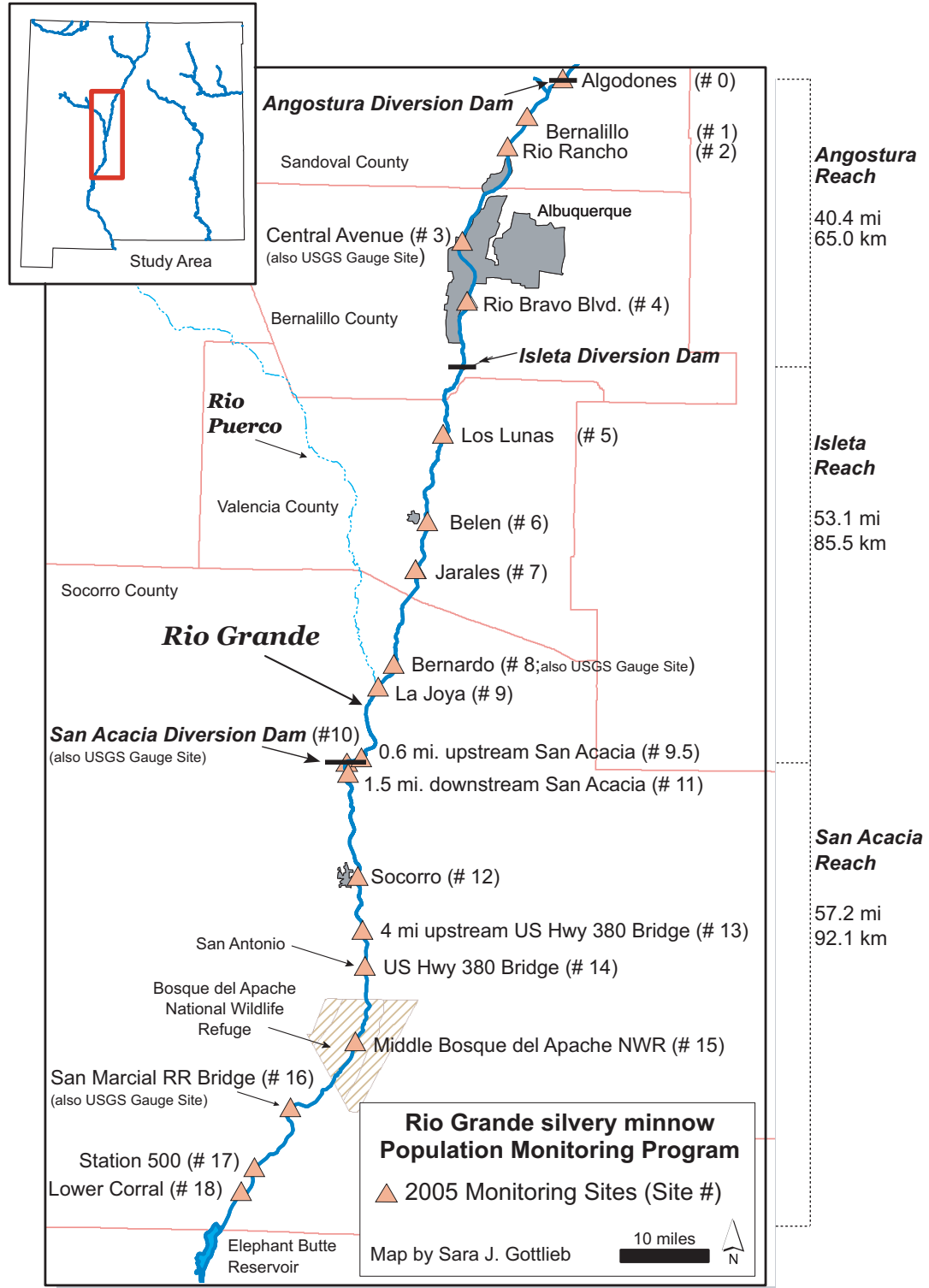


Figure 1. Map of the study area and sampling localities (numbered) for the 2005 Rio Grande silvery minnow population monitoring program. Sampling locality information that correspond with the numbered localities are provided in Appendix A (Table A-1).

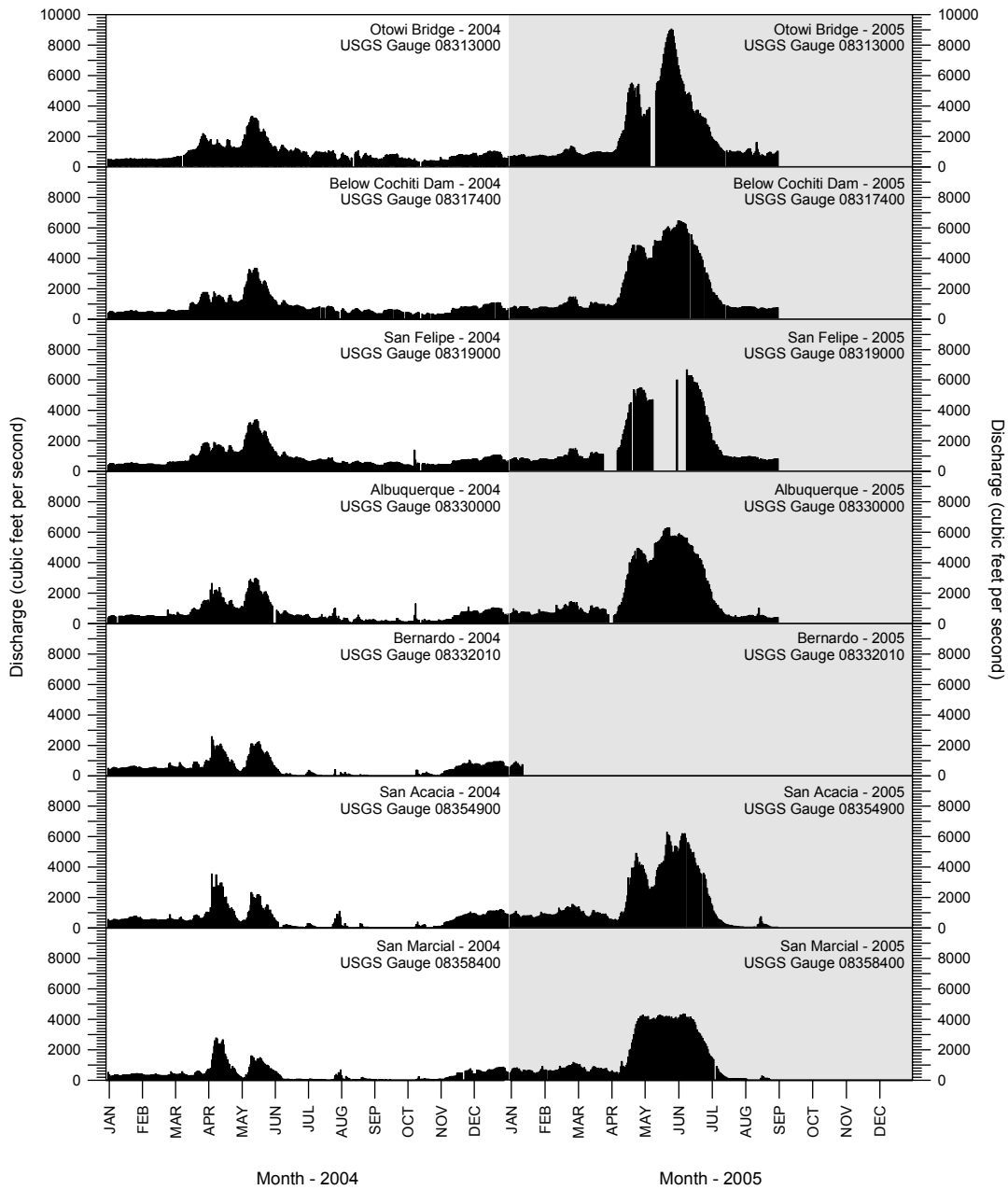


Figure 2. Discharge in the Rio Grande from January 2004 through August 2005 as recorded at seven U. S. Geological Survey (USGS) gauge stations. The Otowi Bridge gauge site is outside of the study area (ca. 25.5 river miles upstream of Cochiti Dam) and provided for reference. Discharge data are provisional and subject to change. \*Note: Bernardo discharge data (USGS 08332010) became temporarily unavailable on 13 January 2005 and data collection is now discontinued at that gauge.

Table 1. Scientific and common names and species codes of fish collected in the Middle Rio Grande during the 1999-2004 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 <sup>1</sup>	(RDS)
<i>Cyprinus carpio</i> .....	common carp <sup>1</sup>	(CCA)
<i>Gila pandora</i> .....	Rio Grande chub	(RGC)
<i>Hybognathus amarus</i> .....	Rio Grande silvery minnow <sup>1</sup>	(RGM)
<i>Pimephales promelas</i> .....	fathead minnow <sup>1</sup>	(FHM)
<i>Pimephales vigilax</i> .....	bullhead minnow	(BHM)
<i>Platygobio gracilis</i> .....	flathead chub <sup>1</sup>	(FHC)
<i>Rhinichthys cataractae</i> .....	longnose dace <sup>1</sup>	(LND)
Family Catostomidae	suckers	
<i>Carpiodes carpio</i> .....	river carpsucker <sup>1</sup>	(RCS)
<i>Catostomus commersonii</i> .....	white sucker <sup>1</sup>	(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 <sup>1</sup>	(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 <sup>1</sup>	(MOS)

<sup>1</sup> 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 1999-2004 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 August 2005 Rio Grande silvery minnow population monitoring program results (species list is based on fish collected from 1999-2004).

SPECIES	RESIDENCE STATUS <sup>1</sup>	TOTAL NUMBER OF SPECIMENS	PERCENT (%) OF TOTAL	FREQUENCY OF OCCURRENCE <sup>2</sup>	% FREQUENCY OF OCCURRENCE <sup>2</sup>
<b>HERRINGS</b>					
gizzard shad	I	123	1.74	5	25
<b>CARPS AND MINNOWS</b>					
red shiner	N	968	13.66	20	100
common carp	I	183	2.58	18	90
Rio Grande chub	N	—	0.00	—	—
Rio Grande silvery minnow	N	3,299	46.56	19	95
fathead minnow	N	383	5.41	19	95
bullhead minnow	I	—	0.00	—	—
flathead chub	N	104	1.47	12	60
longnose dace	N	77	1.09	9	45
<b>SUCKERS</b>					
river carpsucker	N	30	0.42	10	50
white sucker	I	19	0.27	4	20
smallmouth buffalo	N	1	0.01	1	5
<b>BULLHEAD CATFISHES</b>					
black bullhead	I	1	0.01	1	5
yellow bullhead	I	28	0.40	10	50
channel catfish	I	205	2.89	16	80
flathead catfish	I	1	0.01	1	5
<b>TROUTS</b>					
rainbow trout	I	—	0.00	—	—
brown trout	I	—	0.00	—	—
<b>LIVEBEARERS</b>					
western mosquitofish	I	1,656	23.37	20	100
<b>TEMPERATE BASSES</b>					
white bass	I	4	0.06	4	20
<b>SUNFISHES</b>					
green sunfish	I	—	0.00	—	—
bluegill	N	—	0.00	—	—
largemouth bass	I	3	0.04	2	10
white crappie	I	1	0.01	1	5
black crappie	I	—	0.00	—	—
<b>PERCHES</b>					
yellow perch	I	—	0.00	—	—
walleye	I	—	0.00	—	—
TOTAL		7,086			

<sup>1</sup> N = native; I = introduced

<sup>2</sup> Frequency and % frequency of occurrence are based on n=20 sample sites

Table 3. Summary of the monthly 2005 Rio Grande silvery minnow population monitoring program results (species list based on fish collected from 1999-2004).

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
<b>HERRINGS</b>													
gizzard shad	—	—	—	—	1	3	373	123					500
<b>CARPS AND MINNOWS</b>													
red shiner	2,760	935	2,243	1,344	718	830	2,041	968					11,839
common carp	3	3	3	6	80	167	631	183					1,076
Rio Grande chub	—	—	—	—	—	—	—	—					—
Rio Grande silvery minnow	248	330	133	46	234	6,603	7,668	3,299					18,561
fathead minnow	356	144	171	53	67	762	1,085	383					3,021
bullhead minnow	—	1	4	—	—	—	1	—					6
flathead chub	112	187	181	181	136	217	147	104					1,265
longnose dace	1	14	20	83	54	107	34	77					390
<b>SUCKERS</b>													
river carpsucker	19	20	41	4	148	15	244	30					521
white sucker	16	59	43	30	1,311	262	69	19					1,809
smallmouth buffalo	—	—	—	—	—	51	110	1					162
<b>BULLHEAD CATFISHES</b>													
black bullhead	—	—	—	—	—	—	3	1					4
yellow bullhead	—	2	—	1	—	—	1	28					32
channel catfish	6	49	35	70	8	16	124	205					513
flathead catfish	—	—	—	—	—	—	—	1					1
<b>TROUTS</b>													
rainbow trout	—	—	—	—	—	—	1	—					1
brown trout	—	—	—	—	—	—	—	—					—
<b>LIVEBEARERS</b>													
western mosquitofish	64	146	60	62	109	235	1,685	1,656					4,017
<b>TEMPERATE BASSES</b>													
white bass	—	—	—	—	—	—	24	4					28
<b>SUNFISHES</b>													
green sunfish	—	—	—	—	—	—	—	—					—
bluegill	—	—	—	—	—	—	—	—					—
largemouth bass	—	1	1	—	—	2	10	3					17
white crappie	1	—	—	—	—	4	—	1					6
black crappie	—	—	—	—	—	—	—	—					—
<b>PERCHES</b>													
yellow perch	—	—	—	—	—	3	1	—					4
walleye	—	—	—	—	1	—	—	—					1
<b>TOTAL</b>	<b>3,586</b>	<b>1,891</b>	<b>2,935</b>	<b>1,880</b>	<b>2,867</b>	<b>9,277</b>	<b>14,252</b>	<b>7,086</b>					<b>43,774</b>

Table 4. Summary of the monthly catch of Rio Grande silvery minnow, by site and reach, during the 2005 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
													L
<b>ANGOSTURA REACH</b>													
0 Angostura Dam	—	—	—	3	—	1	53	105					162
1 Bernalillo	20	68	36	5(1)	6(1)	146	295	121					697
2 Rio Rancho	147(4)	137(8)	25	7(1)	3(2)	578(1)	26	149					1,072
3 Central Ave (Abq)	7	64(17)	12	27	2	554	62	13					741
4 Rio Bravo (Abq)	4(1)	19(7)	15	—	—	325	147	10					520
Angostura Reach Total	178	288	88	42	11	1,604	583	398	—	—	—	—	3,192
<b>ISLETA REACH</b>													
5 Los Lunas	3	11	2	1	5	798	556	93					1,469
6 Belen	1	4	3	—	3	1,268	1,885	296					3,460
7 Jarales	30	—	—	—	—	1,059	417	559					2,065
8 US Hwy 60 Bernardo	8	1	1	—	35	390	430	71					936
9 South of Bernardo	5	2	1	—	—	207	148	225					588
10 North of San Acacia	1	—	—	—	—	2	88	122					213
Isleta Reach Total	48	18	7	1	43	3,724	3,524	1,366	—	—	—	—	8,731
<b>SAN ACACIA REACH</b>													
10 San Acacia Dam	3	—	16	2	—	304	1,729	60					2,114
11 S of San Acacia	13	15	14	1	—	73	1,093	27					1,236
12 Socorro	3	—	1	—	—	544	529	561					1,638
13 North of US Hwy 380	—	6	—	—	—	—	173	521					700
14 US Hwy 380	1	—	—	—	—	129	9	327					466
15 Bosque del Apache	2	—	—	—	2	54	13	25					96
16 San Marcial	—	—	1	—	177	104	12	0					294
17 South of San Marcial	—	—	—	—	1	10	2	3					16
18 South of San Marcial	—	3	6	—	—	57	1	11					78
San Acacia Reach Total	22	24	38	3	180	1,275	3,561	1,535	—	—	—	—	6,638
<b>MONTHLY TOTALS</b>													
	248	330	133	46	234	6,603	7,668	3,299	—	—	—	—	18,561
	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

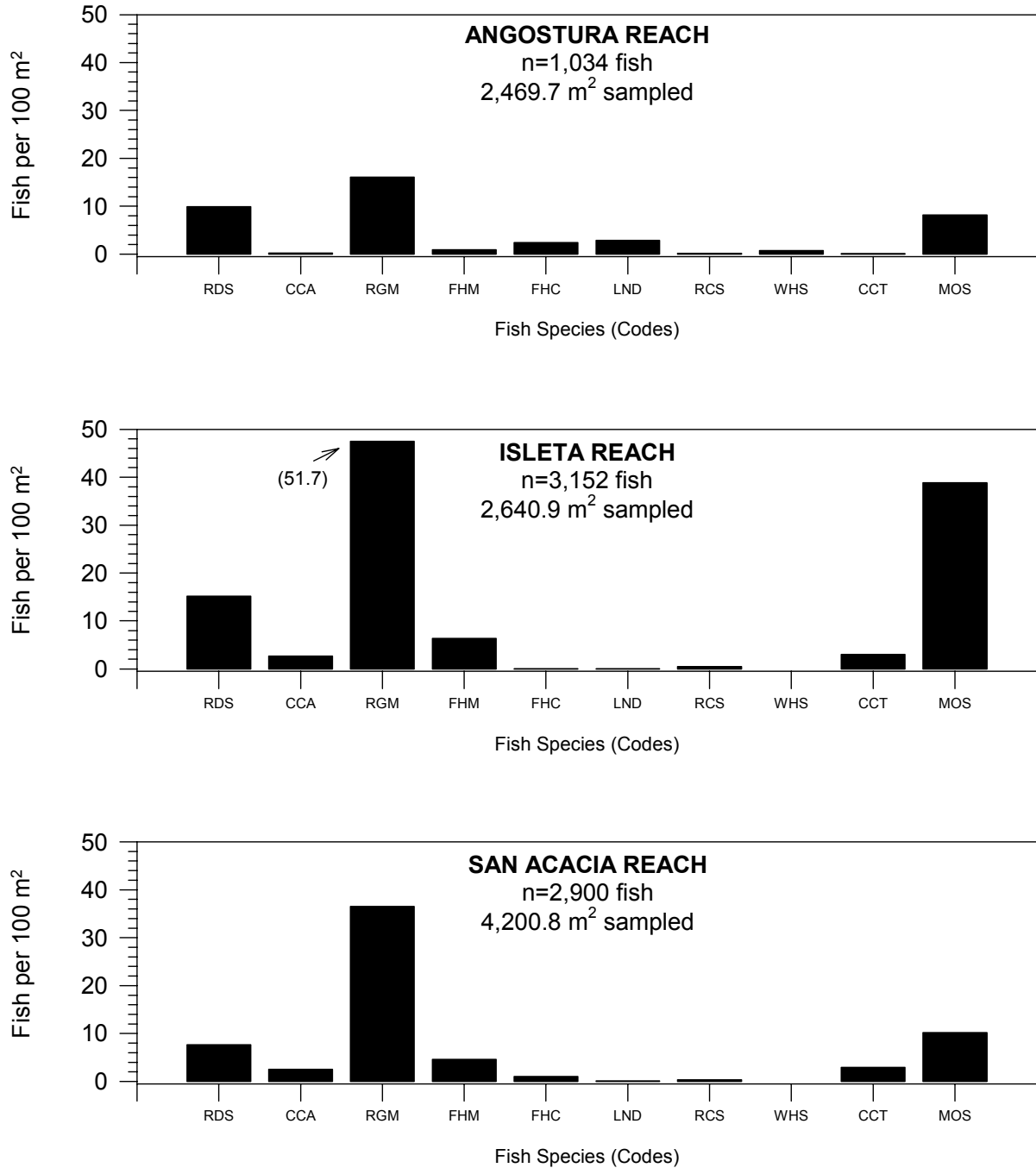


Figure 3. Catch rates, for the 10 focal species, by river reach during August 2005 at Rio Grande silvery minnow population monitoring program collection sites (see Table A-1 for fish species codes). An arrow indicates the Rio Grande silvery minnow (RGM) histogram bar.

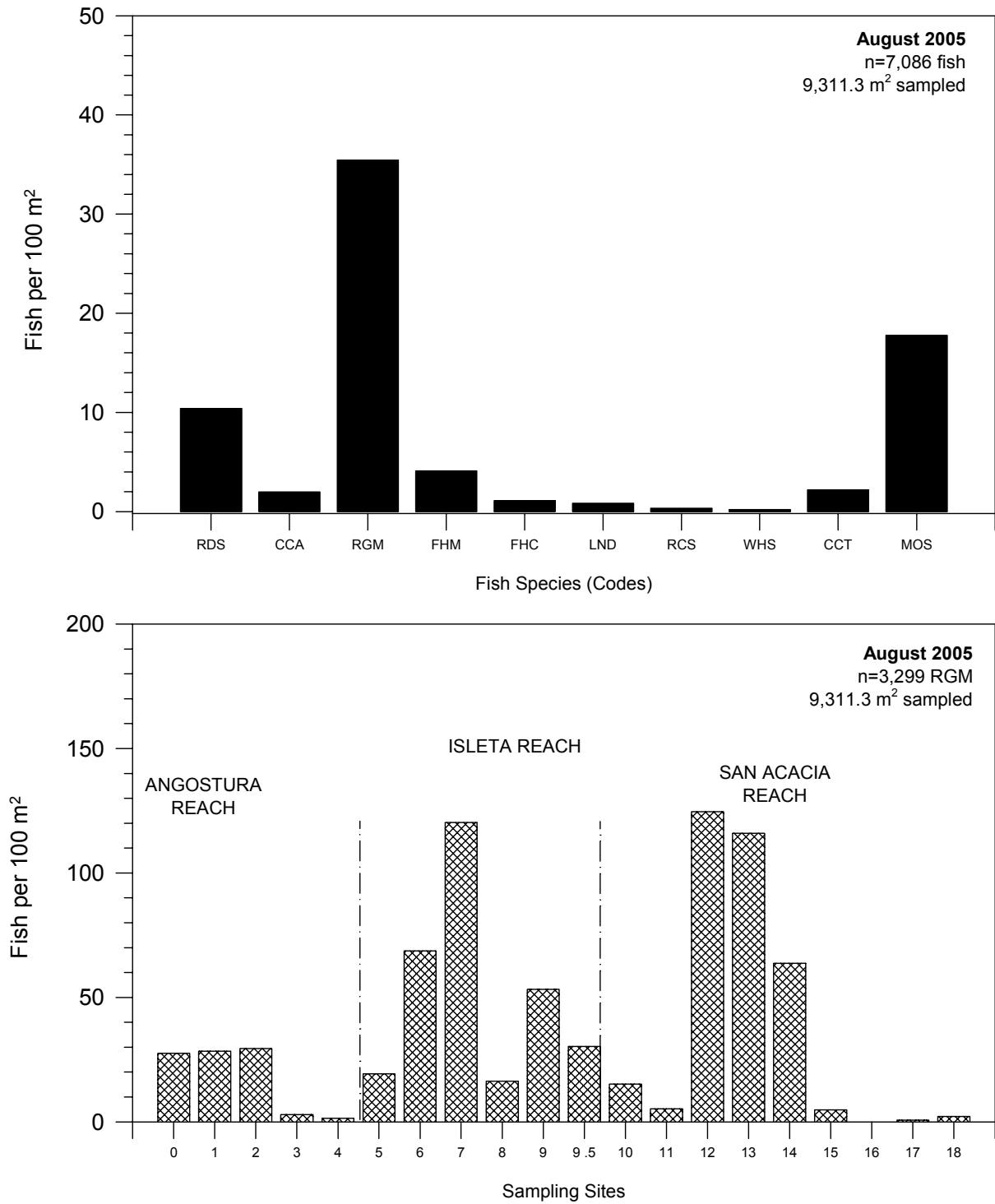


Figure 4. Catch rates for ten focal species (upper graph\*), including Rio Grande silvery minnow, (RGM; lower graph\*) during August 2005 at Rio Grande silvery minnow population monitoring program collection sites (see Table A-1 for fish species codes).

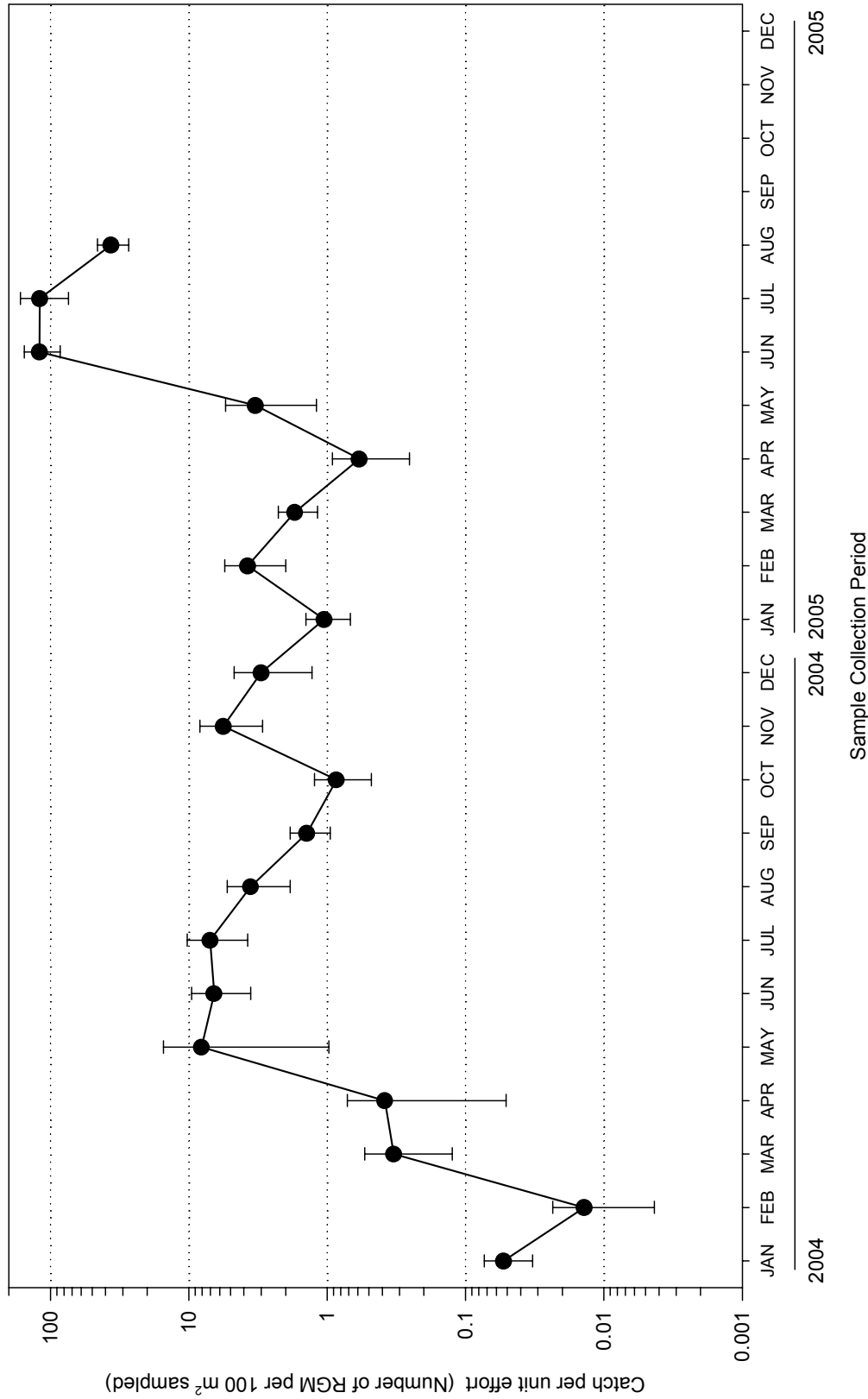


Figure 5. Month catch rates of Rio Grande silvery minnow during 2004 (January-December) and through August 2005 at Rio Grande silvery minnow population monitoring program collection sites. Solid circles indicate monthly means (n=20 site per month) and capped-bars represent the standard error of the mean.

APPENDIX A.

Collection localities of the 2005 Rio Grande silvery minnow population monitoring program.

Table A-1. Collection localities of the 2005 Rio Grande silvery minnow population monitoring program.

Site #	Site Locality
<b>ANGOSTURA REACH SITES</b>	
<b>SITE #</b>	
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
<b>ISLETA REACH SITES</b>	
<b>SITE #</b>	
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 2005 Rio Grande silvery minnow population monitoring program (continued).

Site #	Site Locality
<b>ISLETA REACH SITES (continued)</b>	
<b>SITE #</b>	
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
<b>SAN ACACIA REACH SITES</b>	
<b>SITE #</b>	
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 2005 Rio Grande silvery minnow population monitoring program (continued).

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Site #	Site Locality
<b>SAN ACACIA REACH SITES (continued)</b>	
<b>SITE #</b>	
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

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APPENDIX B.

Ichthyofaunal composition of the August 2005  
Rio Grande silvery minnow population monitoring efforts

\*\*\* All data are provisional and should be verified by direct inspection of field data and specimens \*\*\*

**Rio Grande silvery minnow Population Monitoring  
August 2005**

New Mexico: Sandoval Co., Rio Grande Drainage

Rio Grande, directly below Angostura Diversion Dam, Algodones.

Site Number: 0

22 August 2005

**RKD05-149**

River Mile: 209.7

UTM Easting: 363811 UTM Northing: 3916006 Zone: 13 Quad: San Felipe Pueblo

R.K. Dudley, W.H. Brandenburg, and M.A. Farrington

Effort: 381.7 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
76	<i>Cyprinella lutrensis</i>	42
76	<i>Cyprinus carpio</i>	4
76	<i>Hybognathus amarus*</i>	105
76	<i>Pimephales promelas</i>	15
76	<i>Rhinichthys cataractae</i>	35
81	<i>Catostomus commersoni</i>	8
212	<i>Gambusia affinis</i>	46
294	<i>Micropterus salmoides</i>	1

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

age-0: 102

age-1: 3

New Mexico: Sandoval Co., Rio Grande Drainage

Rio Grande, at US HWY 550 (formerly NM State HWY 44) bridge crossing, Bernalillo.

Site Number: 1

22 August 2005

**RKD05-150**

River Mile: 203.8

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

R.K. Dudley, W.H. Brandenburg, and M.A. Farrington

Effort: 426.9 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
76	<i>Cyprinella lutrensis</i>	82
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	121
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	37
76	<i>Rhinichthys cataractae</i>	30
81	<i>Catostomus commersoni</i>	6
212	<i>Gambusia affinis</i>	10
283	<i>Morone chrysops</i>	1

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

age-0: 120

age-1: 1

**Rio Grande silvery minnow Population Monitoring  
August 2005**

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

22 August 2005

**RKD05-151**

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

R.K. Dudley, W.H. Brandenburg, and M.A. Farrington

Effort: 505.8 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
76	<i>Cyprinella lutrensis</i>	32
76	<i>Hybognathus amarus*</i>	149
76	<i>Pimephales promelas</i>	4
76	<i>Platygobio gracilis</i>	10
76	<i>Rhinichthys cataractae</i>	2
81	<i>Carpoides carpio</i>	2
81	<i>Catostomus commersoni</i>	2
93	<i>Ictalurus punctatus</i>	2
212	<i>Gambusia affinis</i>	76

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

age-0: 148

age-1: 1

New Mexico: Bernalillo Co., Rio Grande Drainage

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

Site Number: 3

26 August 2005

**RKD05-168**

River Mile: 183.4

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

R.K. Dudley, M.A. Farrington, and L.E. Renfro

Effort: 464.2 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
76	<i>Cyprinella lutrensis</i>	36
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	13
76	<i>Platygobio gracilis</i>	6
76	<i>Rhinichthys cataractae</i>	3
81	<i>Carpoides carpio</i>	3
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	10

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

age-0: 13

**Rio Grande silvery minnow Population Monitoring  
August 2005**

New Mexico: Bernalillo Co., Rio Grande Drainage

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

Site Number: 4  
River Mile: 178.3

26 August 2005

**RKD05-167**

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

R.K. Dudley, M.A. Farrington, and L.E. Renfro

Effort: 691.0 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
76	<i>Cyprinella lutrensis</i>	53
76	<i>Hybognathus amarus*</i>	10
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	6
76	<i>Rhinichthys cataractae</i>	2
81	<i>Catostomus commersoni</i>	3
212	<i>Gambusia affinis</i>	60

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

age-0: 10

New Mexico: Valencia Co., Rio Grande Drainage

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

Site Number: 5

26 August 2005

**RKD05-166**

River Mile: 161.4

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

R.K. Dudley, M.A. Farrington, and L.E. Renfro

Effort: 483.1 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
76	<i>Cyprinella lutrensis</i>	113
76	<i>Cyprinus carpio</i>	6
76	<i>Hybognathus amarus*</i>	93
76	<i>Pimephales promelas</i>	12
81	<i>Carpionodes carpio</i>	2
93	<i>Ameiurus melas</i>	1
93	<i>Ictalurus punctatus</i>	3
212	<i>Gambusia affinis</i>	58

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

age-0: 93

**Rio Grande silvery minnow Population Monitoring  
August 2005**

New Mexico: Valencia Co., Rio Grande Drainage

Rio Grande, ca. 1.0 miles upstream of NM State HWY 309/6 bridge crossing, Belen.  
25 August 2005

**RKD05-165**

Site Number: 6

River Mile: 151.5

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

R.K. Dudley, W.H. Brandenburg, and M.A. Farrington

Effort: 431.2 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
76	<i>Cyprinella lutrensis</i>	55
76	<i>Cyprinus carpio</i>	19
76	<i>Hybognathus amarus*</i>	296
76	<i>Pimephales promelas</i>	30
76	<i>Platygobio gracilis</i>	1
81	<i>Carpiodes carpio</i>	10
93	<i>Ameiurus natalis</i>	4
212	<i>Gambusia affinis</i>	58
283	<i>Morone chrysops</i>	1

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

age-0: 295

age-1: 1

New Mexico: Valencia Co., Rio Grande Drainage

Rio Grande, ca. 2.2 miles upstream of NM State HWY 346 bridge crossing, Jarales.  
25 August 2005

**RKD05-164**

Site Number: 7

River Mile: 143.2

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

R.K. Dudley, W.H. Brandenburg, and M.A. Farrington

Effort: 465.0 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
76	<i>Cyprinella lutrensis</i>	102
76	<i>Cyprinus carpio</i>	17
76	<i>Hybognathus amarus*</i>	559
76	<i>Pimephales promelas</i>	3
93	<i>Ameiurus natalis</i>	2
93	<i>Ictalurus punctatus</i>	4
212	<i>Gambusia affinis</i>	319

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

age-0: 559

**Rio Grande silvery minnow Population Monitoring  
August 2005**

New Mexico: Socorro Co., Rio Grande Drainage

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

25 August 2005

**RKD05-163**

Site Number: 8

River Mile: 130.6

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

R.K. Dudley, W.H. Brandenburg, and M.A. Farrington

Effort: 435.1 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
76	<i>Cyprinella lutrensis</i>	44
76	<i>Cyprinus carpio</i>	14
76	<i>Hybognathus amarus*</i>	71
76	<i>Pimephales promelas</i>	30
76	<i>Rhinichthys cataractae</i>	1
93	<i>Ameiurus natalis</i>	6
93	<i>Ictalurus punctatus</i>	10
212	<i>Gambusia affinis</i>	149
294	<i>Micropterus salmoides</i>	2

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

age-0: 71

New Mexico: Socorro Co., Rio Grande Drainage

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

25 August 2005

**RKD05-162**

Site Number: 9

River Mile: 127.0

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

R.K. Dudley, W.H. Brandenburg, and M.A. Farrington

Effort: 422.7 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
76	<i>Cyprinella lutrensis</i>	73
76	<i>Cyprinus carpio</i>	4
76	<i>Hybognathus amarus*</i>	225
76	<i>Pimephales promelas</i>	81
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	4
212	<i>Gambusia affinis</i>	335

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

age-0: 225



**Rio Grande silvery minnow Population Monitoring  
August 2005**

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, ca. 0.6 miles upstream of San Acacia Diversion Dam, San Acacia  
25 August 2005 **RKD05-161**

Site Number: 9.5

River Mile: 116.8

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

R.K. Dudley, W.H. Brandenburg, and M.A. Farrington

Effort: 403.8 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
76	<i>Cyprinella lutrensis</i>	14
76	<i>Cyprinus carpio</i>	11
76	<i>Hybognathus amarus*</i>	122
76	<i>Pimephales promelas</i>	11
93	<i>Ameiurus natalis</i>	9
93	<i>Ictalurus punctatus</i>	59
212	<i>Gambusia affinis</i>	107
294	<i>Pomoxis annularis</i>	1

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

age-0: 122

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, directly below San Acacia Diversion Dam, San Acacia.  
25 August 2005 **RKD05-160**

Site Number: 10

River Mile: 116.2

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

R.K. Dudley, W.H. Brandenburg, and M.A. Farrington

Effort: 397.7 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
69	<i>Dorosoma cepedianum</i>	7
76	<i>Cyprinella lutrensis</i>	5
76	<i>Cyprinus carpio</i>	45
76	<i>Hybognathus amarus*</i>	60
76	<i>Pimephales promelas</i>	10
76	<i>Platygobio gracilis</i>	4
76	<i>Rhinichthys cataractae</i>	1
93	<i>Ameiurus natalis</i>	2
93	<i>Ictalurus punctatus</i>	16
212	<i>Gambusia affinis</i>	48
283	<i>Morone chrysops</i>	1

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

age-0: 60

**Rio Grande silvery minnow Population Monitoring  
August 2005**

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, ca. 1.5 miles downstream of San Acacia Diversion Dam, San Acacia.  
24 August 2005

**RKD05-159**

Site Number: 11  
River Mile: 114.6

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

R.K. Dudley, W.H. Brandenburg, and M.A. Farrington

Effort: 522.8 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
69	<i>Dorosoma cepedianum</i>	1
76	<i>Cyprinella lutrensis</i>	14
76	<i>Cyprinus carpio</i>	5
76	<i>Hybognathus amarus*</i>	27
76	<i>Pimephales promelas</i>	14
76	<i>Platygobio gracilis</i>	4
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	26
212	<i>Gambusia affinis</i>	10

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

age-0: 27

New Mexico: Socorro Co., Rio Grande Drainage

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,  
24 August 2005

**RKD05-158**

Site Number: 12  
River Mile: 99.5

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

R.K. Dudley, W.H. Brandenburg, and M.A. Farrington

Effort: 450.2 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
76	<i>Cyprinella lutrensis</i>	91
76	<i>Cyprinus carpio</i>	13
76	<i>Hybognathus amarus*</i>	561
76	<i>Pimephales promelas</i>	14
76	<i>Platygobio gracilis</i>	9
81	<i>Carpoides carpio</i>	1
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	16
212	<i>Gambusia affinis</i>	108

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

age-0: 561

**Rio Grande silvery minnow Population Monitoring  
August 2005**

New Mexico: Socorro Co., Rio Grande Drainage

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

24 August 2005

**RKD05-157**

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

R.K. Dudley, W.H. Brandenburg, and M.A. Farrington

Site Number: 13

River Mile: 91.7

Effort: 449.2 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
76	<i>Cyprinella lutrensis</i>	38
76	<i>Cyprinus carpio</i>	4
76	<i>Hybognathus amarus*</i>	521
76	<i>Pimephales promelas</i>	29
76	<i>Platygobio gracilis</i>	11
76	<i>Rhinichthys cataractae</i>	2
81	<i>Carpoides carpio</i>	2
93	<i>Ictalurus punctatus</i>	3
212	<i>Gambusia affinis</i>	64

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

age-0: 520

age-1: 1

New Mexico: Socorro Co., Rio Grande Drainage

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

24 August 2005

**RKD05-156**

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

R.K. Dudley, W.H. Brandenburg, and M.A. Farrington

Site Number: 14

River Mile: 87.1

Effort: 514.1 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
76	<i>Cyprinella lutrensis</i>	41
76	<i>Cyprinus carpio</i>	9
76	<i>Hybognathus amarus*</i>	327
76	<i>Pimephales promelas</i>	15
76	<i>Platygobio gracilis</i>	10
81	<i>Carpoides carpio</i>	2
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	22
212	<i>Gambusia affinis</i>	11
283	<i>Morone chrysops</i>	1

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

age-0: 327

**Rio Grande silvery minnow Population Monitoring  
August 2005**

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, directly east of Bosque del Apache National Wildlife Refuge Headquarters. Site Number: 15  
23 August 2005 **RKD05-155** River Mile: 79.1

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

R.K. Dudley, W.H. Brandenburg, and M.A. Farrington Effort: 520.4 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
76	<i>Cyprinella lutrensis</i>	31
76	<i>Cyprinus carpio</i>	13
76	<i>Hybognathus amarus*</i>	25
76	<i>Pimephales promelas</i>	101
76	<i>Platygobio gracilis</i>	4
76	<i>Rhinichthys cataractae</i>	1
81	<i>Carpoides carpio</i>	2
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	18
212	<i>Gambusia affinis</i>	23

\* *Hybognathus amarus* by age class:

age-0: 25

New Mexico: Socorro Co., Rio Grande Drainage

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

23 August 2005

**RKD05-154**

Site Number: 16

River Mile: 68.6

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

R.K. Dudley, W.H. Brandenburg, and M.A. Farrington

Effort: 368.2 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
69	<i>Dorosoma cepedianum</i>	70
76	<i>Cyprinella lutrensis</i>	28
76	<i>Cyprinus carpio</i>	2
76	<i>Pimephales promelas</i>	3
81	<i>Carpoides carpio</i>	2
93	<i>Ictalurus punctatus</i>	2
212	<i>Gambusia affinis</i>	61

**Rio Grande silvery minnow Population Monitoring  
August 2005**

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, at (former) confluence with the Low Flow Conveyance Channel, 16.0 miles Site Number: 17  
downstream of the southern end of Bosque del Apache National Wildlife Refuge; ca. 8 River Mile: 60.5  
miles downstream of the San Marcial Railroad Bridge crossing.

23 August 2005

**RKD05-153**

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

R.K. Dudley, W.H. Brandenburg, and M.A. Farrington

Effort: 446.4 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
69	<i>Dorosoma cepedianum</i>	14
76	<i>Cyprinella lutrensis</i>	24
76	<i>Cyprinus carpio</i>	7
76	<i>Hybognathus amarus*</i>	3
76	<i>Pimephales promelas</i>	6
81	<i>Ictiobus bubalus</i>	1
93	<i>Ictalurus punctatus</i>	12
93	<i>Pylodictis olivaris</i>	1
212	<i>Gambusia affinis</i>	59

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

age-0: 3

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, ca. 10 miles downstream of the San Marcial Railroad Bridge crossing.

Site Number: 18

23 August 2005

**RKD05-152**

River Mile: 58.8

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

R.K. Dudley, W.H. Brandenburg, and M.A. Farrington

Effort: 531.8 m<sup>2</sup>

<b>FAMILY</b>		<b>N</b>
69	<i>Dorosoma cepedianum</i>	31
76	<i>Cyprinella lutrensis</i>	50
76	<i>Cyprinus carpio</i>	8
76	<i>Hybognathus amarus*</i>	11
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	2
81	<i>Carpionodes carpio</i>	4
93	<i>Ictalurus punctatus</i>	7
212	<i>Gambusia affinis</i>	44

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

age-0: 11