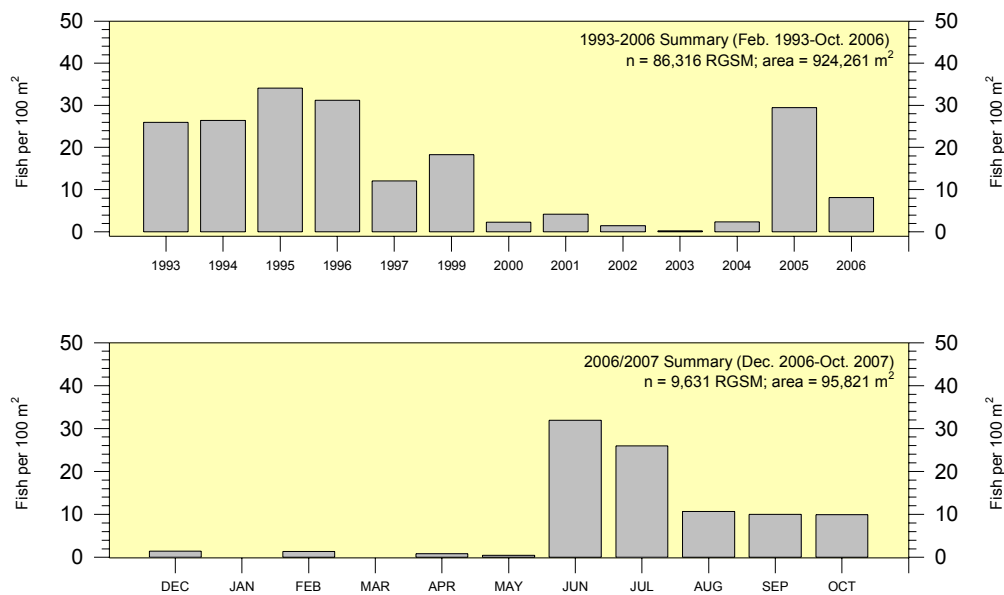


***RIO GRANDE SILVERY MINNOW
POPULATION MONITORING PROGRAM RESULTS FROM
DECEMBER 2006 TO OCTOBER 2007***

FINAL

***A Middle Rio Grande Endangered Species Act
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

22 August 2008

***RIO GRANDE SILVERY MINNOW
POPULATION MONITORING PROGRAM RESULTS FROM
DECEMBER 2006 TO OCTOBER 2007***

FINAL

Funded through the Middle Rio Grande Endangered Species Act Collaborative Program.

Prepared by:

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

under USBR contract (Number 03CR408029):

U.S. Bureau of Reclamation
Upper Colorado Regional Office
125 South State Street, Room 6107
Salt Lake City, UT 84138-1102

Submitted to:

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

22 August 2008

TABLE OF CONTENTS

INTRODUCTION	1
STUDY AREA	1
METHODS	2
RESULTS	8
Rio Grande Silvery Minnow	8
Population status	8
Population trends: 1993 to 2007	11
Mesohabitat associations	21
Fish Community	21
Population status	21
Sampling Variation	29
November 2006	29
November 2007	39
Spatial Correlation of Population Dynamics	45
DISCUSSION	45
ACKNOWLEDGMENTS	50
LITERATURE CITED	50
APPENDIX A	53
APPENDIX B	57

LIST OF TABLES

Table 1.	Scientific and common names and species codes of fishes collected in the Middle Rio Grande from December 2006 to October 2007	6
Table 2.	Summary of the monthly catch of Rio Grande silvery minnow, by site and reach, from December 2006 to October 2007	12
Table 3.	Codes used for mesohabitat type classification in the Middle Rio Grande	25
Table 4.	Summary of the Rio Grande silvery minnow population monitoring program fish collections from December 2006 to October 2007	27
Table 5.	Summary of annual rank abundance of species collected nearly every year in the Rio Grande over the past ten sampling years (1997, 1999-2007)	31
Table 6.	Summary of the December 2006 to October 2007 Rio Grande silvery minnow population monitoring program fish collections	34

LIST OF FIGURES

Figure 1.	Map of the study area and sampling localities for the December 2006 to October 2007 Rio Grande silvery minnow population monitoring program	3
Figure 2.	Discharge in the Rio Grande from January 2006 through October 2007 as recorded at seven U. S. Geological Survey (USGS) gauge stations	4
Figure 3.	Rio Grande silvery minnow densities (CPUE) from December 2006 to May 2007 for each collection locality in the Middle Rio Grande	9
Figure 4.	Rio Grande silvery minnow densities (CPUE) from June to October 2007 for each collection locality in the Middle Rio Grande	10
Figure 5.	Rio Grande silvery minnow densities (CPUE) by river reach for the December 2006 to October 2007 samples in the Middle Rio Grande	13
Figure 6.	Inter-month fluctuations in densities of Rio Grande silvery minnow from December 2006 to October 2007	14
Figure 7.	Inter-site comparison of Rio Grande silvery minnow densities (CPUE) by sampling locality (20 sites) and river reach from December 2006 to October 2007	15
Figure 8.	Time sequence of quarterly Rio Grande silvery minnow densities (1993-1997, 1999-2007) at population monitoring program collection sites	16
Figure 9.	Monthly densities of Rio Grande silvery minnow during 2006 (January-December) and through October 2007 at all population monitoring program collection sites	17
Figure 10.	Mean monthly densities of Rio Grande silvery minnow during 2006 and through October 2007 at population monitoring program collection sites in the Angostura, Isleta, and San Acacia reaches	18

LIST OF FIGURES (continued)

Figure 11.	Rio Grande silvery minnow densities (CPUE) during October, at all sampling sites, by sampling year (1993-1997, 1999-2007)	20
Figure 12.	Annual Rio Grande silvery minnow densities (CPUE), at all sampling sites, by sampling year (1993-1997, 1999-2007)	21
Figure 13.	Regression analysis of Rio Grande silvery minnow log-transformed mean October densities (1993-1997, 1999-2007) and different hydraulic variables for USGS Gauge #08330000 (Rio Grande at Albuquerque, NM)	22
Figure 14.	Regression analysis of Rio Grande silvery minnow log-transformed mean October densities (1993-1997, 1999-2007) and different hydraulic variables for USGS Gauge #08358400 (Rio Grande Floodway at San Marcial, NM)	23
Figure 15.	Time sequence of quarterly Rio Grande silvery minnow densities (1993-1997, 1999-2007) at population monitoring program collection sites and mean monthly discharge at USGS Gauge #08330000 (Rio Grande at Albuquerque, NM)	24
Figure 16.	Percent total of mesohabitats sampled and those occupied by Rio Grande silvery minnow (RGM) in the Middle Rio Grande as part of population monitoring from December 2006 to October 2007 for each river reach and the annual total	26
Figure 17.	Relative abundance of Rio Grande silvery minnow as a percentage of the total ichthyofaunal community by sampling year (1993-1997, 1999-2007)	29
Figure 18.	Densities (CPUE) of Rio Grande silvery minnow and the total ichthyofaunal community during October, at all sampling sites, by sampling year (1993-1997, 1999-2007)	30
Figure 19.	Fish densities (CPUE) from December 2006 to May 2007 for each focal species in the Middle Rio Grande	32
Figure 20.	Fish densities (CPUE) from June to October 2007 for each focal species in the Middle Rio Grande	33
Figure 21.	Fish catch rates (CPUE) by river reach for each focal species in the Middle Rio Grande from December 2006 to October 2007	35
Figure 22.	Variation in density values of Rio Grande silvery minnow, for each sampling site, during November 2006	36
Figure 23.	Variation in density values of all fish species combined, for each sampling site, during November 2006	37
Figure 24.	Variation in density values for Rio Grande silvery minnow and for all fish species combined, for each sampling reach, during November 2006	39
Figure 25.	Variation in density values for each focal species, at all sampling sites combined, during November 2006	40
Figure 26.	Variation in density values of Rio Grande silvery minnow, for each sampling site, during November 2007	41

LIST OF FIGURES (continued)

Figure 27.	Variation in density values of all fish species combined, for each sampling site, during November 2007	42
Figure 28.	Variation in density values for Rio Grande silvery minnow and for all fish species combined, for each sampling reach, during November 2007	43
Figure 29.	Variation in density values for each focal species, at all sampling sites combined, during November 2007	44

LIST OF TABLES (APPENDIX A)

Table A-1.	Collection localities for December 2006 to October 2007 population monitoring of Rio Grande silvery minnow	54
------------	--	----

EXECUTIVE SUMMARY

Population monitoring efforts of the Middle Rio Grande fish community over the past decade have documented vast changes (i.e., order of magnitude increases and decreases) in the abundance of Rio Grande silvery minnow. Recent monitoring efforts show that the October density of Rio Grande silvery minnow was significantly lower ($p < 0.05$) in 2007 compared to 2005. However, the October density of this species was higher ($p < 0.05$) in 2007 than in 1996 or 2000-2004. The Angostura Reach yielded most of the Rio Grande silvery minnow in October of 2007, followed by the Isleta Reach, and the San Acacia Reach. This was in contrast to population monitoring in October of 2006, when the largest catch rates were recorded in the San Acacia Reach.

An analysis of sampling variation at all 20 sampling sites revealed that overall sampling variation for Rio Grande silvery minnow was low and consistent among sites. Values of the coefficient of variation (CV) were often < 0.7 for individual sites and nearly always < 1 . The overall CV value for collections of this species in the Middle Rio Grande was quite low in 2006 and 2007 (0.38 and 0.35, respectively). It is likely that the population monitoring sampling protocol combined with modest numbers of Rio Grande silvery minnow during 2006 and 2007 accounted for these low and consistent CV values. The notable changes in densities among years (i.e., often $> 1,000\%$) greatly outweighed the reasonable value of relative precision (ca. 35-38%) observed during this intensive sampling effort. This indicates that the current sampling approach should provide a reasonable trend estimate of increasing or decreasing population size of Rio Grande silvery minnow over time.

Spatial correlation of Rio Grande silvery minnow population dynamics was calculated among sites over the project duration (1993-1997, 1999-2007). Several models were analyzed to determine the spatial correlation among Rio Grande silvery minnow densities using year and site as effects. The most parsimonious model had a compound symmetry covariance structure for year and a spatial power covariance structure for site ($AICc = 2,092.7$, $\rho = 0.9505$, and practical range = 59.01 km), indicating that correlation among sites is low enough to ignore (i.e., autocorrelation < 0.05) when the distance between sites is about 60 km. This corresponds roughly to the minimum length between sites within the shortest fragmented reach (i.e., Angostura Reach sites were 59.7 km apart) and indicates that strong correlations among sites could be driven by reach-specific effects (e.g., discharge patterns, water operations, ichthyofaunal community structure etc.). Additional analyses revealed a high degree of correlation between sampling sites over time. There were 41 negative correlations (all non-significant) out of 226 comparisons and most of these ($N = 27$) had p values of 0.7 or higher. A total of 82 of the 185 positive pair-wise correlations yielded significant values ($p < 0.05$). Of the 40 comparisons yielding the lowest p values, 22 were sites within 50 km of each other and 37 were sites within 100 km of each other. These results suggest that Rio Grande silvery minnow populations from different sites exhibit a high degree of spatial correlation over longer distances (especially within a reach), meaning that changes in the hydraulic regime or other environmental variables are likely to impact large portions of the reach-specific population simultaneously.

Linear regression analyses of October catch rates of Rio Grande silvery minnow from 1993-2007 revealed significant associations with several hydraulic variables. At the Albuquerque gauge, catch rate increased significantly ($p < 0.001$) with maximum spring discharge and all combinations of number of days with discharge exceeding a threshold value (i.e., density positively correlated with extended periods of high discharge). The relationship that explained the most variation (82%) in mean catch rate was number of days with discharge $> 3,000$ cfs during spring; similar patterns were noted using San Marcial gauge data. In contrast, there was a strong negative relationship ($p < 0.001$) between the number of low flow days in the San Acacia Reach (either days < 200 cfs or days < 100 cfs) and mean October catch rates. Although still a working hypothesis, the abundance of Rio Grande silvery minnow over the period of study has consistently decreased during years with low spring

discharge combined with prolonged summer low-flow/drying conditions but consistently increased following years with extended high spring flows (Dudley et al., 2007).

Despite recent increases in the abundance of Rio Grande silvery minnow, the full suite of issues that threaten the long-term persistence of this species remain. The increased abundance of Rio Grande silvery minnow in 2005 and 2007 is a positive sign but it does not eliminate the threats that currently endanger this species. While recent management strategies are essential to prevent short-term catastrophic losses, a renewed focus on issues that could lead to self-sustaining populations of Rio Grande silvery minnow in the wild (e.g., natural flow regime, river connectivity, functional floodplains etc.) will assist in achieving the ultimate goal of long-term recovery.

INTRODUCTION

Population information on Rio Grande silvery minnow and the associated Middle Rio Grande (Rio Grande between Velarde and Elephant Butte Reservoir, New Mexico) fish community has been gathered systematically since 1987. The first studies were conducted by Platania (1993a) from 1987-1992 to determine spatial and temporal changes in the Middle Rio Grande ichthyofaunal community and to provide resolution of species-specific habitat use patterns. An additional purpose of those preliminary studies was to provide information on the conservation status of Rio Grande silvery minnow. Sampling efforts during 1989-1990 revealed that Rio Grande silvery minnow population numbers had declined markedly since 1987-1988 (Platania, 1993a). Based on previous samples, reduced numbers of individuals indicated a rapid decline of this species in its already reduced range. The 90-95% reduction in the range of Rio Grande silvery minnow and threats to its continued persistence in the Middle Rio Grande were central to this species being listed as endangered by the U. S. Fish and Wildlife Service (U. S. Department of Interior, 1994).

From 1992 until the present, the U. S. Bureau of Reclamation, U. S. Fish and Wildlife Service, New Mexico Department of Game and Fish, and U. S. Army Corps of Engineers have cooperated to fund numerous ichthyofaunal studies of the Middle Rio Grande. Among these studies was the long-term monitoring of the Middle Rio Grande fish community at numerous sites between Angostura Diversion Dam and Elephant Butte Reservoir (initiated in 1993). Population monitoring efforts have documented wide fluctuations (i.e., order of magnitude increases and decreases) in the abundance of Rio Grande silvery minnow over the past decade. Although still a working hypothesis, the abundance of this species has consistently decreased during years with low spring discharge combined with prolonged summer low-flow/drying conditions but has consistently increased following years with extended high spring flows (Dudley and Platania, 2007). While Rio Grande silvery minnow was the focus of most population monitoring efforts and hypothesis testing, research activities were also designed to provide information about the associated Middle Rio Grande fish community.

The primary objective of the December 2006 to October 2007 sampling activities was to monitor the long-term and short-term trends in the abundance and status of Rio Grande silvery minnow at numerous sites throughout the Middle Rio Grande. Additional objectives included evaluating the influence of discharge patterns on population fluctuations, determining general habitat use patterns, documenting the changes in relative abundance among fish species over time, determining site-specific sampling variation, and examining spatial correlation of population dynamics over time. Seasonal and spatial differences in population structure and abundance of native and nonnative Middle Rio Grande fishes were also examined. This study should aid natural resource managers in obtaining a more thorough understanding of the current conservation status and population dynamics of Rio Grande silvery minnow, both of which are important components for the recovery of this species.

STUDY AREA

The headwaters of the Rio Grande are located in the San Juan Mountains of southern Colorado. The mainstem Rio Grande flows 750 km through New Mexico, draining an area of about 68,104 km² (excluding closed basins). The Rio Chama is the only major perennial tributary of the Rio Grande in New Mexico and confluences with it near the city of Española. Snowmelt from southern Colorado and northern New Mexico yields the majority of water for the Rio Grande, but transmontane diversions from the San Juan River (Colorado River Basin) supplement flow by providing water in route to downstream agricultural users and municipalities. The highest flow in the Rio Grande generally occurs shortly after spring snowmelt, while the lowest flow usually occurs in late summer and early autumn prior to the cessation of irrigation season (October 31). Summer thunderstorms

periodically augment low flow in discrete reaches, but do not ensure that the river channel will remain wetted. Precipitation in the region is low, averaging <25 cm/year (Gold and Denis, 1985).

Several large dams on the Rios Chama and Grande and numerous smaller irrigation diversion dams regulate flow in the Middle Rio Grande. A complex system of ditches, drains, and conveyance channels provides water for extensive irrigated agriculture in the Rio Grande Valley. Cochiti Dam is the primary flood control structure that regulates discharge in the mainstem Middle Rio Grande. The Middle Rio Grande has been greatly modified over the last 50 years; this has led to degradation, armoring, and narrowing of the river channel and abandonment of the floodplain in various portions of the overall reach (Lagasse, 1980; Massong et al., 2006; Makar et al., 2006).

The Middle Rio Grande is defined as the reach between Velarde, New Mexico and Elephant Butte Reservoir. The study area (Figure 1) is a segment of the Middle Rio Grande, from Angostura Diversion Dam to the inflow of Elephant Butte Reservoir, that encompasses most of the current range of Rio Grande silvery minnow (i.e., below Cochiti Dam [although additional study is required to determine if Rio Grande silvery minnow still persist upstream of Angostura Diversion Dam] to the inflow of Elephant Butte Reservoir). The Cochiti Reach of the Rio Grande (between Cochiti Dam and Angostura Diversion Dam) passes first through Cochiti Pueblo, then Santo Domingo Pueblo, and finally San Felipe Pueblo. Access is currently restricted or unreliable in the Cochiti Reach, precluding long-term fish monitoring in this area. The last comprehensive ichthyofaunal surveys of the Rio Grande in the Cochiti Reach documented the presence, at low abundance, of Rio Grande silvery minnow on Santo Domingo and San Felipe pueblos (Platania, 1995). Rio Grande silvery minnow was not found within the boundaries of Cochiti Pueblo during similar surveys (Platania, 1993b).

Sampling localities were located from Angostura Diversion Dam to just upstream of Elephant Butte Reservoir. Most of the sampling localities were selected from a list of nearly 100 Middle Rio Grande sites, which were sampled from 1987 to 1992 (Platania, 1993a); these localities have been sampled consistently since 1993. Site locations were chosen based on spatial distribution, site accessibility, relative permanence of flow (or deep pools during drought), and the presence of adequate instream habitat. While most sites have been consistently monitored over time, several localities have been added (e.g., to increase the spatial coverage within and among reaches) or removed (e.g., loss of consistent land access) over the past decade.

Reach names were derived from the diversion structure at the upper portion of the reach. The Angostura Reach (Angostura Diversion Dam to Isleta Diversion Dam) had five sampling localities and the Isleta Reach (Isleta Diversion Dam to San Acacia Diversion Dam) had six sampling sites. There were nine sampling localities in the San Acacia Reach (San Acacia Diversion Dam to inflow of Elephant Butte Reservoir). The 20 sampling sites in the Middle Rio Grande (Appendix A, Table A-1) overlap the current documented range of Rio Grande silvery minnow.

Diel and seasonal discharge varied greatly during 2006 and 2007, especially in southern reaches of the Middle Rio Grande (Figure 2). There was a general trend of lower flow at downstream locations (e.g., U. S. Geological Survey (USGS) San Acacia Gauge [#08354900] and USGS San Marcial Gauge [#08358400]) compared to upstream locations (e.g., USGS Albuquerque Gauge [#08330000]). Mean annual discharge was higher and included higher peaks in 2007 compared to 2006. From mid-March 2007 until late June 2007, flows were elevated and variable. Flow conditions in 2006 and 2007 included periodic intervals of very low discharge from July through October. Summer rains contributed little flow to the river in 2007 compared to 2006.

METHODS

This investigation was structured to monitor the population of Rio Grande silvery minnow and the associated fish community in the study area over time. Monthly sampling efforts allowed for determination of general spatial and temporal changes in population structure and species

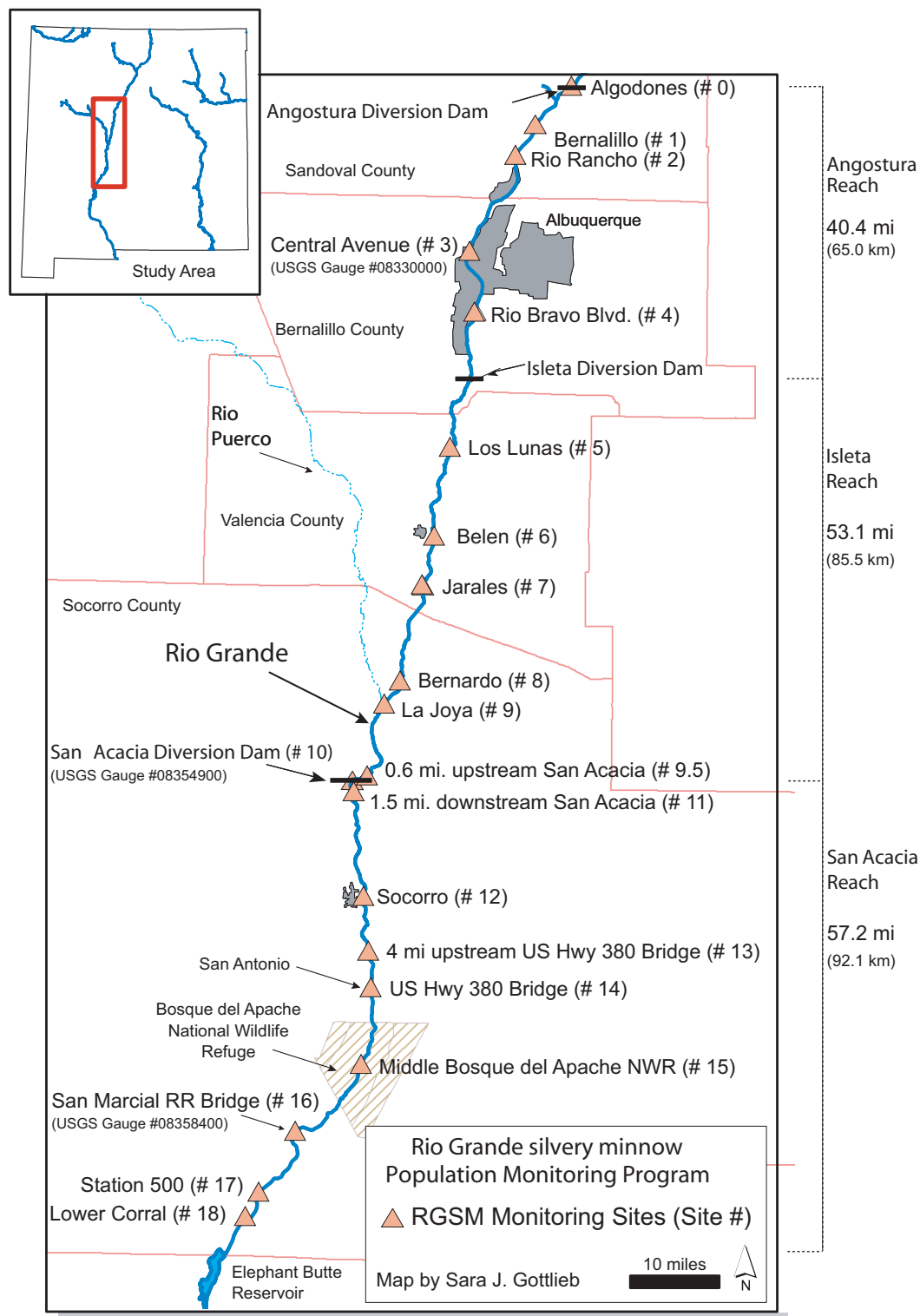


Figure 1. Map of the study area and sampling localities (numbered) for the December 2006 to October 2007 Rio Grande silvery minnow population monitoring program. Sampling locality information is provided in Appendix A (Table A-1).

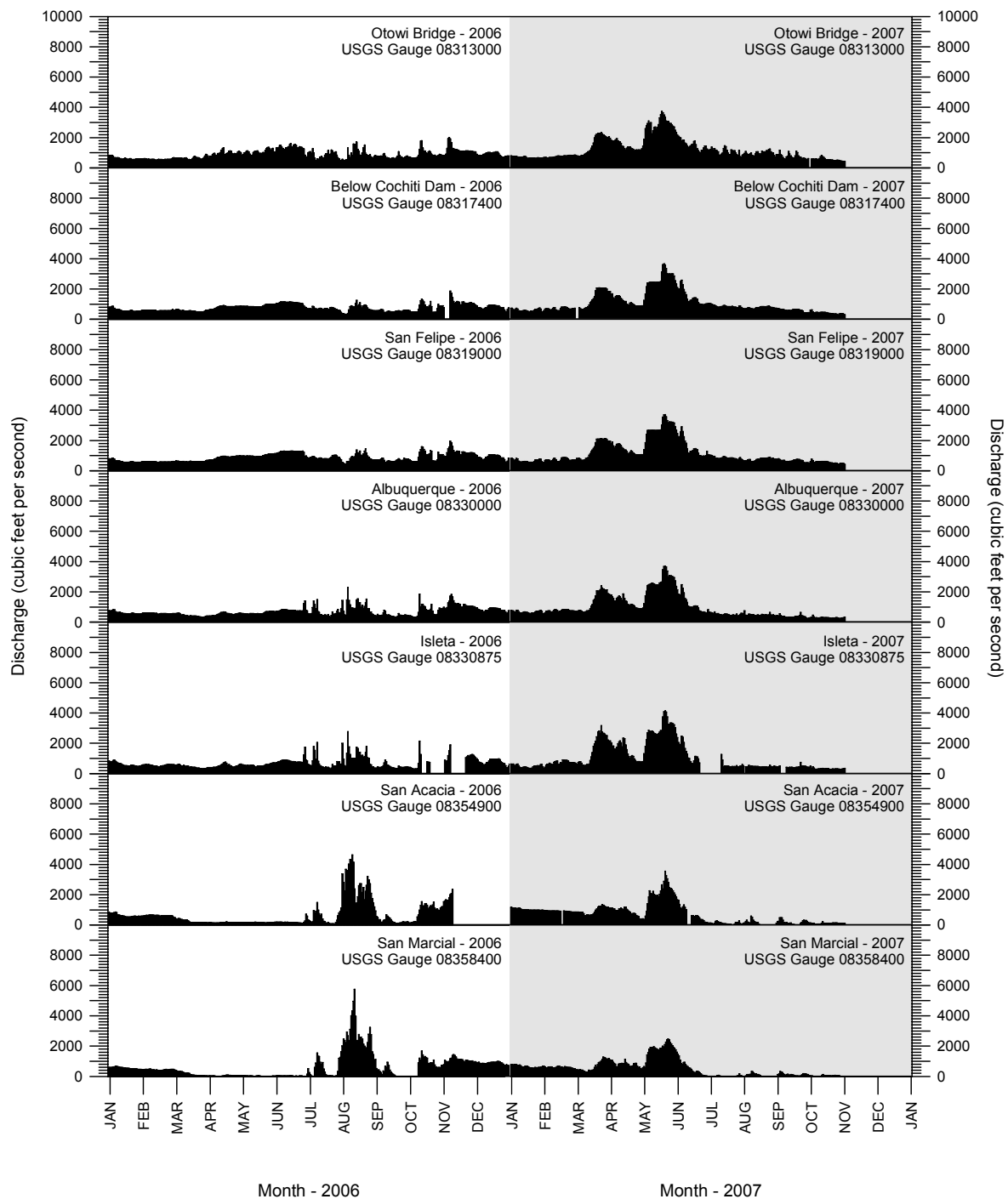


Figure 2. Discharge in the Rio Grande from January 2006 through October 2007 as recorded at seven U. S. Geological Survey (USGS) gauge stations. The Otowi Bridge gauge site is outside of the study area (ca. 25.5 river miles upstream of Cochiti Dam) but is provided for reference. Discharge data are provisional and subject to change.

abundance. Sampling was conducted at 20 sites in December 2006, February 2007, and monthly from April 2007 to October 2007 (Appendix B). Additional intensive sampling was conducted during November (2006 and 2007) for characterizing sampling variation at each of the 20 sites. For the intensive sampling effort, sites were sampled once per day, using regular population monitoring sampling protocols, for four days (N=80 samples). Samples were taken at the same or similar locations on subsequent days.

Fish were collected by rapidly drawing a two-person 3.1 m x 1.8 m small mesh (ca. 5 mm) seine through 20 discrete mesohabitats (usually <15 m). Each mesohabitat type (e.g., main channel run, backwaters etc.) was sampled at least once and the remaining samples were taken in the dominant shoreline run habitats. Mesohabitats with similar conditions (i.e., not exceeding reasonable depths/velocities for efficient seining) were sampled to ensure relatively static capture efficiencies regardless of flows. During spring and summer, a 1.0 m x 1.0 m fine mesh (ca. 1.5 mm) seine was used to selectively sample shallow low velocity habitats for larval fish. Catch-per-unit-effort (CPUE) was calculated for each species and each collection as the number of individuals collected per 100 m² (surface area) of water sampled (CPUE= #/100 m²). Effort was calculated by multiplying the seine width during sampling (regular=2.5 m, larval=0.25 m) by the length of the seine haul. Samples obtained from isolated pools were not included in data analysis as densities in these confined habitats were artificially elevated. Prior to release, all Rio Grande silvery minnow collected were examined for Visible Implant Elastomer (VIE) tags (=stocked fish), identified to age-class (based on standard length and past length-frequency histograms during the same time of year [unpubl. data, U. S. Fish and Wildlife Service 1999]), and measured (standard length range). Selected water quality parameters (temperature, conductivity, specific conductance, pH, salinity, and dissolved oxygen) were obtained at each sampling segment as well as digital photographs of physical river conditions. Scientific names and common names (phylogenetic order) of fishes in this report follow Nelson et al. (2004; Table 1).

For parametric data analysis, fish CPUE data from all samples were log-transformed ($X' = \ln(X+1)$) based on low observed values and temporal heterogeneity of variance (Zar, 1984). Single-factor analysis of variance, with Tukey-Kramer HSD multiple comparison tests (Zar, 1984), was used to evaluate differences in mean catch rates of Rio Grande silvery minnow among years. Kendall's W (Zar, 1984) was used to test for the degree of concordance among the annual rank abundance of species (including Rio Grande silvery minnow) over time. Linear regression modeling was used to determine the strength of the relationships among autumnal Rio Grande silvery minnow densities (1993-1997, 1999-2007) and hydraulic variables (e.g., peak discharge and days > or < a threshold discharge value). Peak discharge and days exceeding threshold discharge values in 1,000 cfs increments (days>1,000, 2,000, 3,000 cubic feet per second, cfs) represented a gross range of spring runoff conditions (May-June). Lower threshold discharge values in 100 cfs increments (e.g., days<200 and <100 cfs) were selected to represent low flow conditions (all year). A negative or positive trend in population abundance was defined as occurring when the slope of the regression was significantly different ($p<0.05$) from zero.

Site-specific sampling variation was evaluated using coefficient of variation values generated from multi-day sampling efforts at each of the 20 sites. The coefficient of variation (CV=ratio of the standard deviation to the mean) was calculated for the four day sampling period. Values of CV were calculated for sites, reaches, and the study area.

The PROC MIXED procedure in SAS (Littell et al., 2006) was used to determine spatial relationships among sites over time. The Akaike Information Criterion (AIC; Akaike, 1973; Burnham and Anderson, 2002) was used to generate the most parsimonious model. Practical range (i.e., autocorrelation <0.05) was also calculated from the model to determine the distance (km) at which correlation among sites can be ignored. Correlation analyses (Zar, 1984) were also used to determine the strength of spatial correlation in Rio Grande silvery minnow October densities among

Table 1. Scientific and common names and species codes of fish collected in the Middle Rio Grande from December 2006 to October 2007.

Scientific Name	Common Name	Code
Order Clupeiformes		
Family Clupeidae	herrings	
<i>Dorosoma cepedianum</i>	gizzard shad	(GZS)
<i>Dorosoma petenense</i>	threadfin shad	(TFS)
Order Cypriniformes		
Family Cyprinidae	carps and minnows	
<i>Cyprinella lutrensis</i>	red shiner ¹	(RDS)
<i>Cyprinus carpio</i>	common carp ¹	(CCA)
<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>Carpodes 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)
Order Salmoniformes		
Family Salmonidae	trouts and salmons	
<i>Oncorhynchus mykiss</i>	rainbow trout	(RBT)
<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 10 most abundant species present in recent Middle Rio Grande collections and are illustrated in monthly plots of data.

Table 1. Scientific and common names and species codes of fish collected in the Middle Rio Grande from December 2006 to October 2007 (continued).

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

specific sites and reaches over time (1993-1997, 1999-2007). Associations were reported when there was a significant ($p < 0.05$) negative or positive correlation among variables.

RESULTS

Rio Grande Silvery Minnow

Population status

The December 2006 to October 2007 abundance of Rio Grande silvery minnow at reach-specific collection sites varied within and among seasons. Density of this species also varied noticeably within and among sampling reaches (Figures 3 and 4). The Angostura and Isleta reaches produced the highest densities.

Population monitoring efforts during December 2006 yielded a large number of Rio Grande silvery minnow ($N=173$) and this species was present in 56 of the 203 (ca. 28%) seine hauls that yielded any fish. Rio Grande silvery minnow was present at 17 of 20 localities during this sampling effort; individuals were distributed relatively evenly throughout the Middle Rio Grande with the exception of Site #17.

The February 2007 cumulative catch of Rio Grande silvery minnow ($N=158$) was composed mostly of individuals from the San Acacia Reach ($N=120$; 75.9%). Overall, this species was present in 67 of the 186 (ca. 36%) seine hauls that yielded any fish. Rio Grande silvery minnow density was highest in the San Acacia Reach, but individuals were found in all study reaches. Rio Grande silvery minnow was present in samples at 18 of 20 sampling localities.

The April 2007 sampling results highlighted the low abundance of Rio Grande silvery minnow in the Middle Rio Grande. Rio Grande silvery minnow ($N=80$) was one of the least abundant taxa, comprising only 2.0% of the total catch. This species was present in 38 of the 265 (ca. 14%) seine hauls that yielded any fish and was abundant in low velocity mesohabitats (e.g., backwaters and debris pools). The April cumulative catch of Rio Grande silvery minnow ($N=80$) was distributed fairly evenly among the three study reaches.

During May 2007, Rio Grande silvery minnow ($N=43$) was infrequently captured in the 9,622.0 m² (surface area) of water sampled. This was less than half the number collected in February 2007. Rio Grande silvery minnow was present in 24 of the 236 (ca. 10%) seine hauls that yielded any fish. The May cumulative catch of Rio Grande silvery minnow was composed mostly of individuals from the San Acacia Reach ($N=39$; 90.7%). Very few Rio Grande silvery minnow were taken in collections in the Isleta or Angostura reaches ($N=1$ and $N=3$, respectively).

Monitoring of Rio Grande silvery minnow during June 2007 yielded 3,174 individuals in 9,930.1 m² of aquatic habitat sampled (Angostura Reach= 671, Isleta Reach=1,962, and San Acacia Reach=541). This species was present in 42 of the 275 (ca. 15%) seine hauls that yielded any fish. Rio Grande silvery minnow was the most abundant taxon in June 2007 and comprised 43.0% of the total catch; this was up dramatically since the beginning of the year (e.g., 4.9% in February 2007).

Rio Grande silvery minnow was the second-most abundant taxon in July 2007 ($N=2,680$) and comprised 19.8% of the total catch. The distribution of this species was uneven; the highest densities were recorded in the Angostura and Isleta reaches. Rio Grande silvery minnow was present in 209 of the 350 (59.7%) seine hauls that yielded any fish. There was a marked decline in numbers of this species between June and July 2007, especially in the upstream portion of the Isleta Reach.

The August 2007 sampling effort produced a moderate number of Rio Grande silvery minnow ($N=1,121$). Rio Grande silvery minnow was present in 173 of the 332 (52.1%) seine hauls that yielded any fish and was moderately abundant in low velocity mesohabitats (e.g., backwaters and

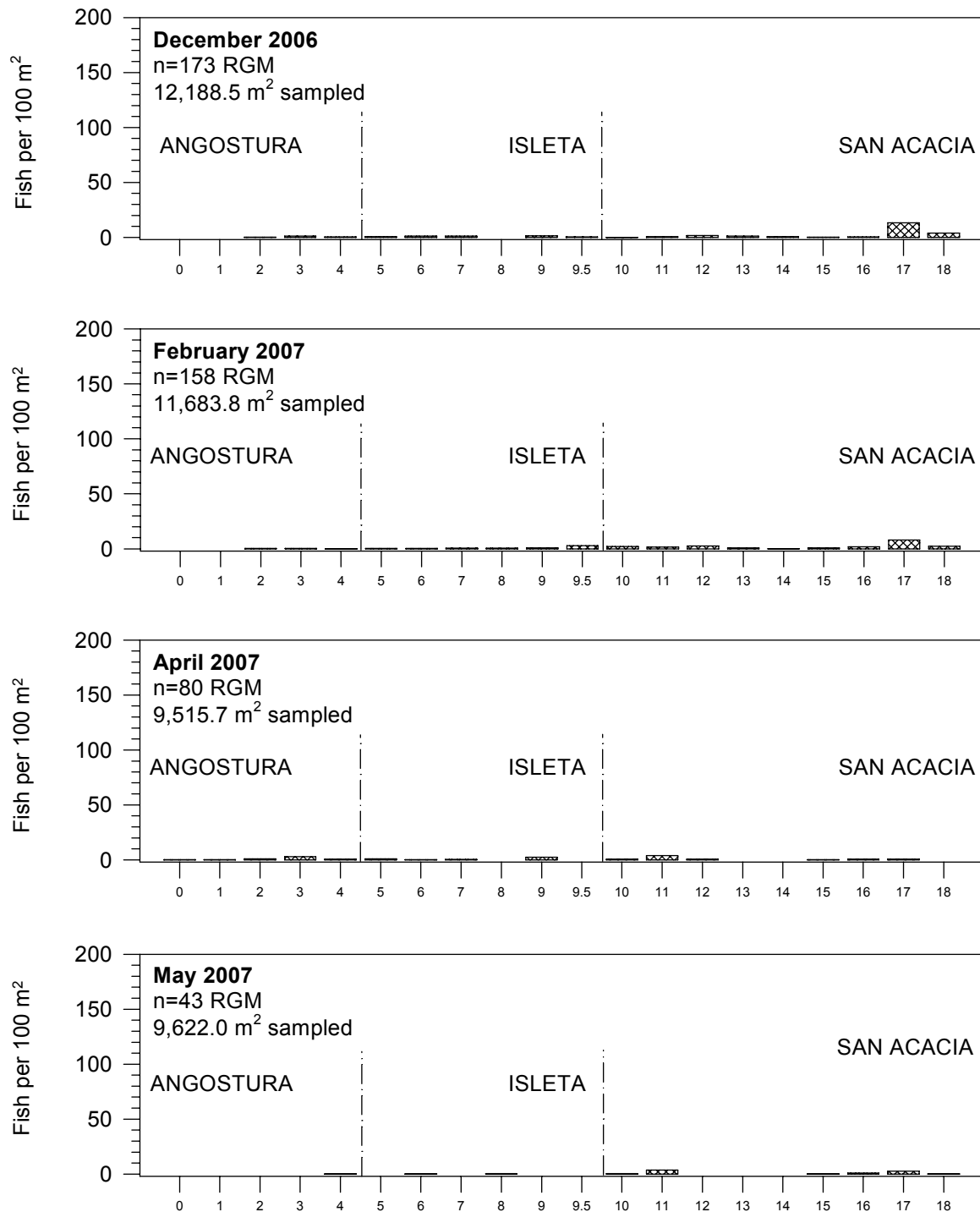


Figure 3. Rio Grande silvery minnow (RGM) densities (CPUE) from December 2006 to May 2007 for each collection locality in the Middle Rio Grande.

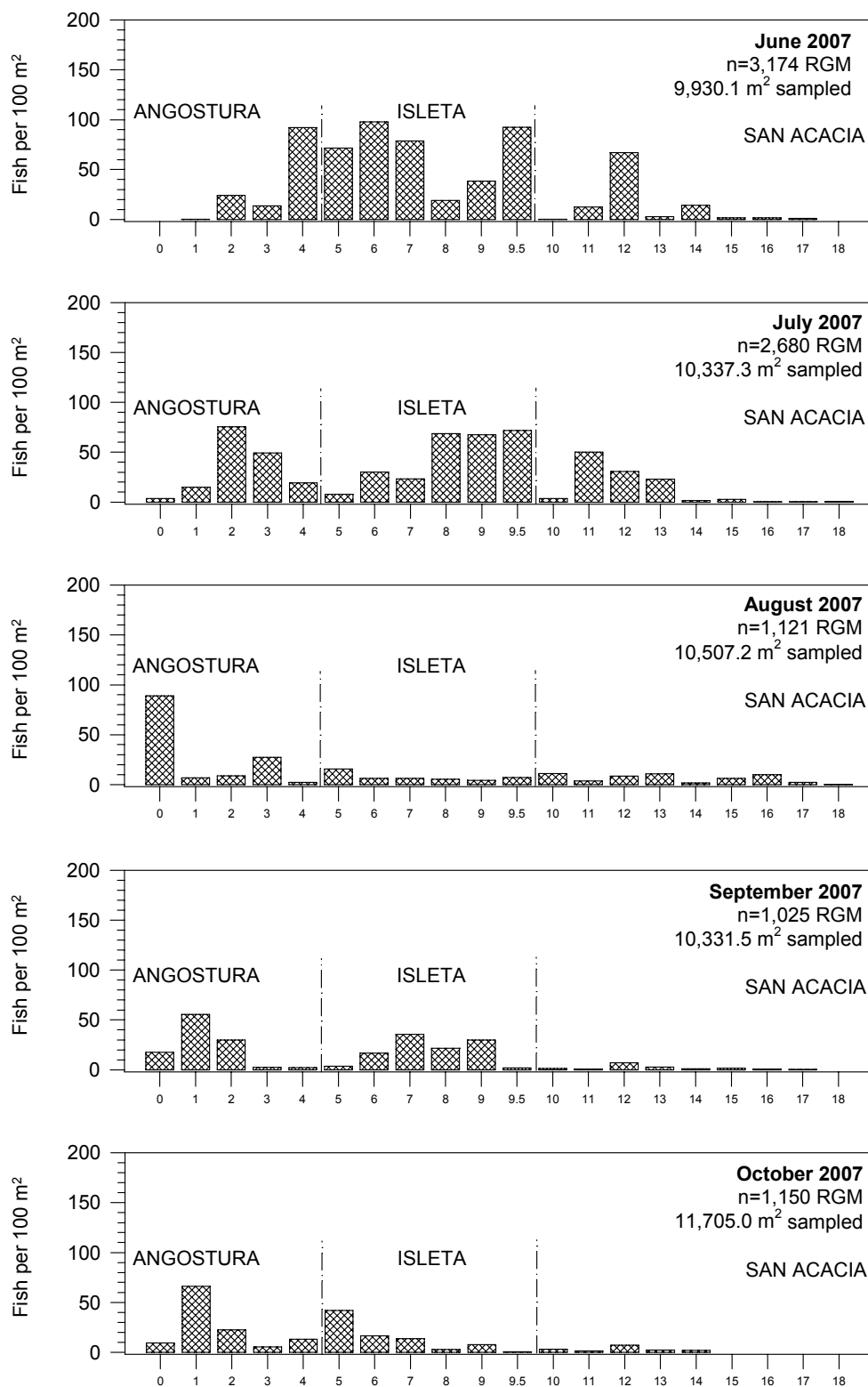


Figure 4. Rio Grande silvery minnow (RGM) densities (CPUE) from June to October 2007 for each collection locality in the Middle Rio Grande.

debris pools). The August cumulative catch of Rio Grande silvery minnow was composed mostly of individuals from the Angostura Reach (N=597). Individuals were collected at all 20 sampling sites.

Slightly lower numbers of Rio Grande silvery minnow (N=1,025) were collected during September, as compared to August, in the 10,331.5 m² (surface area) of water sampled. Rio Grande silvery minnow was the second-most abundant taxon in September 2007 and comprised 11.2% of the total catch. This species was present in 135 of the 325 (ca. 42%) seine hauls that yielded any fish. The September cumulative catch of Rio Grande silvery minnow was composed mostly of individuals from the Angostura and Isleta reaches (N=468 and 471, respectively). In September 2007, about 45% of the cumulative catch was from the Angostura Reach.

Far more Rio Grande silvery minnow were collected in October 2007 (N=1,150) compared to December 2006 (N=173). This species was present in 150 of the 341 (ca. 44%) seine hauls that yielded any fish. Rio Grande silvery minnow was the second-most abundant taxon in October 2007 and comprised 14.4% of the total catch. The October cumulative catch of Rio Grande silvery minnow was composed mostly of individuals from the Angostura and San Acacia reaches (N=601 and 463, respectively).

A month-by-month summary of Rio Grande silvery minnow densities provides reference to trends in relative abundance observed from December 2006 to October 2007 (Table 2). The overall abundance of this species declined steadily during the early half of 2007. However, the density of Rio Grande silvery minnow increased by nearly an order of magnitude from December 2006 to October 2007. Hatchery reared fish made up only a small portion of the total catch over the 9 month sampling period.

Densities of Rio Grande silvery minnow from December 2006 to October 2007 were generally highest in the Isleta Reach and lowest in the San Acacia Reach. The Isleta Reach yielded the most individuals (N=4,520) (Figure 5), followed by the Angostura Reach (N=3,182), and San Acacia Reach (N=1,929). While only modest densities of young-of-year were recorded following spawning in 2006, high numbers of young-of-year were observed in 2007. The abundance of Rio Grande silvery minnow was relatively high in all reaches, as compared to 2006, by October 2007. Age-0 individuals comprised a large proportion of the catch in June and July (Figure 6). Densities of Rio Grande silvery minnow decreased dramatically following summer spawning but stabilized by August 2007. Age-0 Rio Grande silvery minnow made up a relatively higher percentage of the total catch in October 2007 (98.6%) compared to December 2006 (38.7%).

Densities of Rio Grande silvery minnow in the Angostura and Isleta reaches were generally even among sites over the sampling period (Figure 7). However, the highest densities of individuals in the San Acacia Reach were generally in the upper portion of that reach. There was notable variation in densities among sites even within a reach.

Population trends: 1993 to 2007

Rio Grande silvery minnow density, plotted as quarterly collections, has fluctuated dramatically since systematic sampling began in 1993 (Figure 8). While densities recorded from 2001-2004 represented a period of low abundance, more recent monitoring efforts (2005-2007) illustrate an apparent rebound in the population. Densities have declined and increased two to three orders of magnitude on several occasions within the last decade, often within the span of only two or three years. Despite seasonal fluctuations in the abundance of this species, recent samples document a modest increase over the last year (Figure 9) with increases occurring primarily in the Angostura and Isleta reaches (Figure 10). Increases were particularly notable in the Isleta Reach, and to a lesser extent in the Angostura Reach, from October 2006 to October 2007. Autumnal population monitoring efforts in 2007 demonstrated that Rio Grande silvery minnow abundance was significantly lower ($p < 0.05$) than that recorded in 2005 but that it was significantly higher ($p < 0.05$) than in 1996 or 2000-2004. October population monitoring samples illustrate that the magnitude of

Table 2. Summary of the monthly catch of Rio Grande silvery minnow, by site and reach, from December 2006 to October 2007. Numerals in parenthesis, a subset of the total catch, are the number of individuals in that sample that were marked with VIE tags (=hatchery reared [stocked] fish).

REACH	D	J	F	M	A	M	J	J	A	S	O	N	T
Site Number	E	A	E	A	P	A	U	U	U	E	C	O	O
Site Name	C	N	B	R	R	Y	N	L	G	P	T	V	A L
ANGOSTURA REACH													
0 Angostura Dam	0	--			1	--	--	17	319	80	48		465
1 Bernalillo	0	--			1	--	1	62	31	249	311		655
2 Rio Rancho	1		3(1)		4	--	118	348	40	112	126		752
3 Central Ave (Abq)	7(4)		2		15(5)	--	69(2)	285	195	15	32		620
4 Rio Bravo (Abq)	2		1		4(1)	1	483(6)	91	12	12	84		690
<i>Angostura Reach Total</i>	10		6		25	1	671	803	597	468	601		3,182
ISLETA REACH													
5 Los Lunas	4		2		6	--	373	36	85	15	233		754
6 Belen	6		2		1	1	489	123	34	72	91		819
7 Jarales	6		2		2	--	369	116	28	154	76		753
8 US Hwy 60 Bernardo	0		2		--	2	83	332	28	83	18(12)		548
9 South of Bernardo	7		5(1)		13(10)	--	170(1)	295	19	134	40		683
9.5 North of San Acacia	4(3)		19(19)		--	--	478	405	39	13	5		963
<i>Isleta Reach Total</i>	27		32		22	3	1,962	1,307	233	471	463		4,520
SAN ACACIA REACH													
10 San Acacia Dam	1		10		3	2(1)	1(1)	21	52	7	19		116
11 S of San Acacia	4(3)		7(4)		19 (10)	19(8)	63(3)	224	21	4	10		367
12 Socorro	12		17(2)		4	--	352	169	50	41	46		691
13 North of US Hwy 380	8(1)		6		--	--	16	127	57	17	14(9)		237
14 US Hwy 380	6		1		--	--	89	11	11	6	13(1)		137
15 Bosque del Apache	1		5		1	1	8	15	35	9	0		75
16 San Marcial	3		13		3	4	7	2	52	5	0		89
17 South of San Marcial	75		48		3	12	5	2	12	2	0		159
18 South of San Marcial	26		13		--	1	--	4	2	0	0		46
<i>San Acacia Reach Total</i>	136		120		33	39	541	575	292	91	102		1,929
MONTHLY TOTALS	173		158		80	43	3,174	2,680	1,121	1,025	1,150		9,631
	D	J	F	M	A	M	J	J	A	S	O	N	T
	E	A	E	A	P	A	U	U	U	E	C	O	O
	C	N	B	R	R	Y	N	L	G	P	T	V	A L

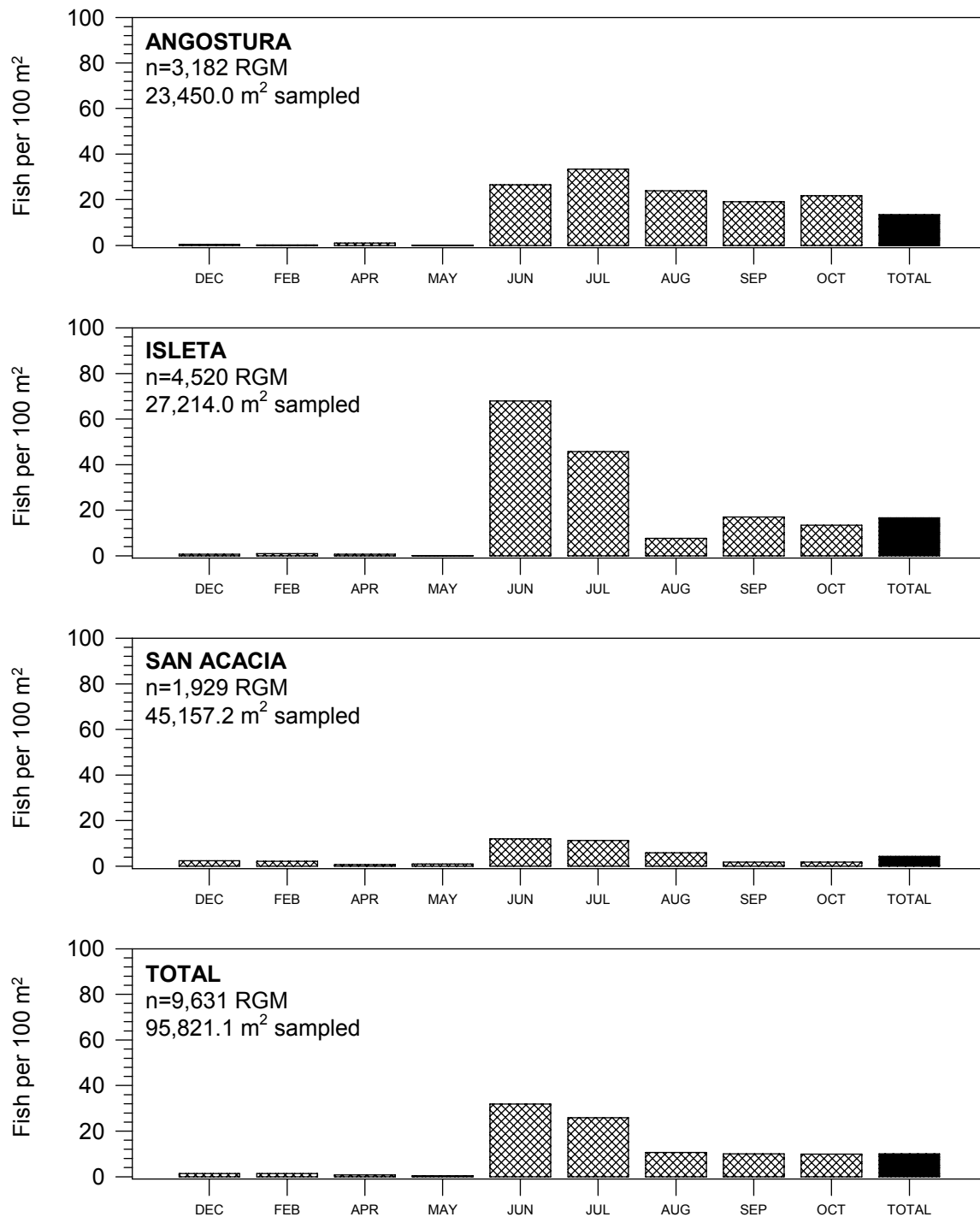


Figure 5. Rio Grande silvery minnow (RGM) densities (CPUE) by river reach for December 2006 to October 2007 samples in the Middle Rio Grande.

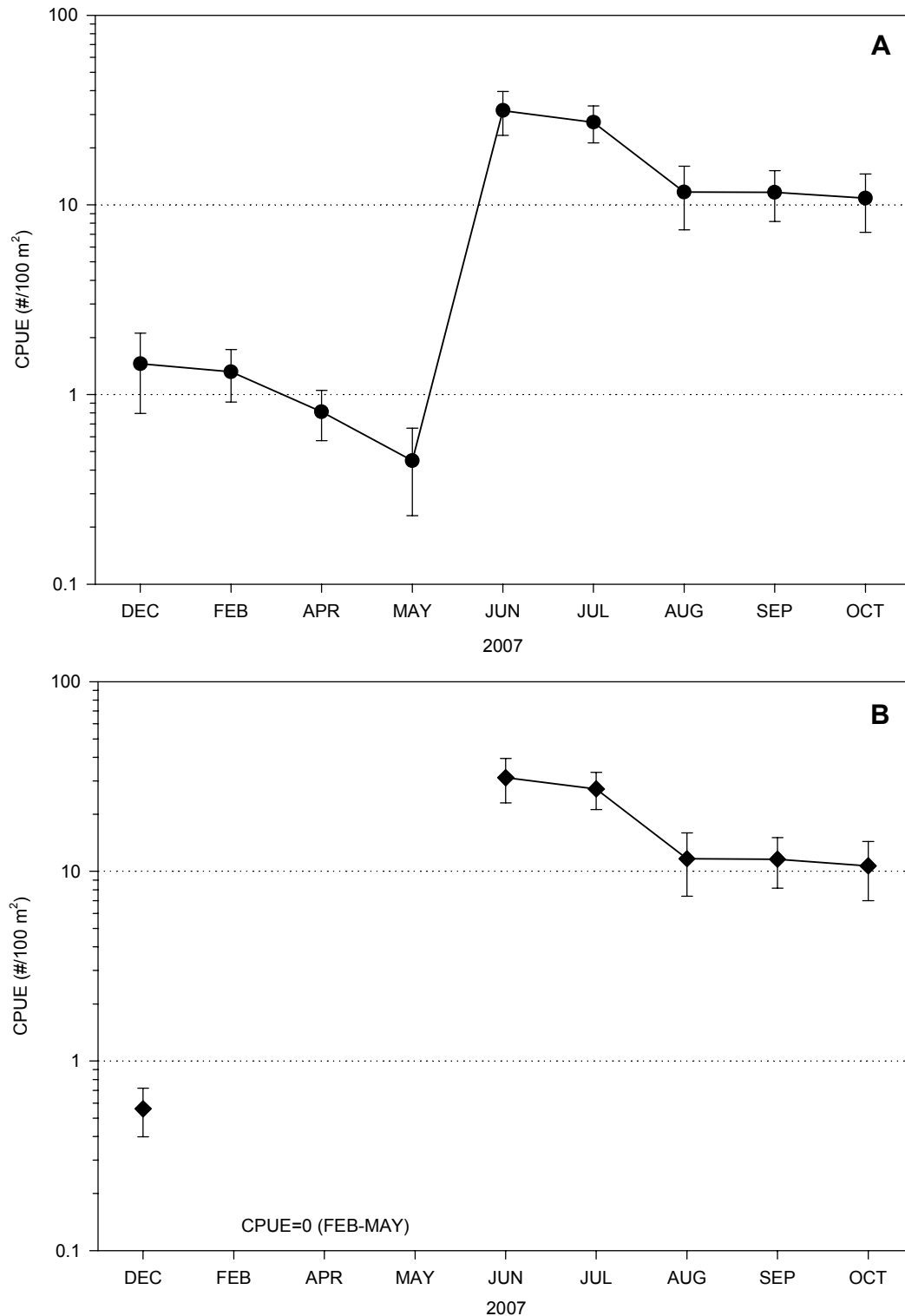
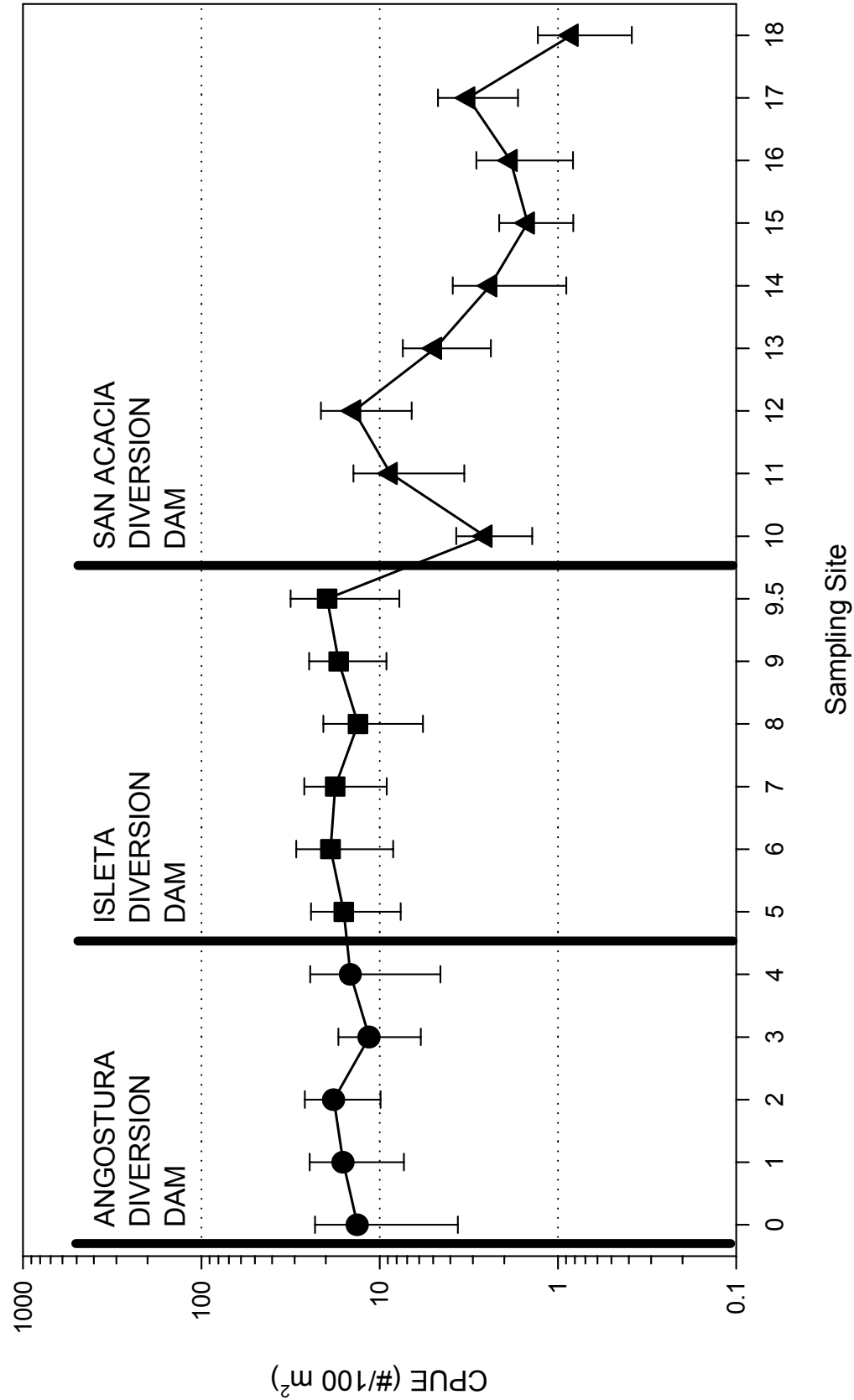


Figure 6. Inter-month fluctuations in densities of Rio Grande silvery minnow from December 2006 to October 2007 (**A**=all age-classes including age-0 [circle]; **B**=age-0 only [diamond]). Symbols represent mean value for all sites sampled (n=20); bars represent the standard error. Dotted horizontal lines represent orders of magnitude.



Inter-site comparison of Rio Grande silvery minnow densities (CPUE) by sampling locality (20 sites) and river reach (Angostura=circle, Isleta=square, San Acacia=triangle) from December 2006 to October 2007. Symbols represent mean values for all sampling months and bars represent the standard error. Dotted horizontal lines represent different orders of magnitude.

Figure 7.

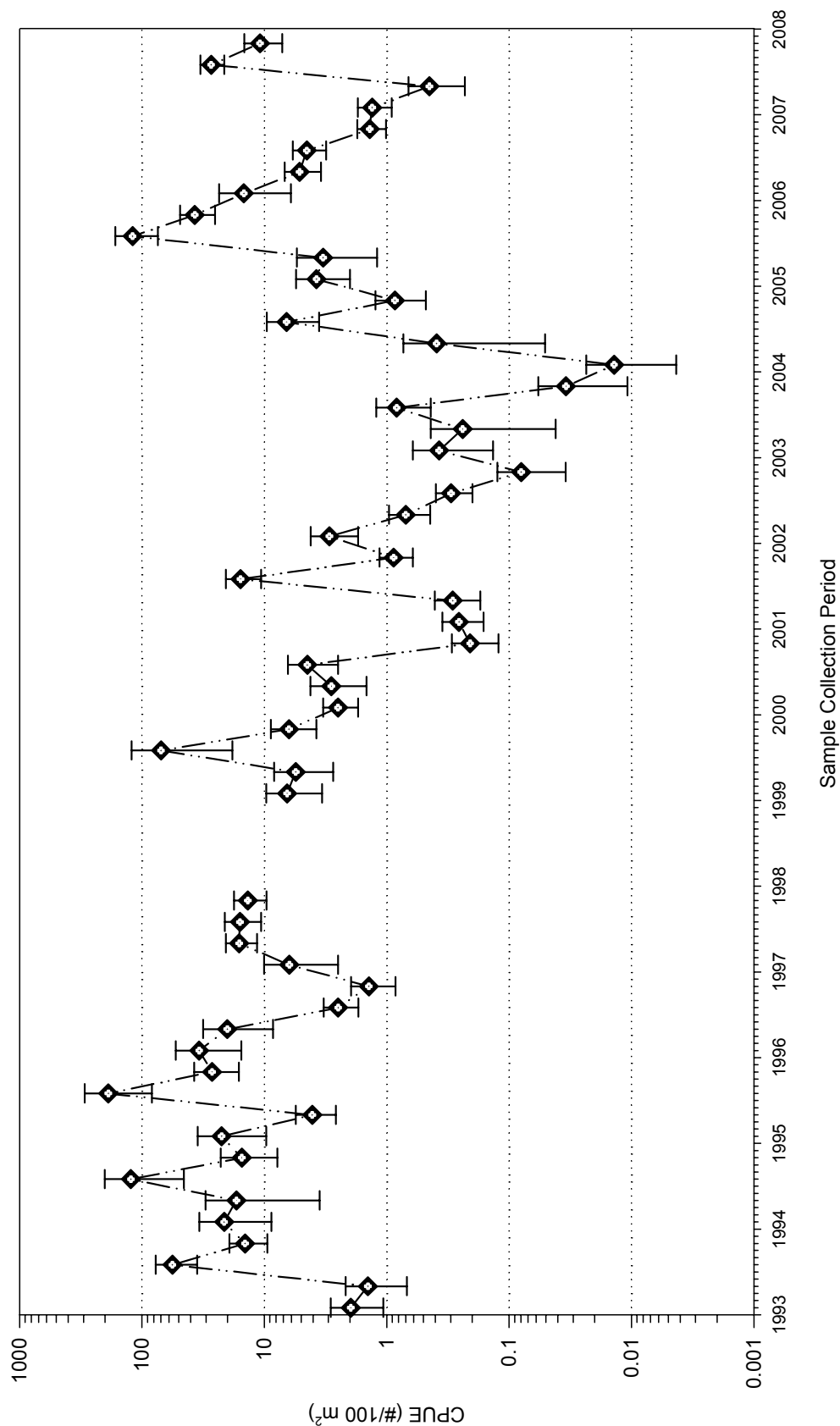


Figure 8. Time sequence of quarterly Rio Grande silvery minnow densities (1993-1997, 1999-2007) at population monitoring program collection sites. Hollow diamonds indicate sample means for each survey and capped-bars represent the standard error. Dotted horizontal lines represent different orders of magnitude.

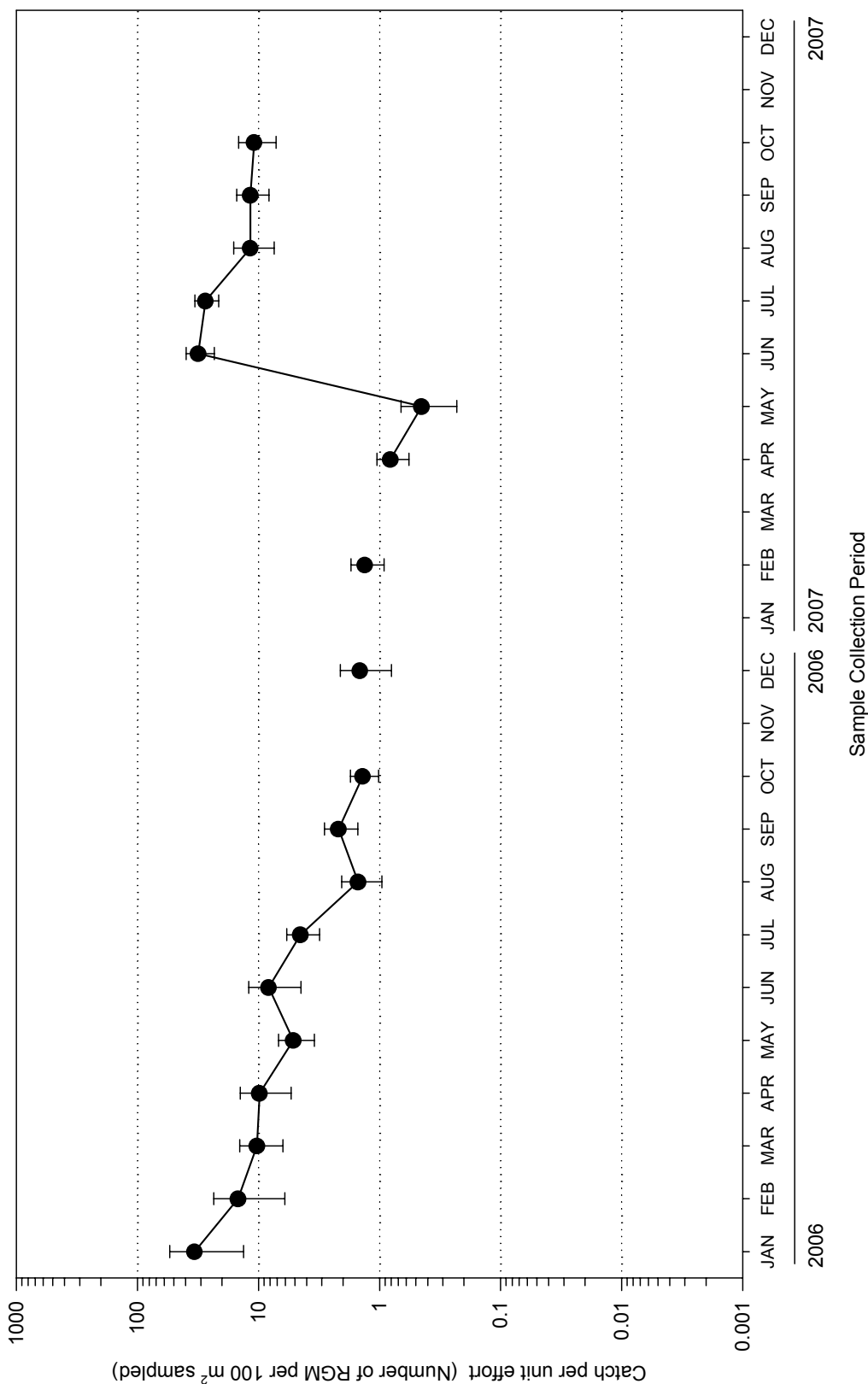


Figure 9. Monthly densities of Rio Grande silvery minnow during 2006 and through October 2007 at population monitoring program collection sites. Solid circles indicate monthly means (n=20 sites per month) and capped-bars represent the standard error. Missing symbols indicate that no individuals were collected in a particular reach during that month (i.e., no sampling). Dotted horizontal lines represent different orders of magnitude.

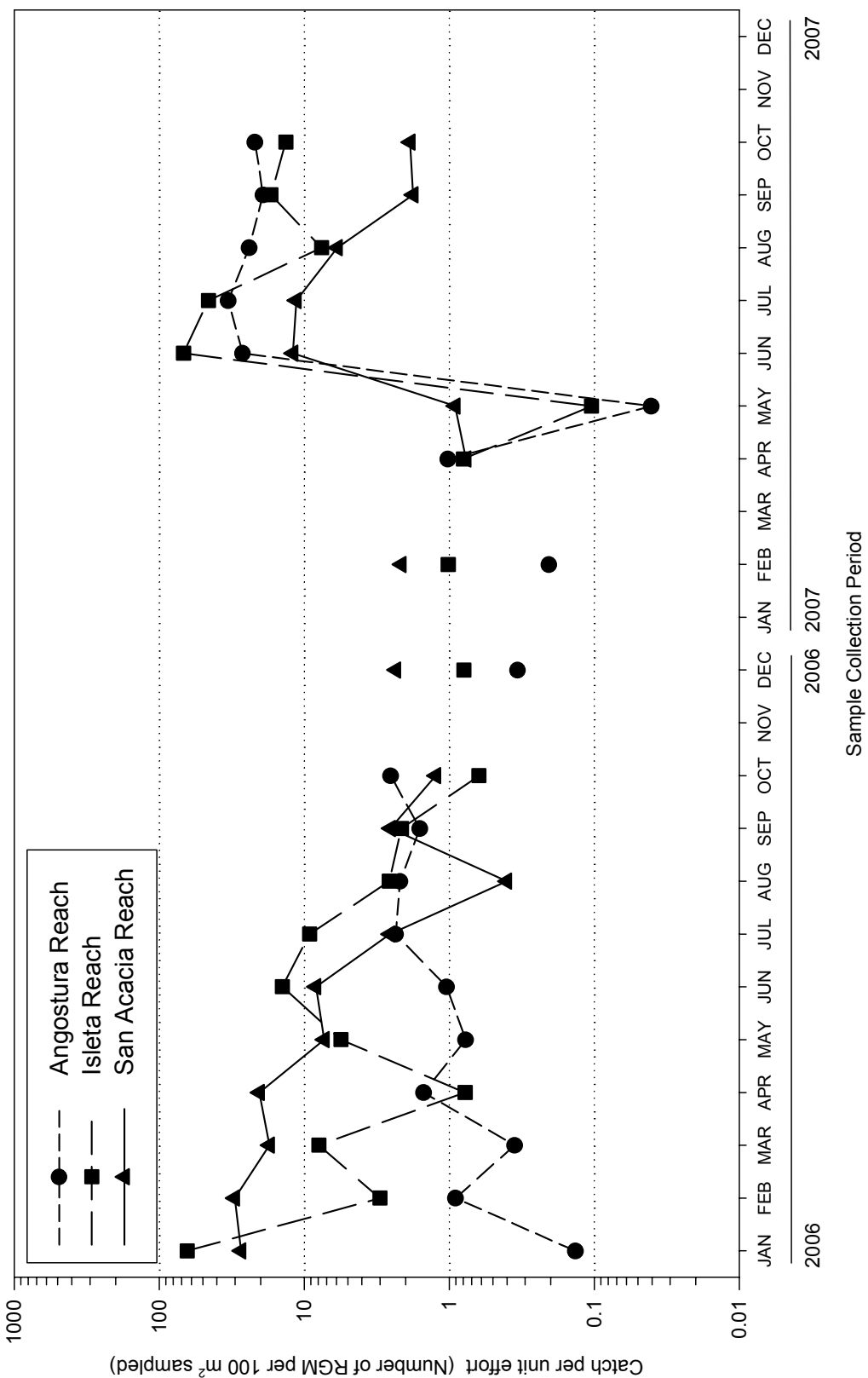


Figure 10. Mean monthly densities of Rio Grande silvery minnow during 2006 and through October 2007 at population monitoring program collection sites in the Angostura, Isleta, and San Acacia reaches. Missing symbols indicate that no individuals were collected in a particular reach during that month (i.e., not present or no sampling). Dotted horizontal lines represent different orders of magnitude.

increase (as measured logarithmically) from 2006 to 2007 (Figure 11) was modest but not significant. Population levels in 2006 only approached the lows observed following extensive river drying in 1996. However, mean densities in 2007 were the second highest recorded since 1997. Similar trends were also evident from annual Rio Grande silvery minnow densities (Figure 12).

Hydraulic variables that represent different flow conditions were compared at upstream and downstream USGS gauging stations in the Middle Rio Grande. Extended periods of higher flows were recorded in 1993-1995, 1997, 1999, 2004, 2005 and 2007. These years were notably different in both the magnitude and duration of higher flows compared with 1996, 2000-2003, and 2006. While there were fewer high flow days at downstream stations compared with upstream stations, the number of low flow days at downstream stations was higher than upstream stations for all years.

Linear regression analyses of October densities of Rio Grande silvery minnow from 1993-1997, 1999-2007 revealed significant associations with hydraulic variables. Regression analysis of Rio Grande silvery minnow October densities revealed significant relationships with several hydraulic variables. Density increased significantly ($p < 0.005$) with maximum discharge and all combinations of number of days with discharge (as measured at the Albuquerque gauge) exceeding a threshold value (Figure 13). The relationship that explained the most variation (83%) in mean density was number of days with discharge $> 3,000$ cfs. October densities of Rio Grande silvery minnow increased significantly with maximum discharge for all combinations of number of days with discharge (as measured at the San Marcial gauge) exceeding a threshold value (Figure 14). The relationship between fish density and discharge was slightly better when using the San Marcial gauge as compared with the Albuquerque gauge. The relationship that explained the most variation (ca. 90%) in mean density was the number of days with discharge < 200 cfs. A striking pattern of association between changes in discharge and changes in Rio Grande silvery minnow abundance emerged when plotting all data over the past decade on a single graph (Figure 15).

Mesohabitat associations

Mesohabitats sampled in the Middle Rio Grande were classified during field sampling and given unique codes to identify their hydraulic features (Table 3). The overall distribution of mesohabitats did not differ notably among reaches although there were some exceptions (Figure 16). For example, backwaters were more commonly sampled in the Isleta Reach while riffles were more commonly sampled in the Angostura Reach. A wide variety of habitats were sampled to ensure balanced monitoring for the Middle Rio Grande ichthyofaunal community and all life stages of Rio Grande silvery minnow. The actual habitats occupied by Rio Grande silvery minnow were diverse and included all of the habitats sampled. The only exception was the lack of individuals in rare riffle habitats of the Isleta Reach. Habitats most frequently used by Rio Grande silvery minnow included shoreline pools and backwaters.

Fish Community

Population status

The ichthyofaunal community in the Middle Rio Grande between Angostura Diversion Dam and Elephant Butte Reservoir was numerically dominated by cyprinids (Table 4). The native ichthyofauna consisted of eight species (red shiner, Rio Grande silvery minnow, fathead minnow, flathead chub, longnose dace, river carpsucker, smallmouth buffalo, and bluegill). Bluegill ($N=6$) was the least abundant native fish while smallmouth buffalo ($N=40$) was the second least abundant. Red shiner was the most abundant native species collected ($N=35,034$) followed by Rio Grande silvery minnow ($N=9,631$), flathead chub ($N=2,663$), river carpsucker ($N=1,975$), and fathead minnow

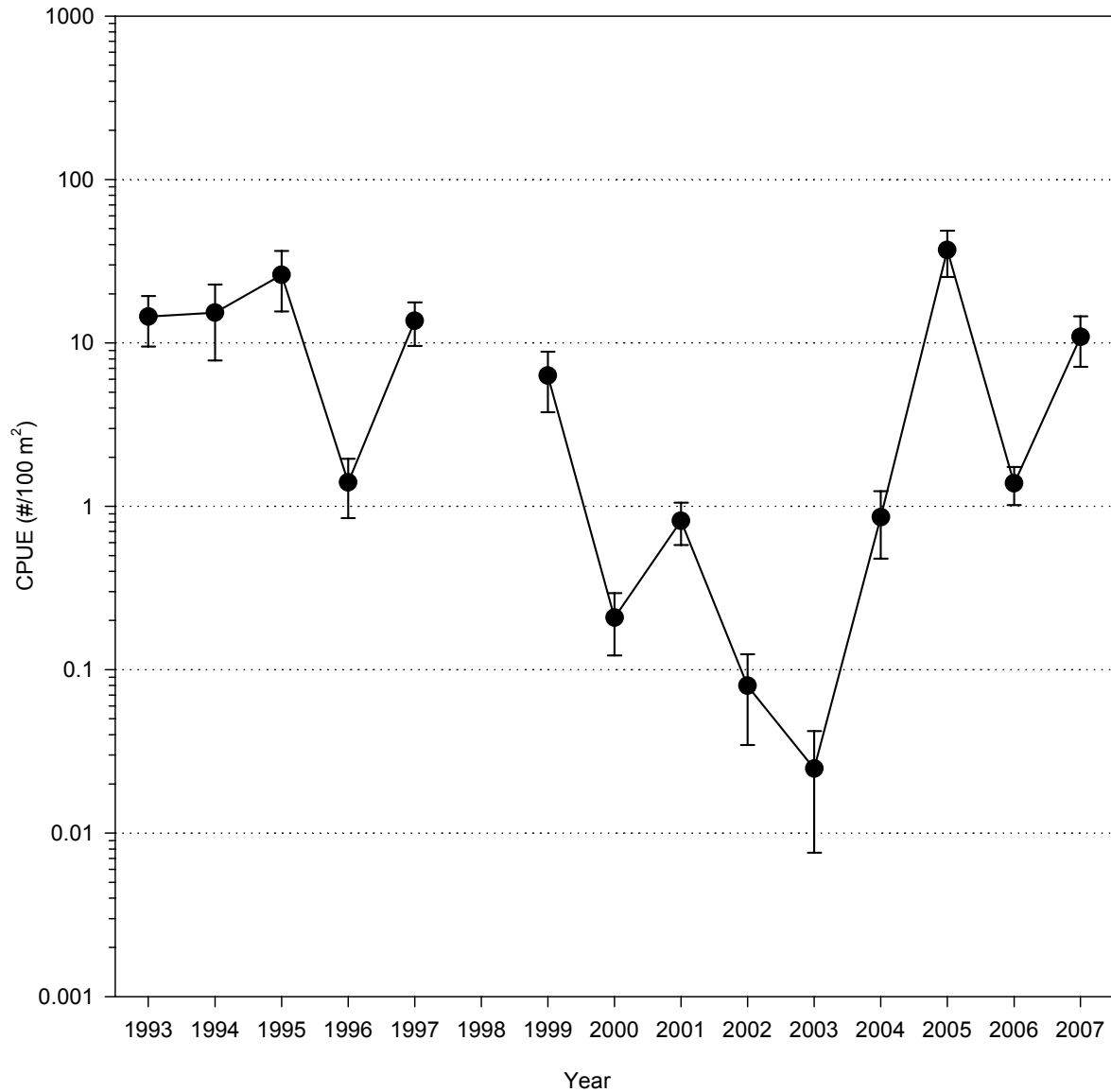


Figure 11. Rio Grande silvery minnow densities (CPUE) during October, at all sampling sites, by sampling year (1993-1997, 1999-2007). Solid circles indicate means and capped-bars represent the standard error. Dotted horizontal lines represent different orders of magnitude.

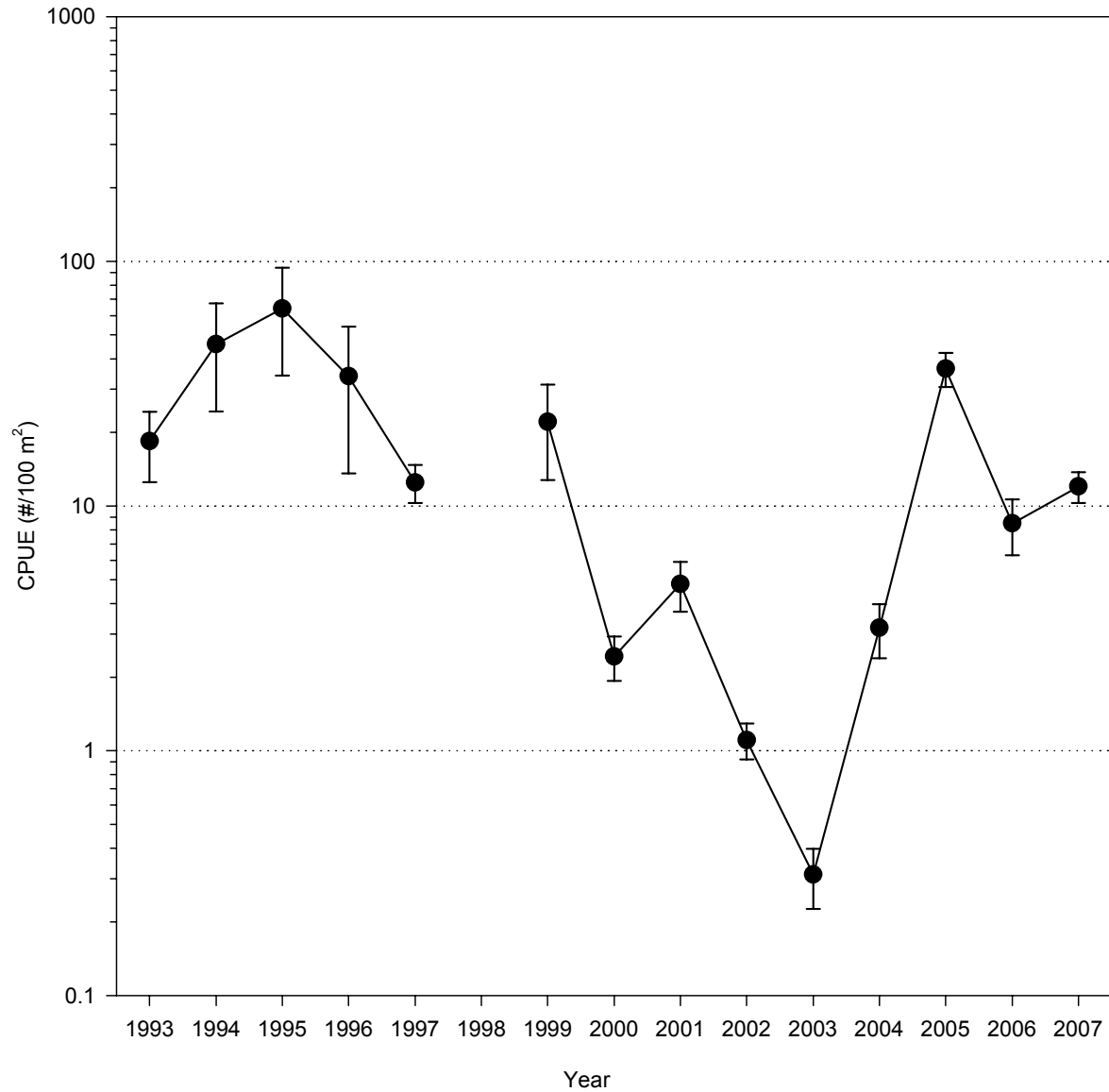


Figure 12. Annual Rio Grande silvery minnow densities (CPUE), at all sampling sites, by sampling year (1993-1997, 1999-2007*). Solid circles indicate means and capped-bars represent the standard error. Dotted horizontal lines represent different orders of magnitude. *Annual rate in 2007 (January-October).

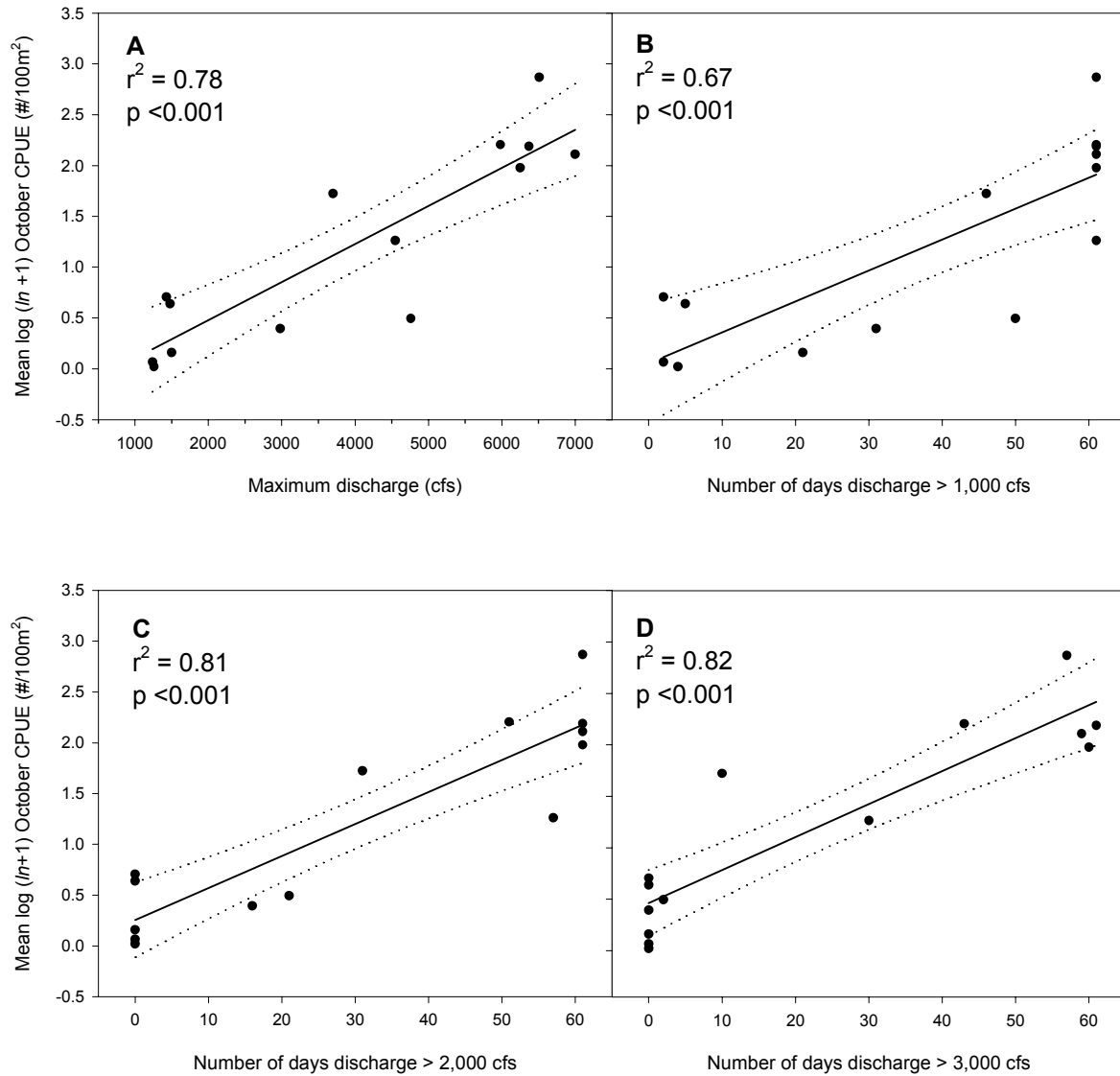


Figure 13 A-D. Regression analysis of Rio Grande silvery minnow log-transformed mean October densities (1993-1997, 1999-2007) and different hydraulic variables for USGS Gauge #08330000 (Rio Grande at Albuquerque, NM). Graph shows regression line (solid) and 95% confidence intervals (dotted).

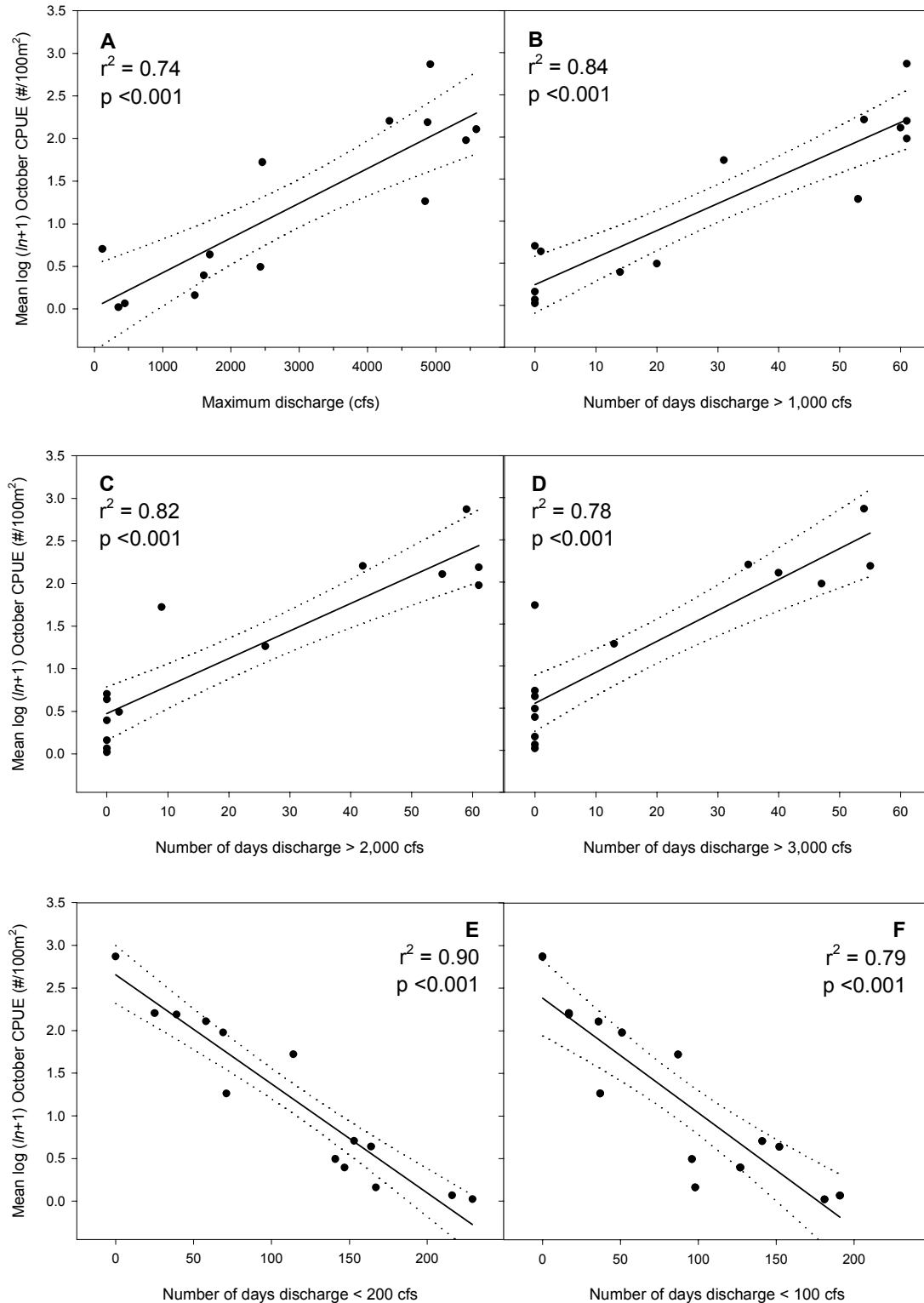


Figure 14 A-F. Regression analysis of Rio Grande silvery minnow log-transformed mean October densities (1993-1997, 1999-2007) and different hydraulic variables for USGS Gauge #08358400 (Rio Grande Floodway at San Marcial, NM). Graph shows regression line (solid) and 95% confidence intervals (dotted).

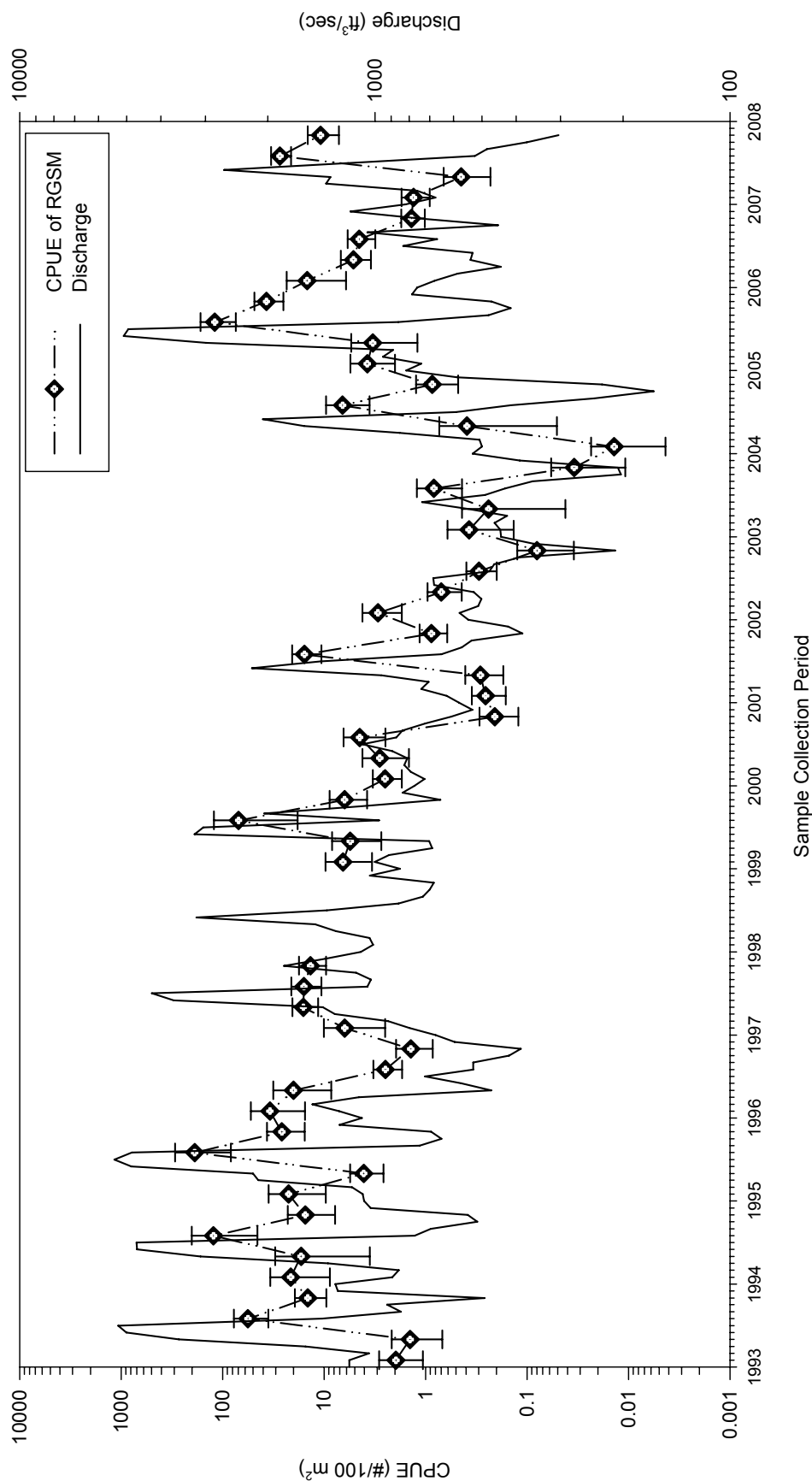


Figure 15. Time sequence of quarterly Rio Grande silvery minnow densities (1993-1997, 1999-2007) at population monitoring program collection sites and mean monthly discharge at USGS Gauge #08330000 (Rio Grande at Albuquerque, NM). Diamonds indicate sample means for each survey and capped-bars represent the standard error.

Table 3. Codes used for mesohabitat type classification in the Middle Rio Grande.

MESOHABITAT TYPES	
<i>Primary</i>	
MC	Main channel- the section of the river which carries the majority of the flow; there can be only one main channel.
SC	Secondary channel- all channels not designated as the main channel; there can be zero or several secondary channels at a site.
BW	Backwater- a body of water, connected to the main channel, with no appreciable flow; often created by a drop in flow which partially isolates a former channel.
DE	Debris- any habitat that has associated organic cover (e.g., grasses, woody vegetation etc.).
IP	Isolated pool- a pool which is not connected to the main or secondary channel; frequently a former backwater which is no longer connected to the main or a secondary channel.
RI	Riffle- a shallow and high velocity habitat where the water surface is irregular and broken by waves; generally indicates gravel-cobble substrata.
<i>Secondary</i>	
SH	Shoreline- usually a shallower, lower velocity area that is adjacent to shore. This designation precedes other secondary mesohabitat types (e.g., MCSHRU= main channel shoreline run or SCSHPO= side channel shoreline pool).
PO	Pool- the portion of the river with very little velocity compared to the rest of the river channel (e.g., downstream of islands, instream sand dunes, debris piles, or shoreline peninsulas).
RU	Run- a reach of relatively fast velocity water with laminar flow and a non-turbulent surface.

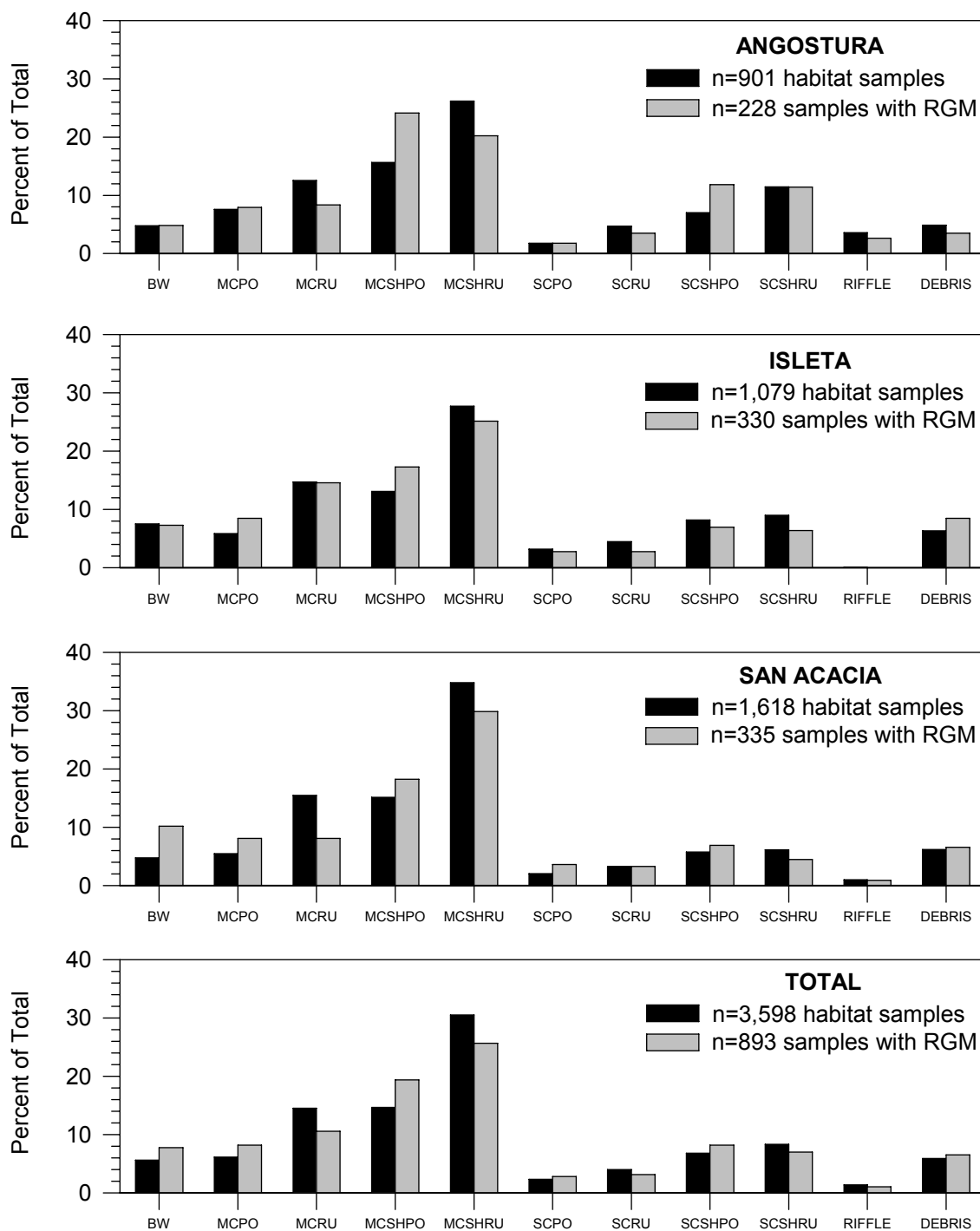


Figure 16. Percent total of mesohabitats (see Table 3 for codes) sampled and those occupied by Rio Grande silvery minnow (RGM) in the Middle Rio Grande as part of population monitoring from December 2006 to October 2007 for each river reach and the annual total.

Table 4. Summary of the Rio Grande silvery minnow population monitoring program fish collections from December 2006 to October 2007.

SPECIES	RESIDENCE STATUS ¹	TOTAL NUMBER OF SPECIMENS	PERCENT OF % OF TOTAL	FREQUENCY OF OCCURRENCE ²	% FREQUENCY OCCURRENCE ²
HERRINGS					
gizzard shad	I	12	0.021	6	3.3
threadfin shad	I	2	0.003	2	1.1
CARPS AND MINNOWS					
red shiner	N	35,034	60.230	169	93.9
common carp	I	366	0.629	50	27.8
Rio Grande silvery minnow	N	9,631	16.557	152	84.4
fathead minnow	N	679	1.167	101	56.1
bullhead minnow	I	1	0.002	1	0.6
flathead chub	N	2,663	4.578	143	79.4
longnose dace	N	489	0.841	42	23.3
SUCKERS					
river carpsucker	N	1,975	3.395	82	45.6
white sucker	I	2,702	4.645	49	27.2
smallmouth buffalo	N	40	0.068	4	2.2
NORTH AMERICAN CATFISHES					
black bullhead	I	6	0.010	5	2.8
yellow bullhead	I	9	0.015	9	5.0
channel catfish	I	1,707	2.935	104	57.8
TROUTS					
rainbow trout	I	1	0.002	1	0.6
brown trout	I	1	0.002	1	0.6
LIVEBEARERS					
western mosquitofish	I	2,797	4.809	99	55.0
TEMPERATE BASSES					
white bass	I	2	0.003	2	1.1
SUNFISHES					
bluegill	N	6	0.010	5	2.8
largemouth bass	I	26	0.045	12	6.7
white crappie	I	14	0.024	8	4.4
PERCHES					
yellow perch	I	2	0.003	2	1.1
walleye	I	3	0.005	2	1.1
TOTAL		58,167			

¹ N = native; I = introduced

² Frequency and percent frequency of occurrence are based on n=180 samples (i.e., 9 months at 20 sites).

(N=679). The most abundant introduced species were western mosquitofish (N=2,797), white sucker (N=2,702), channel catfish (N=1,707), and common carp (N=366). The 12 remaining nonnative fish species were present at much lower numbers (N<30 for each taxon) than were the aforementioned nonnative species.

Rio Grande silvery minnow comprised a higher fraction of the total ichthyofaunal community in 2006 and 2007 than it did from 2000-2004. While this percentage had dropped precipitously over the past decade (Figure 17), it improved markedly between 2004 and 2005. There was, however, a substantial decline from 2005 (ca. 50%) to 2007 (ca. 25%). Interestingly, the relative abundance of Rio Grande silvery minnow continued to decline from 2006 to 2007 despite an increase in the density of this species. The magnitude of change in densities of Rio Grande silvery minnow over time is particularly evident when compared to overall fish densities (all species) over the past decade (Figure 18). While Rio Grande silvery minnow had declined from being one of the most common species in the early 1990s to being one of the least common species by 2003, other species (e.g., fathead minnow and western mosquitofish) increased during that same period (Table 5). However, the rank of Rio Grande silvery minnow increased notably from 2003 (11th) to 2007 to (2nd). The coefficient of concordance ($W=0.71$) indicated high overall agreement in ranks ($p<0.001$) over time despite broad changes in ranks for some taxa (e.g., Rio Grande silvery minnow and white sucker).

There were notable seasonal changes in the relative abundance of the 10 most abundant fish species from December 2006 to October 2007 (Figures 19 and 20). Density of all species increased during spring or summer. Rio Grande silvery minnow abundance in samples peaked in June and then slowly declined until August. Common carp and white sucker also peaked in abundance during June. The highest densities of red shiner were recorded in July and September although the abundance of this taxon was high throughout the year. Other fish species whose densities peaked in July were fathead minnow, flathead chub, river carpsucker, and channel catfish. A detailed accounting of species-specific temporal abundance revealed similar trends and documented the season-specific presence of certain taxa (e.g., gizzard shad and smallmouth buffalo; Table 6).

Besides temporal variation in the relative abundance in the fish community, there were also longitudinal changes in the abundance of fish species (Figure 21). Red shiner, fathead minnow, and western mosquitofish densities were highest in the Isleta Reach. Densities of longnose dace and white sucker were higher in the Angostura Reach compared to the Isleta or San Acacia reaches. Rio Grande silvery minnow was most abundant in the Angostura and Isleta reaches.

Sampling Variation

November 2006

The sampling variation for Rio Grande silvery minnow (Figure 22) was proportionally very similar and low among the 20 sampling sites. This species was present at all sites except Site #0 but was only found on a single occasion at Site #15 (i.e., no lower error bar). While mean density at occupied sites ranged from 0.05 (Site #15) to 11.82 (Site #2) individuals per 100 m², the coefficient of variation (CV) was ≤ 1.2 at all sites except Site #5 (1.24) and Site #15 (2.00). The lowest value of CV was recorded at Site #7 (0.19) and the average of all CV values for all occupied sites (N=19) was 0.88. A total of 5 out of 19 sites had CV values of <0.7 .

Values for sampling variation were similar when comparing all fish species among the sampling sites (Figure 23). However, the proportional amount of variation was slightly less than it was for Rio Grande silvery minnow alone. Sites #5, #9, and #14 had the highest site-specific variation. The mean density of all fish species ranged from 1.48 (Site #0) to 78.58 (Site #14) individuals per 100 m². The coefficient of variation (CV) was <1 at all sites. The lowest value of CV

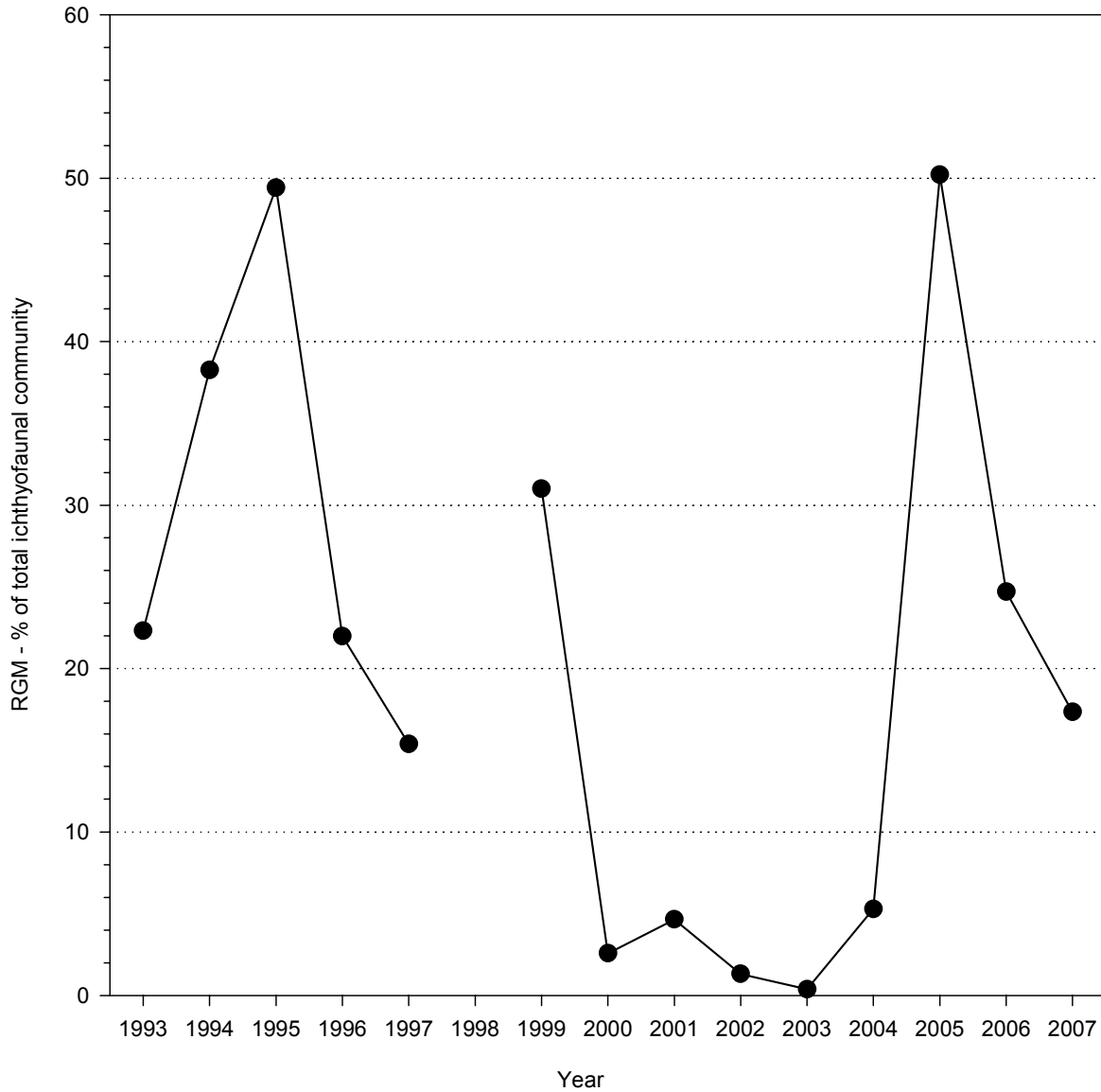


Figure 17. Relative abundance of Rio Grande silvery minnow as a percentage of the total ichthyofaunal community by sampling year (1993-1997, 1999-2007). Dotted horizontal lines represent different orders of magnitude.

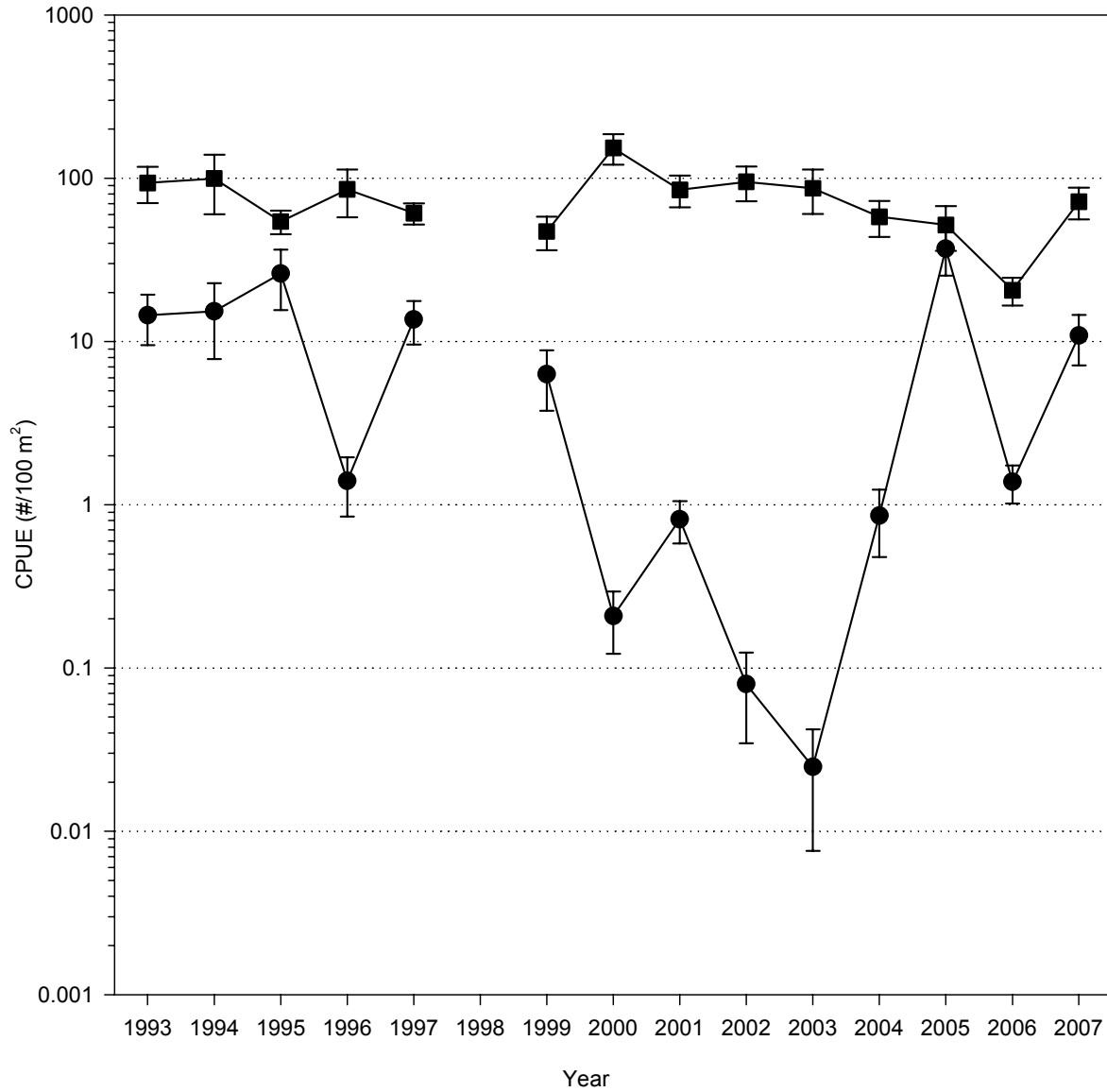


Figure 18. Densities (CPUE) of Rio Grande silvery minnow (circles) and the total ichthyofaunal community (squares) during October, at all sampling sites, by sampling year (1993-1997, 1999-2007). Solid circles or squares indicate means and capped-bars represent the standard error. Dotted horizontal lines represent different orders of magnitude.

Table 5. Summary of annual rank abundance of species collected nearly every year in the Rio Grande over the past ten sampling years (1997, 1999-2007).

SPECIES	1	1	2	2	2	2	2	2	2	2
	9	9	0	0	0	0	0	0	0	0
	9	9	0	0	0	0	0	0	0	0
	7	9	0	1	2	3	4	5	6	7
HERRINGS										
gizzard shad	11	8	12	11	13	14	13	10	11	13
CARPS AND MINNOWS										
red shiner	1	1	1	1	1	1	1	2	1	1
common carp	8	9	9	6	10	10	9	7	8	10
<u>RG silvery minnow</u>	<u>2</u>	<u>2</u>	<u>6</u>	<u>5</u>	<u>8</u>	<u>11</u>	<u>4</u>	<u>1</u>	<u>2</u>	<u>2</u>
fathead minnow	6	7	5	3	2	3	3	4	3	8
flathead chub	9	6	8	9	7	5	7	6	7	5
longnose dace	10	10	10	10	9	9	10	11	10	9
SUCKERS										
river carpsucker	4	3	4	4	4	4	5	9	5	6
white sucker	3	11	3	8	5	6	6	5	4	4
NORTH AMERICAN CATFISHES										
black bullhead	13	12	17	17	16	16	15	15	14	15
yellow bullhead	17	15	13	14	11	8	11	12	12	14
channel catfish	8	4	7	7	6	7	8	8	9	7
LIVEBEARERS										
western mosquitofish	5	5	2	2	3	2	2	3	6	3
TEMPERATE BASSES										
white bass	15	14	15	12	15	16	NA	13	13	17
SUNFISHES										
bluegill	16	17	16	16	14	15	14	NA	17	15
largemouth bass	12	16	14	15	16	13	12	14	16	11
white crappie	14	12	11	13	12	12	12	16	15	12

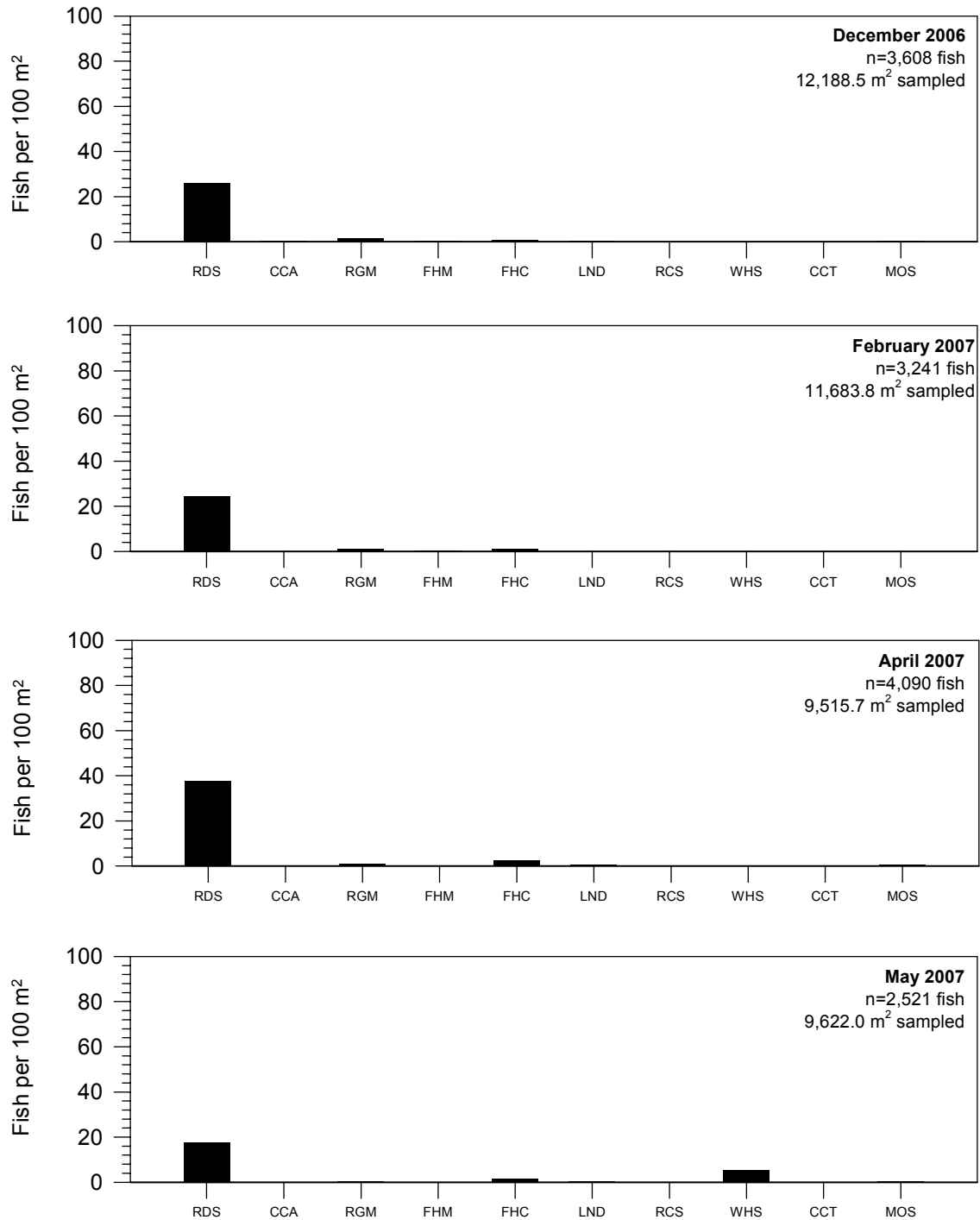


Figure 19. Fish densities (CPUE) from December 2006 to May 2007 for each focal species (see Table 1 for species codes) in the Middle Rio Grande. Rio Grande silvery minnow = RGM.

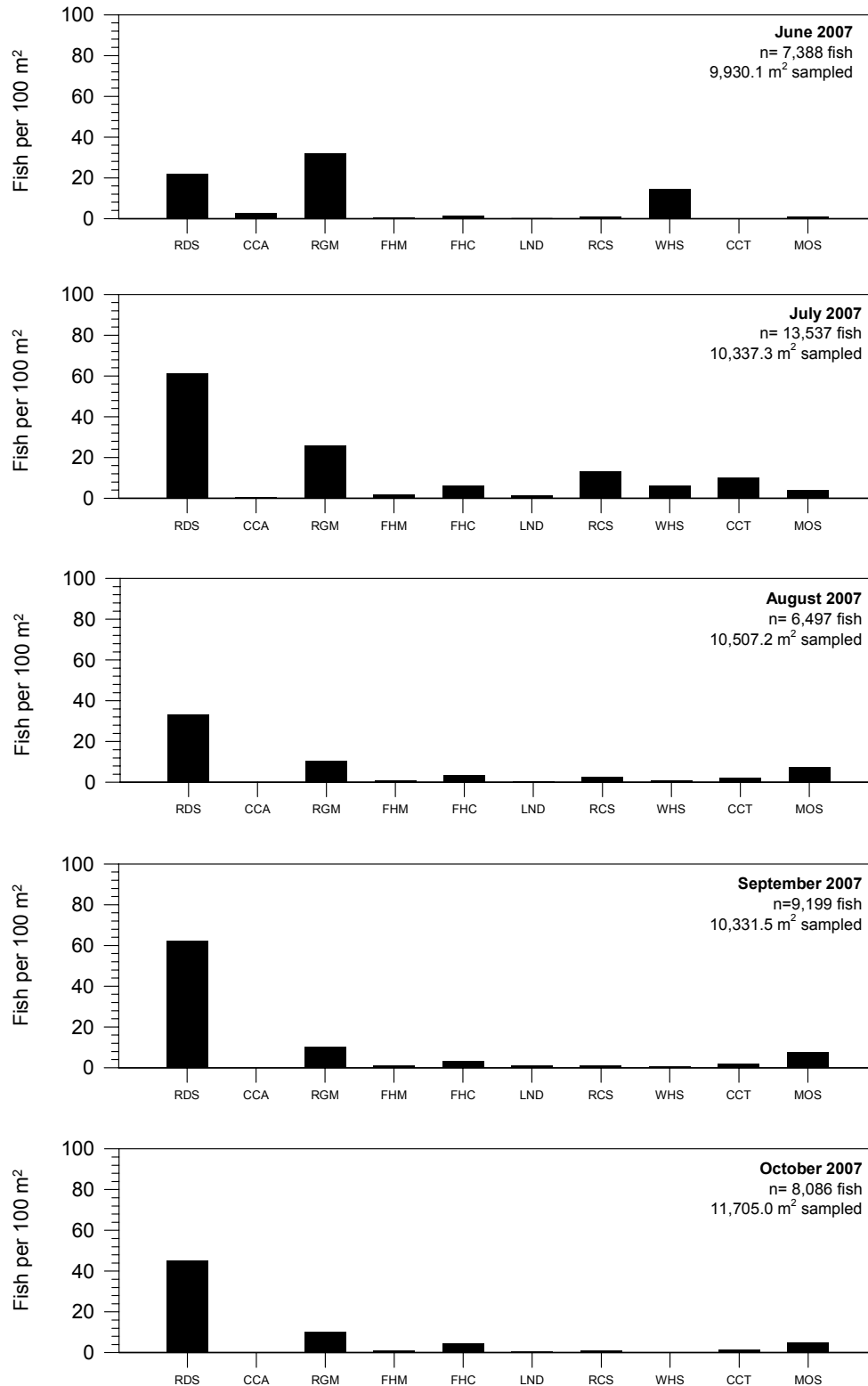


Figure 20. Fish densities (CPUE) from June to October 2007 for each focal species (see Table 1 for species codes) in the Middle Rio Grande. Rio Grande silvery minnow = RGM.

Table 6. Summary of the December 2006 to October 2007 Rio Grande silvery minnow population monitoring program fish collections.

SPECIES	D E C	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	T O T A L
HERRINGS													
gizzard shad	--	--	--	3	6	1	2	--	--	--	--	--	12
threadfin shad	--	--	--	--	--	1	1	--	--	--	--	--	2
CARPS AND MINNOWS													
red shiner	3,188	2,871	--	3,587	1,696	2,153	6,329	3,504	6,419	5,287	--	--	35,034
common carp	--	3	--	1	3	267	61	6	19	6	--	--	366
Rio Grande silvery minnow	173	158	--	80	43	3,174	2,685	1,122	1,030	1,166	--	--	9,631
fathead minnow	40	42	--	33	19	36	177	76	127	129	--	--	679
bullhead minnow	--	--	--	--	--	--	--	--	--	1	--	--	1
flathead chub	121	120	--	230	162	143	615	384	345	543	--	--	2,663
longnose dace	--	1	--	51	49	28	147	53	105	55	--	--	489
SUCKERS													
river carpsucker	14	15	--	6	5	72	1,354	256	111	142	--	--	1,975
white sucker	1	1	--	10	494	1,423	635	81	38	19	--	--	2,701
smallmouth buffalo	--	--	--	--	--	--	40	--	--	--	--	--	40
NORTH AMERICAN CATFISHES													
black bullhead	--	--	--	3	--	--	1	1	1	--	--	--	6
yellow bullhead	--	1	--	1	1	--	1	2	2	1	--	--	9
channel catfish	14	7	--	37	13	6	1,042	223	190	174	--	--	1,707
TROUTS													
rainbow trout	--	--	--	1	--	--	--	--	--	--	--	--	1
brown trout	--	--	--	--	--	--	1	--	--	--	--	--	1
LIVEBEARERS													
western mosquitofish	54	22	--	46	28	82	424	780	804	557	--	--	2,797
TEMPERATE BASSES													
white bass	--	--	--	--	--	--	1	--	--	1	--	--	2
SUNFISHES													
bluegill	--	--	--	1	--	--	2	2	--	1	--	--	6
largemouth bass	1	--	--	--	--	1	11	3	7	3	--	--	26
white crappie	2	--	--	--	--	--	7	4	--	1	--	--	14
PERCHES													
yellow perch	--	--	--	--	--	1	1	--	--	--	--	--	2
walleye	--	--	--	--	2	--	--	--	1	--	--	--	3
TOTAL	3,608	3,241	4,090	2,521	7,388	13,537	6,497	9,199	8,086	58,167			

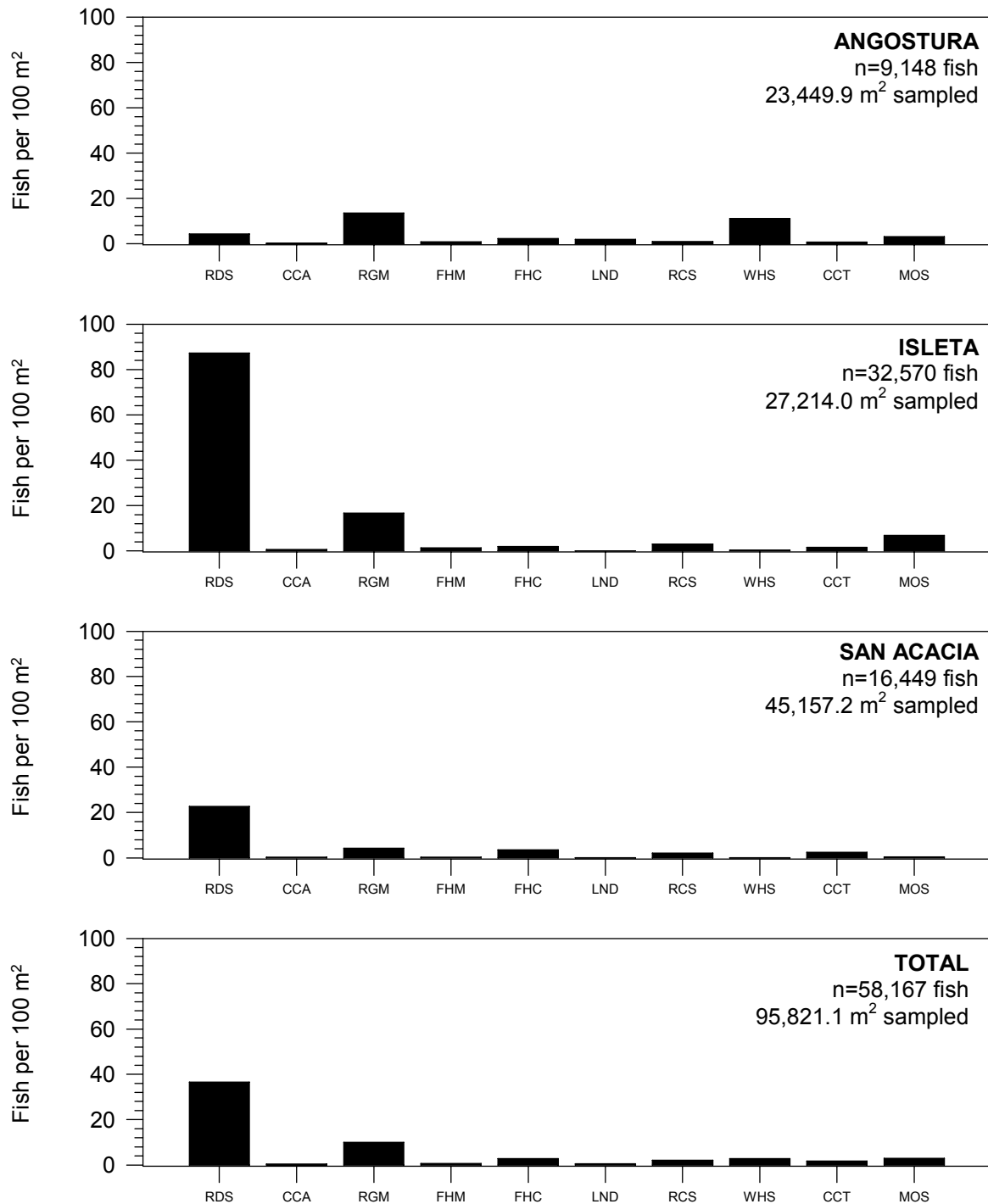


Figure 21. Fish densities (CPUE) by river reach for each focal species (see Table 1 for species codes) in the Middle Rio Grande from December 2006 to October 2007.

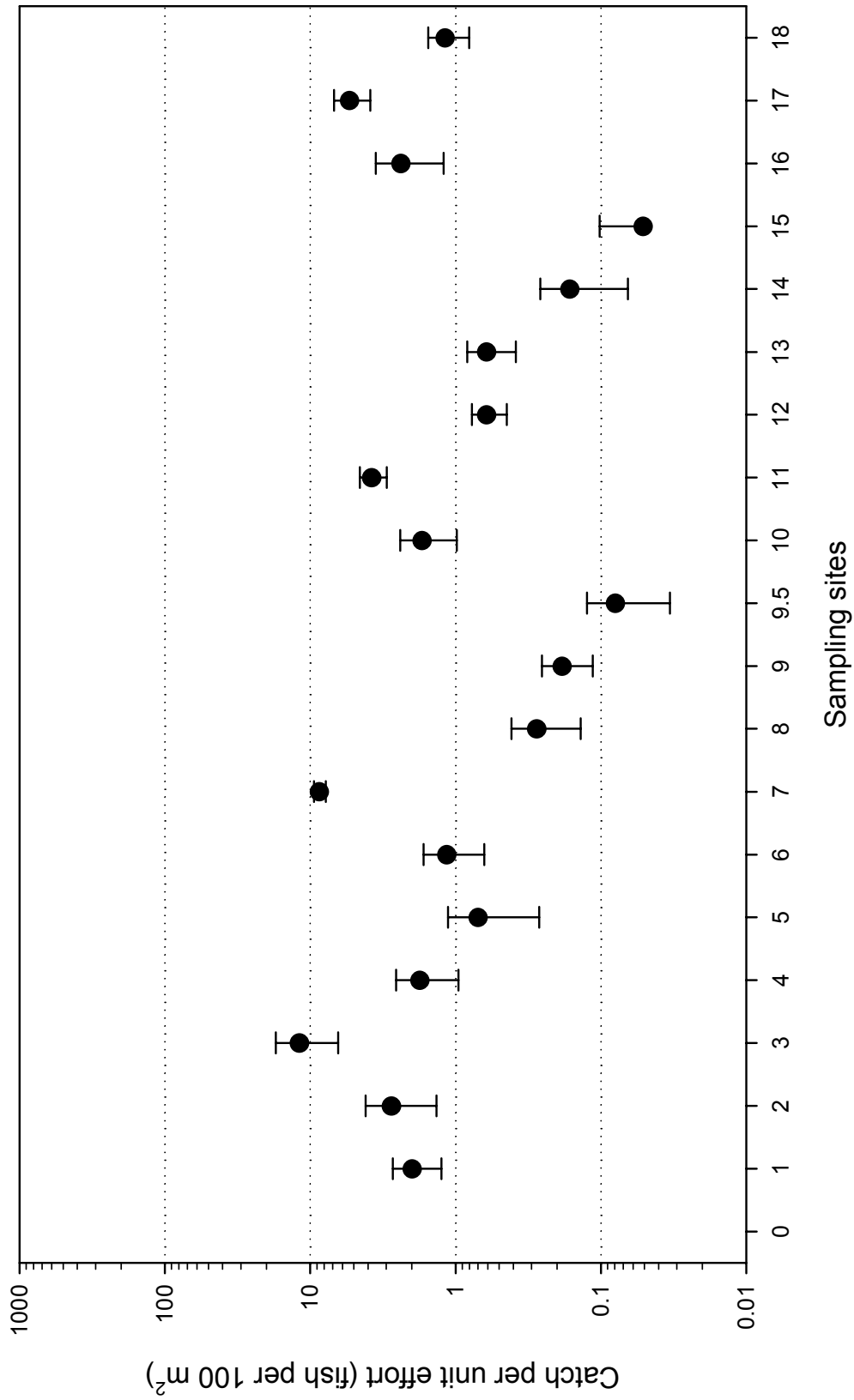


Figure 22. Variation in density values of Rio Grande silvery minnow, for each sampling site, during November 2006. Solid circles indicate means for each sampling site and capped-bars represent the standard error. Dotted horizontal lines represent different orders of magnitude.

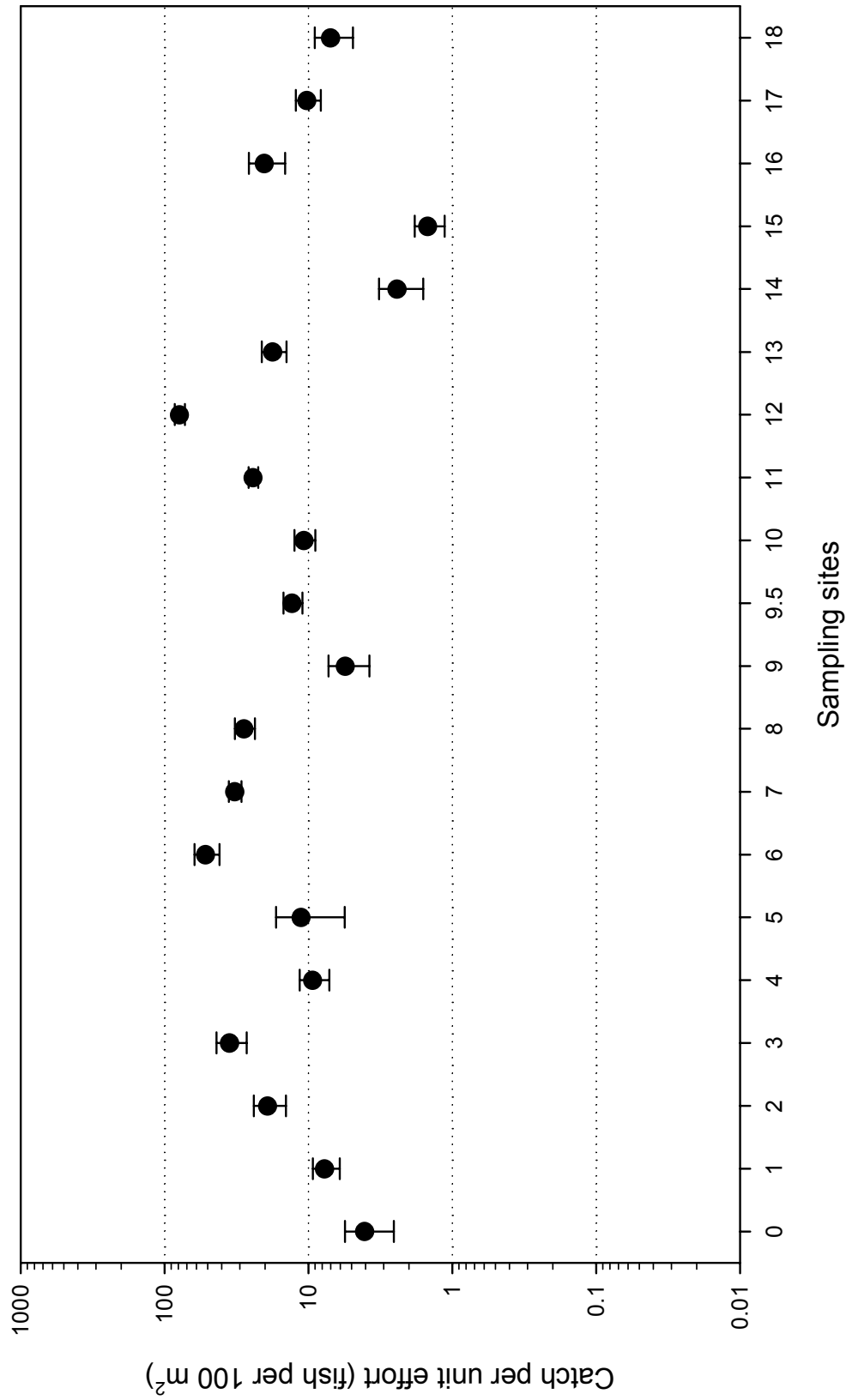


Figure 23. Variation in density values of all fish species combined, for each sampling site, during November 2006. Solid circles indicate means for each sampling site and capped-bars represent the standard error. Dotted horizontal lines represent different orders of magnitude.

was recorded at Site #11 (0.15) and the average of all CV values for the 20 sites was 0.46. A total of 18 out of 20 sites had CV values of <0.7.

Sampling variation by reach was also calculated for Rio Grande silvery minnow and all fish species combined (Figure 24A and 24B, respectively). The total variation among reaches for Rio Grande silvery minnow was highest in the Angostura Reach and lowest in the Isleta Reach. Mean density ranged from 1.60 (Isleta) to 3.29 (Angostura) individuals per 100 m². The values of CV were 0.12 (Isleta), 0.26 (San Acacia), and 0.70 (Angostura). Slightly different results were noted for the inter-reach comparison when using all fish species combined. The overall variation was highest in the Isleta Reach and lowest in the San Acacia Reach. The mean density for all fish species combined ranged from 13.91 (Angostura) to 22.84 (Isleta) individuals per 100 m². Values of CV were 0.10 (San Acacia), 0.30 (Angostura), and 0.35 (Isleta).

A final comparison of sampling variation was made among the 10 focal taxa for the entire sampling area (Figure 25). The mean density of focal fish taxa ranged between 0.02 (white sucker: CATCOM) and 12.84 (red shiner: CYPLUT) individuals per 100 m². Values of CV ranged from 0.18 (western mosquitofish: GAMAFF) to 1.15 (white sucker: CATCOM). The overall CV value for all fish species combined was 0.21 and for Rio Grande silvery minnow was 0.38.

November 2007

The sampling variation for Rio Grande silvery minnow (Figure 26) varied among sites but was moderately low overall. In general, the variation was most pronounced in the southern reaches of the study area. While mean density of this species ranged from 0.19 (Site #15) to 28.99 (Site #2) individuals per 100 m², the coefficient of variation (CV) was <1 at all sites except Site #9.5 (1.22). The lowest value of CV was recorded at Site #7 (0.20) and the average of all CV values for all occupied sites (N=19) was 0.61. A total of 12 out of 19 sites had CV values of <0.7.

Values for sampling variation did not follow the pattern noted for Rio Grande silvery minnow (i.e., more variable in the southern reaches) when comparing all fish species among the sampling sites (Figure 27). The proportional amount of variation was slightly less than it was for Rio Grande silvery minnow alone. Sites #0, #15, and #17 had the highest site-specific variation. The mean density of all fish species ranged from 0.62 (Site #15) to 300.59 (Site #14) individuals per 100 m²; these sites were different than the extremes noted for Rio Grande silvery minnow. The coefficient of variation (CV) was <1 at all sites. The lowest value of CV was recorded at Site #13 (0.09) and the average of all CV values for all 20 sites was 0.40. A total of 18 out of 20 sites had CV values of <0.7.

Sampling variation by reach was also calculated for Rio Grande silvery minnow and all fish species combined (Figure 28A and 28B, respectively). The total variation among reaches for Rio Grande silvery minnow was highest in the Angostura Reach and lowest in the Isleta Reach. Mean density ranged from 1.33 (San Acacia) to 11.12 (Angostura) individuals per 100 m². The values of CV were 0.27 (Isleta), 0.28 (San Acacia), and 0.49 (Angostura). Similar results for the inter-reach comparison were noted for all fish species combined. The overall variation was highest in the Angostura Reach and lowest in the Isleta Reach. The mean density for all fish species combined ranged from 20.21 (San Acacia) to 122.88 (Isleta) individuals per 100 m². Values of CV were 0.16 (Isleta), 0.37 (San Acacia), and 0.48 (Angostura).

A final comparison of sampling variation was made among the 10 focal taxa for the entire sampling area (Figure 29). The mean density of focal fish taxa ranged between 0.02 (common carp: CYPCAR) and 40.64 (red shiner: CYPLUT) individuals per 100 m². Values of CV ranged from 0.19 (flathead chub: PLAGRA) to 0.86 (common carp: CYPCAR). The overall CV value for all fish species combined was 0.23 and for Rio Grande silvery minnow was 0.35.

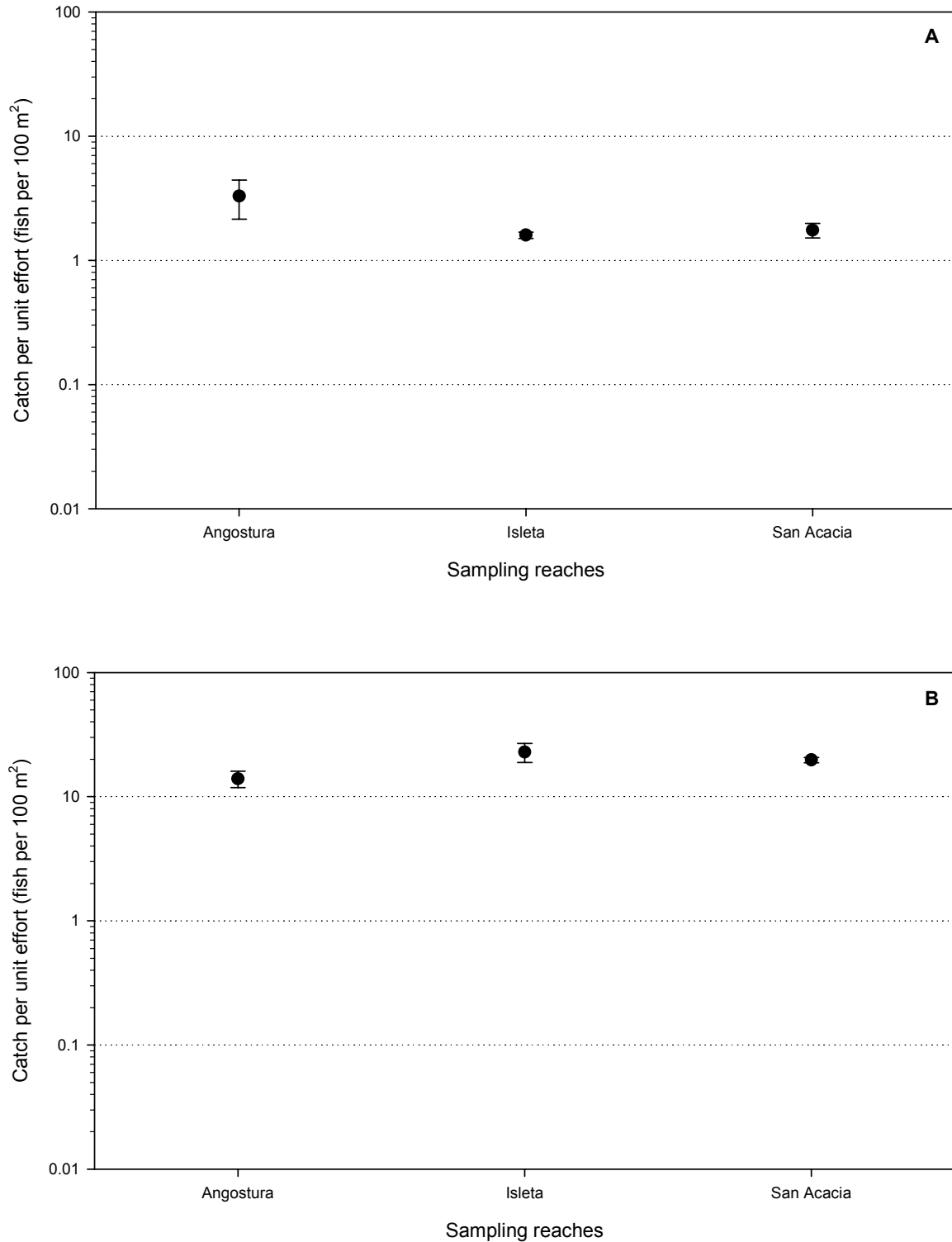


Figure 24. Variation in density values for Rio Grande silvery minnow (A) and for all fish species combined (B), for each sampling reach, during November 2006. Solid circles indicate means for each sampling reach and capped-bars represent the standard error. Dotted horizontal lines represent different orders of magnitude.

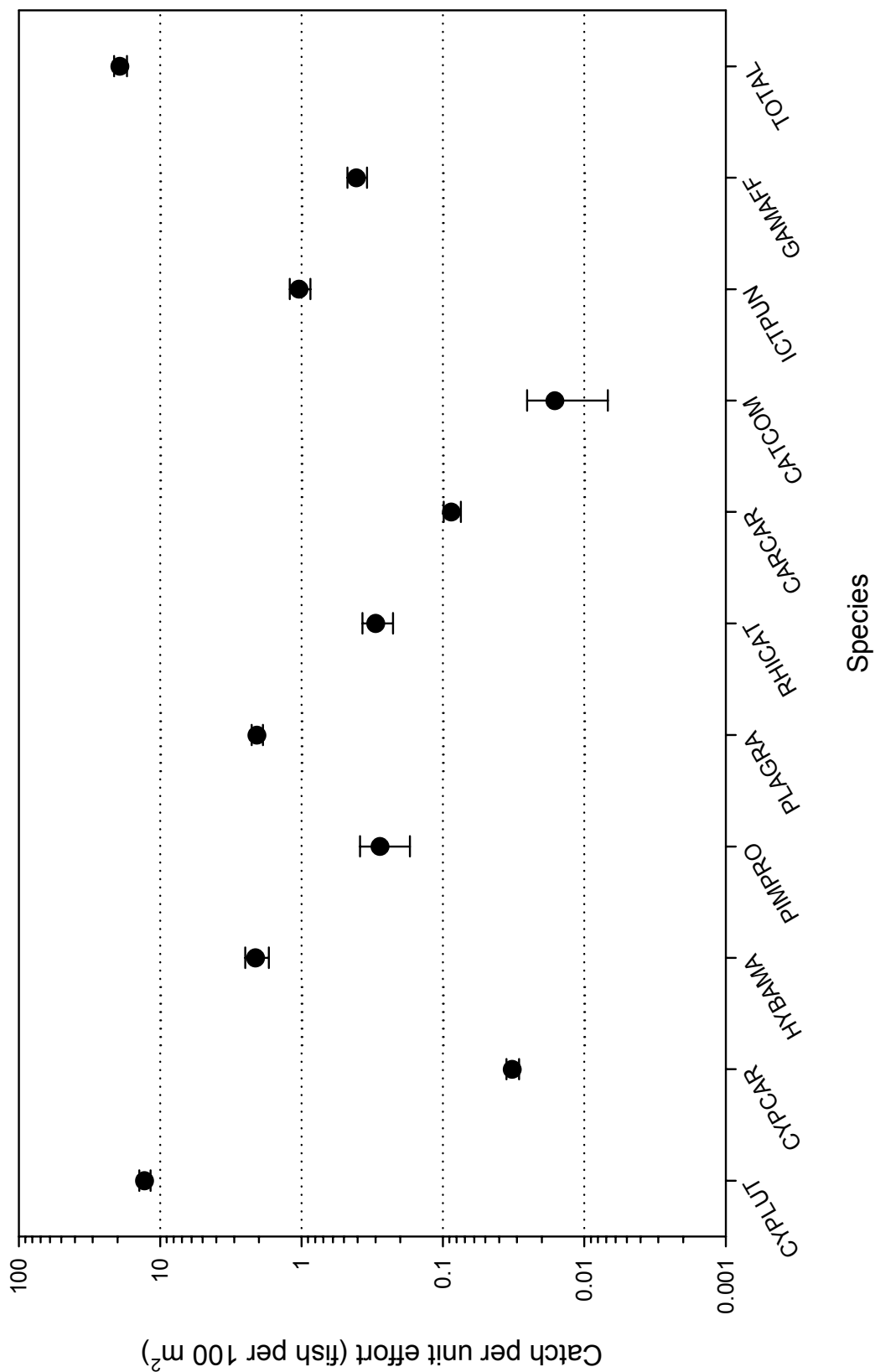


Figure 25. Variation in density values for each focal species, at all sampling sites combined, during November 2006. Solid circles indicate means for each species and capped-bars represent the standard error. Dotted horizontal lines represent different orders of magnitude.

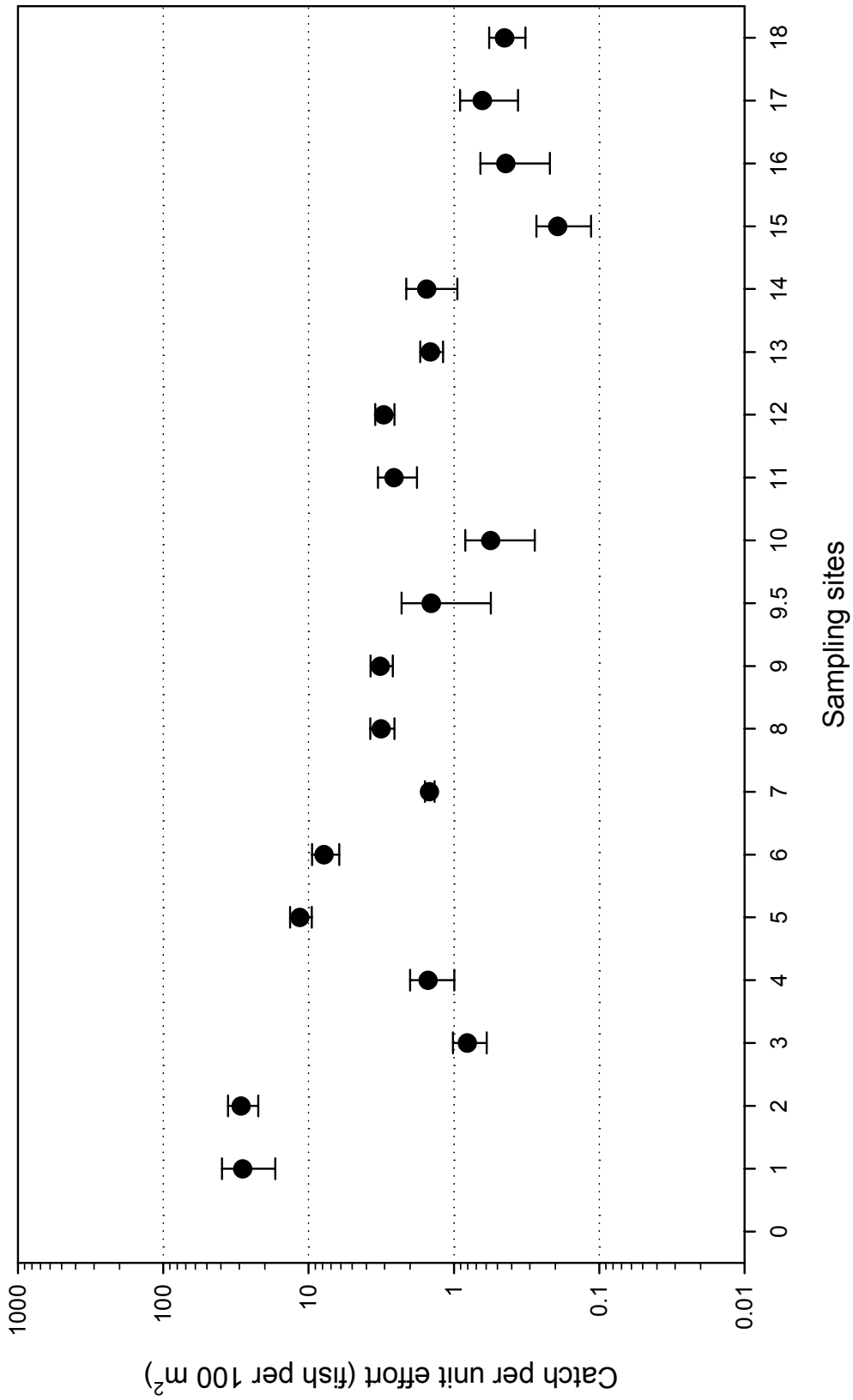


Figure 26. Variation in density values of Rio Grande silvery minnow, for each sampling site, during November 2007. Solid circles indicate means for each sampling site and capped-bars represent the standard error. Dotted horizontal lines represent different orders of magnitude.

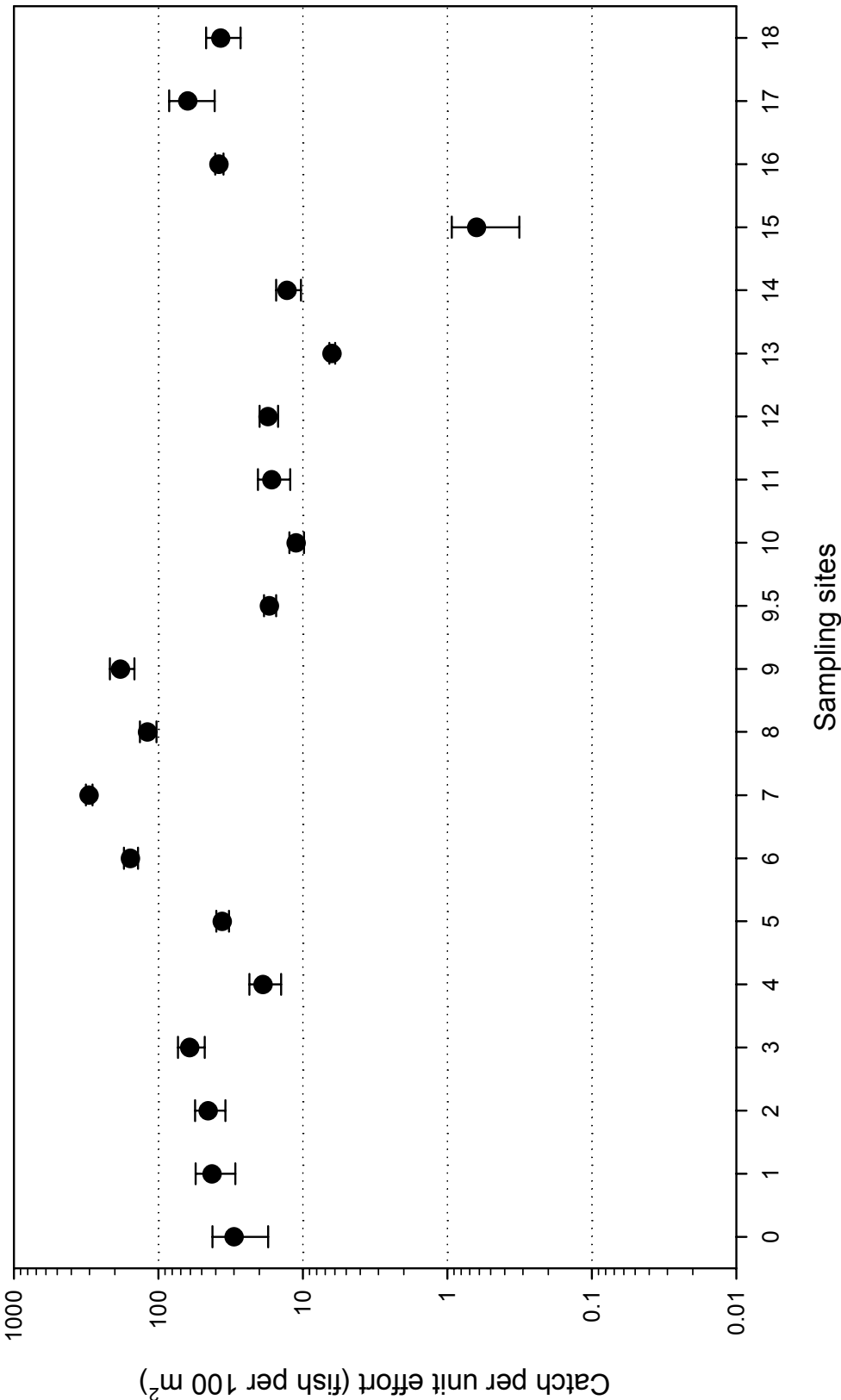


Figure 27. Variation in density values of all fish species combined, for each sampling site, during November 2007. Solid circles indicate means for each sampling site and capped-bars represent the standard error. Dotted horizontal lines represent different orders of magnitude.

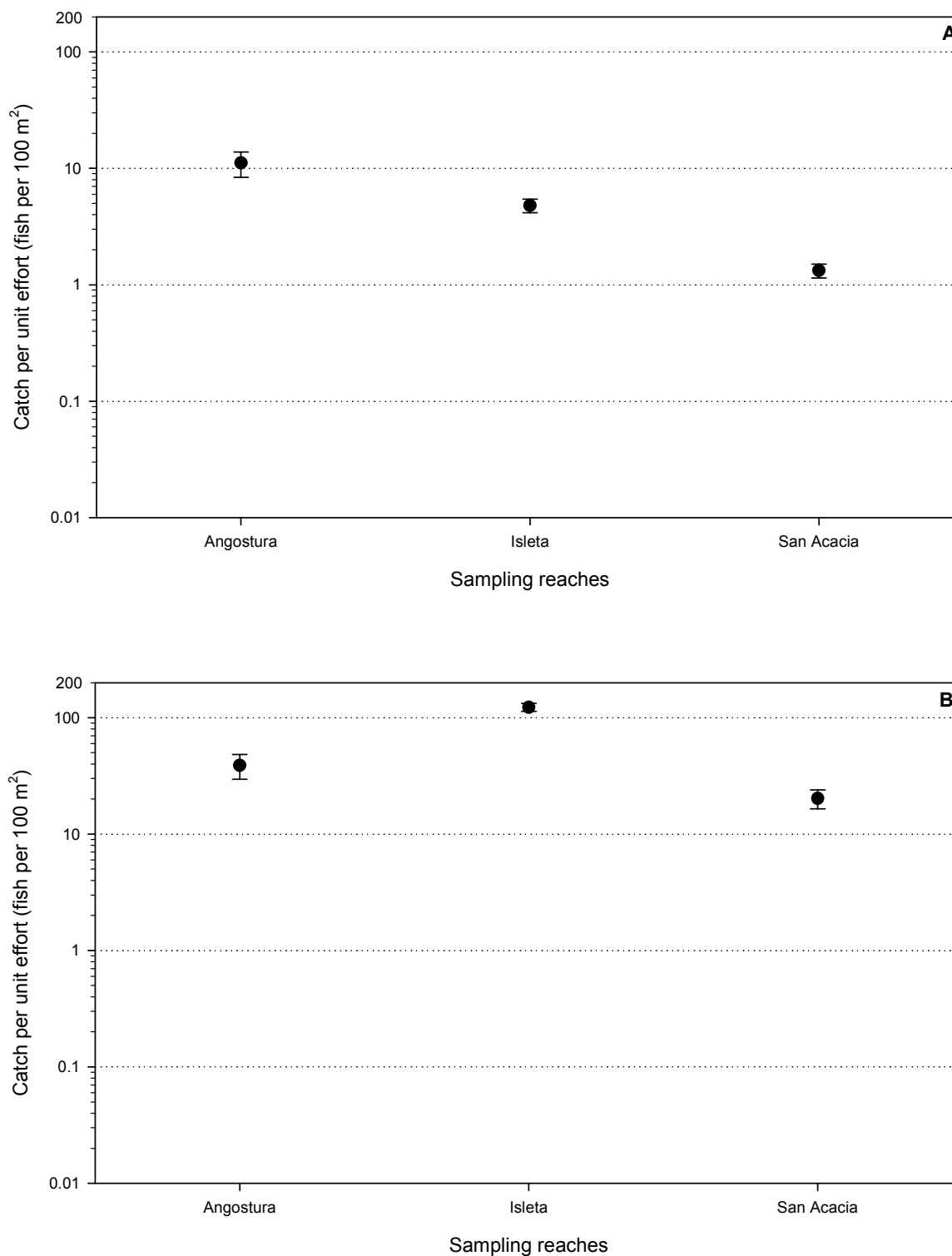


Figure 28. Variation in density values for Rio Grande silvery minnow (**A**) and for all fish species combined (**B**), for each sampling reach, during November 2007. Solid circles indicate means for each sampling reach and capped-bars represent the standard error. Dotted horizontal lines represent different orders of magnitude.

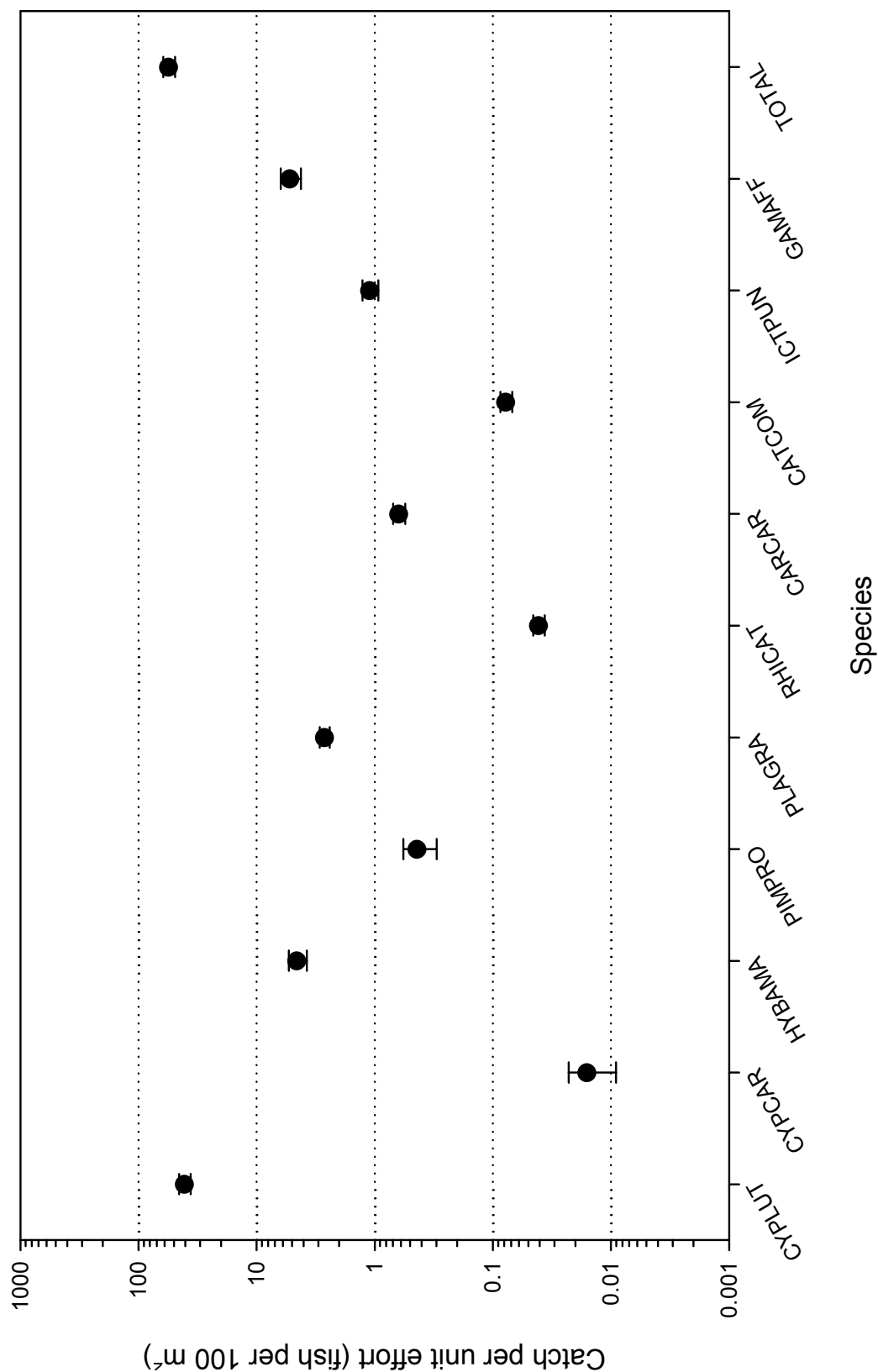


Figure 29. Variation in density values for each focal species, at all sampling sites combined, during November 2007. Solid circles indicate means for each species and capped-bars represent the standard error. Dotted horizontal lines represent different orders of magnitude.

Spatial Correlation of Population Dynamics

Rio Grande silvery minnow densities (1993-1997, 1999-2007) were significantly different among sampling sites ($df=22$, $F=1.82$, $p=0.017$) with the highest densities over time in the Isleta and San Acacia reaches. Several models were analyzed to determine the spatial correlation among Rio Grande silvery minnow densities using year and site as effects. The most parsimonious model had a compound symmetry covariance structure for year and a spatial power covariance structure for site. The AICc statistic was 2,092.7 with a rho estimate of 0.9505 and a practical range of 59.01 km. The next most parsimonious AIC model (AICc=2,092.9, rho=19.6688, practical range=58.92) was identical except that the covariance structure for site was spatial exponential. A third model (with the year and site effects reversed) resulted in a less parsimonious AIC model (AICc=2,092.9, rho=22.2475) but a similar estimate of the practical range (66.65 km). Thus, models indicate that the correlation among sites is low enough to ignore (i.e., autocorrelation<0.05) when the distance between sites is about 60 km. The distance (km) between the upper and lower sites within each reach was 59.7 (Angostura), 77.9 (Isleta), and 94.1 (San Acacia).

Rio Grande silvery minnow population dynamics exhibited a high degree of spatial correlation among sites. There were 253 possible comparisons for the full data set matrix (October 1993-1997, 1999-2007), using all sites over the duration of the study. Slight changes in the number and distribution of sites over time meant that some inter-site comparisons were not possible because of sparse data (i.e., sampling during non-overlapping years). However, there was adequate data to make 226 comparisons among sites sampled over the duration of the study. We have provided a condensed version of this analysis for the sake of brevity.

There was a wide range in spatial correlation values among sites. There were no significant ($p<0.05$) negative correlations among any of the 226 comparisons; the strongest negative correlation (-0.50 ; $p=0.67$) was from two very distant localities (Site #6 vs. #18). There were 41 non-significant negative correlations and most of these ($N=27$) had p values of 0.7 or higher. The positive correlations ($N=185$) ranged between 0.01 and 1.00. Many of the positive combinations were significantly correlated. A total of 82 of 185 positive correlations yielded significant ($p<0.05$) values. Of these comparisons, a total of 65 had $p<0.01$ and 34 had $p<0.001$. While sites that were closer together generally produced most of the significant relationships, there were several examples where distantly spaced sites (often in different reaches) yielded significant values. Of the 40 comparisons yielding the lowest p values, 22 were sites within 50 km of each other and 37 were sites within 100 km of each other. No sites that were more than 150 km away from each other yielded significant ($p<0.01$) values for correlations. A similar trend was observed when comparing the other significant ($p<0.05$) combinations. While there were some significant correlations among sites that were more than 100 km from each other ($N=14$ of 82), many were within 50 km of each other ($N=40$ of 82).

Spatial correlation of Rio Grande silvery minnow population dynamics was also examined among reaches. This comparison yielded three combinations (Angostura vs. Isleta, Angostura vs. San Acacia, and Isleta vs. San Acacia). The Isleta Reach yielded the highest correlation values with the other reaches (Angostura=0.24 and San Acacia=0.44) but neither was significant ($p=0.41$ and $p=0.12$, respectively). The correlation value for the San Acacia Reach vs. the Angostura Reach (0.13) was notably lower and not significant ($p=0.65$).

DISCUSSION

The population status of Rio Grande silvery minnow and the associated Middle Rio Grande ichthyofaunal community has been systematically monitored since 1993. The unique value of this effort has been in providing consistent sampling of fishes over a long duration. Determining trends in short-lived fish populations is best accomplished by analyzing an extensive database of collections

over time. Long-term population monitoring sampling programs are designed so that an individual sample (or small number of samples) does not have a disproportionate effect on the results or interpretation of trends. While this study was initially designed to primarily monitor the long-term trends of fish species in the Middle Rio Grande, the scope of this project has continued to expand to address the information needs of natural resource managers. Some of the key components that were added to this project over the past five years include evaluating the influence of discharge patterns on population fluctuations, determining general habitat use patterns, documenting the changes in relative abundance among fish species over time, and examining seasonal and spatial differences in population structure and abundance of native and nonnative Middle Rio Grande fishes.

Additional field and analytical components were added to the Rio Grande silvery minnow Population Monitoring Program in 2006 (Dudley and Platania, 2007). The first was an analysis of sampling variation at all 20 sampling sites based on intensive monitoring efforts over a four day period in November 2005. Similar analyses were conducted in November 2006 and November 2007. Despite large differences in the mean densities of Rio Grande silvery minnow among sampling sites and among years, the overall sampling variation was relatively low and consistent among sites. Values of the coefficient of variation (CV) were often <0.5 for individuals sites and nearly always <0.7 . There was, however, a modest increase in values of CV during 2006 when the abundance of Rio Grande silvery minnow was at its lowest point over the three year period. It is likely that the decreased number of Rio Grande silvery minnow in 2006 resulted in a higher likelihood of collecting few or no individuals in a particular mesohabitat, which would inflate CV values. Calculated CV values for collections of Rio Grande silvery minnow (2005-2007) in the Middle Rio Grande were reasonably low (range=0.27-0.38). Distributions with $CV > 1$ are often considered high-variance while distributions with $CV < 1$, like Rio Grande silvery minnow, are categorized as low-variance. Thus, the relative sampling variability among sites, reaches, years, and overall was moderately low for Rio Grande silvery minnow during November (2005-2007). It is possible that elevated numbers of Rio Grande silvery minnow during 2005, in part, accounted for the very low and consistent CV values during that year. However, it appears that the consistent sampling protocol itself was largely responsible for the low observed values during 2006 and 2007. Sampling at the same general locations at individual sites likely reduces the overall variability and provides consistent estimates of density over time. This sampling protocol is the same as that employed during regular population monitoring efforts although more notable changes in river morphology may occur among years (as opposed to among days). The notable changes in densities of Rio Grande silvery minnow among years (i.e., often more than several orders of magnitude [$>1,000\%$]) greatly outweighs the reasonable value of relative precision (ca. 27-38%) observed during this intensive three-year sampling effort. This indicates that the current sampling approach should provide a reasonable trend estimate of increasing or decreasing population size of Rio Grande silvery minnow over time. However, additional data from future years will be required to adequately address the validity of this assumption. In particular, if the coefficient of variation increases notably during years with extremely low Rio Grande silvery minnow abundance it may be more difficult to assess relative population trends during those times. It is possible that increased sampling frequency or duration will be required to detect more subtle population changes during periods of greatly reduced abundance.

Another new component added to the Rio Grande silvery minnow Population Monitoring Program in 2006 was an examination of the observed spatial correlation in Rio Grande silvery minnow population dynamics among sites over the project duration (1993-1997, 1999-2006). Preliminary analyses in 2006 indicated a high degree of correlation among sampling sites over time (Dudley and Platania, 2007). Additional analyses were conducted in 2007 to determine more precisely the nature of spatial relationships among sites over time. Models indicated that the correlation among sites was low enough to ignore (i.e., autocorrelation <0.05) when the distance between sites was about 60 km. This corresponds roughly to the minimum length between sites

within the three fragmented reaches (i.e., Angostura Reach sites were 59.7 km apart) and indicates that strong correlations among sites could be driven by reach-specific effects (e.g., discharge patterns, water operations, ichthyofaunal community structure etc.).

A large percentage of the pair-wise comparisons among individual sites yielded elevated and significant correlation values. Most of the significant relationships were observed among sites that were more closely spaced together. Examination of the spatial correlation of Rio Grande silvery minnow population dynamics could be useful in predicting the probable impact of broad changes in environmental conditions. These results suggest that Rio Grande silvery minnow populations from different sites exhibit a high degree of spatial correlation, meaning that changes in the hydraulic regime or other environmental variables are likely to impact large portions of the population simultaneously. It is possible that the physical separation and different water operation strategies for the Angostura, Isleta, and San Acacia reaches could be large enough to be effectively creating three semi-independent systems. Some of the site-specific correlations support this hypothesis but the data do not provide a consistent result for all three reaches. It is possible that distance (in and of itself) is a more important factor than reach separation but this hypothesis will require more data over time to fully evaluate. Although well beyond the scope of this project, it is also possible that a meta-analysis could be conducted using available Program data from various studies (e.g., population monitoring, habitat assessment, geomorphology changes, water quality) to statistically determine the relative strength of associations between changes in the environment and changes in fish abundance over space and time.

A qualitative examination of the mesohabitats occupied by Rio Grande silvery minnow was provided to obtain general information on the habitat use patterns of this species. An examination of October flow conditions from 1993-2007 at USGS Albuquerque Gauge [#08330000] revealed that mean October discharge was relatively consistent (484.0 +/- 53.3 cfs) if a single outlier year (1997: mean=1,802.0 cfs) was removed from the analysis. This indicates that, in general, October flow conditions were similar among years and that the overall distribution of mesohabitats should be relatively comparable over time. While it is certain that the physical location of mesohabitats shifts around considerably among years, established sampling protocol for this study ensures that similar mesohabitats (depths and velocities) are sampled among years. In this study, a wide variety of habitats were sampled to ensure balanced monitoring for the Middle Rio Grande ichthyofaunal community and all life stages of Rio Grande silvery minnow. However, this was only a cursory study of mesohabitat associations and is no substitute for the more rigorous approach used to quantify Rio Grande ichthyofaunal habitat use (including seasonal and ontogenetic shifts) and availability in the past (e.g., Dudley and Platania, 1997).

The types of habitats occupied by Rio Grande silvery minnow in 2007 were again comparable to those occupied in past years (e.g., Dudley and Platania, 1997, 2007). The distribution of sampled habitats among reaches and the habitats occupied by Rio Grande silvery minnow among reaches were relatively consistent. Shoreline pool habitats, backwaters, and debris piles comprised the most frequently occupied habitats (relative to those sampled) by Rio Grande silvery minnow. Main channel runs were the least occupied habitat relative to their sampled abundance. This apparent avoidance could be caused by the lack of cover and high water velocities typical of this relatively homogenous habitat. However, Rio Grande silvery minnow was found to occupy the full suite of habitats sampled, including swift main and side channel runs.

There were notable changes in the relative and rank abundance of Middle Rio Grande fish species over the period of study (1993-1997, 1999-2007). The species that changed most in their rank abundance over time included Rio Grande silvery minnow, white sucker, and gizzard shad. The dramatic changes in rank abundance exhibited by Rio Grande silvery minnow among years (e.g., from 5th [2001] to 11th [2003] to 1st [2005]) was unmatched by any other species monitored. Despite these sometimes-large changes in the abundance of individual species, the combined densities of

Middle Rio Grande fishes remained relatively constant over time. The dynamic changes in rank abundance over time could indicate that key environmental conditions are controlling population size over time. It is possible that changes in the timing, magnitude, and duration of flows during spawning season could be an important factor leading to some of the observed differences in fish species abundance over time and space. However, additional study will be required to determine those factors that most influence these ecological patterns. For the purpose of this study, a more intense and focused effort was made to elucidate possible flow patterns that could account for the variation observed in the densities of Rio Grande silvery minnow over time.

The annual reproductive effort of Rio Grande silvery minnow normally occurs during spring; it is initiated, in part, by a large-scale increase in stream discharge associated with high-mountain snowmelt. Rio Grande silvery minnow releases relatively large numbers of eggs (several thousand) into the water column during spawning and these eggs are passively dispersed downstream with the current. Spring runoff, combined with increasing water temperatures, was likely the historical source of this reproductive stimulus (Platania and Altenbach, 1998). During years of sufficient snowpack, flow in the Middle Rio Grande peaked in late spring and resulted in several months of sustained flooded habitats. However, dams and reservoirs now moderate the magnitude, amplitude, and duration of spring discharge. Water diverted from the river for agricultural and municipal purposes can substantially reduce the total volume of water that would normally have flowed in the Rio Grande. This issue is further compounded in drought years when large volumes of water are diverted from the Rio Grande in early spring, reducing peak flows that stimulate Rio Grande silvery minnow spawning and facilitate recruitment.

The large amount of water passing Otowi Bridge during May 2007 (peak mean daily discharge=3,740 cfs) was more than twice the volume that passed during May 2003 (peak mean daily discharge=1,820 cfs). The elevated discharge in 2007 was not truncated in Cochiti Reservoir (as was apparently the case in 2005) and so the peak flow below Cochiti Dam was 3,660 cfs (the peak in 2003 was only 1,430 cfs). The prolonged and elevated flows of 2005 and 2007 apparently contributed to the recruitment of substantially more individuals into the 2005 and 2007 year-classes compared with the 2002-2004, 2006 year-classes. Densities of Rio Grande silvery minnow increased dramatically during 2007 and by autumn the abundance estimates were amongst the highest values recorded since 1997. However, populations of Rio Grande silvery minnow in the San Acacia Reach did not respond as favorably in 2007 as did populations in the Angostura and Isleta reaches.

The timing of the 2007 spring runoff was typical of this natural annual event. Runoff began in May 2007 and lasted for an extended period (weeks) in contrast to the artificial spike in 2003 that only lasted about four days. While flow in the river had returned to previously low levels within a week during 2003, the elevated and extended flows during 2004, 2005, and 2007 likely resulted in more favorable conditions for the growth and survivorship of newly hatched Rio Grande silvery minnow larvae. It is possible that relatively low numbers of eggs and larvae, as were observed in 2004, could have resulted in greatly increased recruitment success because of the inundation of shoreline habitats, abandoned side channels, and backwaters (see Platania and Dudley, 2006). Low velocity and shallow areas provide the warm and productive habitats required by larval fishes to successfully complete their early life history.

However, there are many unanswered questions regarding the relationship between the quantity of eggs produced in the river and the number of Rio Grande silvery minnow recruited into the October population. The multiple years of data collected (2001-2004, 2006, 2007) to document spawning periodicity of Rio Grande silvery minnow have been conducted, with the exception of 2006 and 2007, at a single sampling site. It is therefore impractical to compare the two monitoring data sets (spawning and population) at this time. While the analysis of data from the 2007 spawning project will allow the first cursory comparison to be made, any such exercise should be carried out with caution because of the numerous assumptions involved.

Comparison of Rio Grande silvery minnow mean October densities (1993-1997, 1999-2007) to hydraulic variables measured at two Middle Rio Grande discharge gauges revealed several strong relationships. Peak discharge and duration of high flows during the spawning season (May-June) were positively correlated with Rio Grande silvery minnow mean October densities. In contrast, extended low flow periods were negatively correlated with Rio Grande silvery minnow mean October densities. The physical conditions produced by prolonged and elevated flows result in overbank flooding of vegetated areas, formation of inundated habitats within the river channel, and creation of shoreline and island backwaters. Overbank and other flooded habitats are well known to be essential for the successful recruitment of early life history stages of freshwater fishes throughout the world (for review see Welcomme, 1979). It is quite likely that similar processes are important for the successful survival and recruitment of the Middle Rio Grande ichthyofaunal community, including Rio Grande silvery minnow (Pease, 2004). However, there has been extensive abandonment of the floodplain, river channelization, and habitat degradation across large portions of the Middle Rio Grande (Lagasse, 1980; Massong et al., 2006; Makar et al., 2006), which likely limits the available habitat for the successful recruitment of Rio Grande silvery minnow.

Another ongoing threat to Rio Grande silvery minnow is the fragmentation of its remaining range and the longitudinal transport of its propagules (drifting eggs and larvae) below instream barriers (i.e., Angostura, Isleta, and San Acacia diversion dams) and ultimately into irrigation networks or Elephant Butte Reservoir. Considerable upstream movement of this species (>25 km) was documented though the collection of marked hatchery reared individuals (Platania, et al., 2002). In addition to helping to repopulate upstream reaches, upstream movement of even a modest portion of the population among reaches (following fish passage efforts) could be beneficial in terms of naturally maintaining genetic diversity. Given the reproductive ecology of this species, reach lengths, and diversion dam placement, the sequential decline and loss of this species from upstream to downstream was predicted (Platania and Altenbach, 1998). While it appears that intensive efforts to stock and relocate Rio Grande silvery minnow into upstream reaches (combined with several years of good spring runoff) have slowed (or even perhaps reversed) this trend, it is unknown how quickly Rio Grande silvery minnow would decline upstream to downstream in the absence of recent artificial population management strategies. Fragmentation of this species' range in the Middle Rio Grande by Angostura, Isleta, and San Acacia diversion dams has long been identified as an important issue that requires resolution to ensure recovery of Rio Grande silvery minnow in the wild (U. S. Fish and Wildlife Service, 1999).

Other factors that could be leading to the decline of Rio Grande silvery minnow include competition/predation with nonnative fish species, ongoing problems with water quality, and limited genetic diversity (i.e., low effective population size). These and other directly and indirectly related issues likely act in concert during a particular year to manifest in the decline of Rio Grande silvery minnow. For example, a year with poor spring runoff and low-flow/drying conditions in summer can trigger a whole host of issues (e.g., crowding, stress, contaminant concentration, poor habitat quality) that in turn exacerbate an already poor year for spawning and larval recruitment. When developing management strategies to help stabilize and enhance populations of Rio Grande silvery minnow it will be important to consider the synergistic effect of all threats rather than focusing on single issues.

Despite periodic and sometimes sustained declines in the abundance of Rio Grande silvery minnow, it is encouraging that this species can apparently rebound so quickly following years with good spawning/recruitment conditions. The dramatic increase in the abundance of Rio Grande silvery minnow from 2006 to 2007 (nearly an order of magnitude) is indicative of the ability of this species to rebound following favorable conditions. The rapid increases in abundance documented after consecutive years of good spring runoff contrast with the equally rapid decreases in abundance documented after consecutive years of poor spring runoff and prolonged summer low-flow/drying conditions. While there have been large fluctuations in the abundance of Rio Grande silvery minnow

over the past decade, the biological importance of recently larger numbers of Rio Grande silvery minnow is uncertain in the face of eroding genetic diversity (pers. comm. M. J. Osborne, UNM; Alò and Turner, 2005).

Despite recent increases in the abundance of Rio Grande silvery minnow, the full suite of issues that threaten the long-term persistence of this species remain. The marked declines in abundance of Rio Grande silvery minnow recorded from 2000-2003 during population monitoring efforts indicate that many of the problems that originally led to the precipitous decline of this species throughout its range have not been remedied. While the dramatic increases in the abundance of Rio Grande silvery minnow during 2004, 2005, and 2007 could be a positive sign that some management strategies are working, it could simply be a reflection of recently favorable environmental conditions. Future study of the ecological interactions among fish species and their environment in the Middle Rio Grande will hopefully begin to elucidate some of the many unanswered questions that remain about this system and how best to manage it in the future. While recent strategies (e.g., population augmentation, pumping water back into the river, small-scale habitat restoration etc.) are essential to prevent short-term catastrophic losses, a renewed focus on issues that could lead to self-sustaining populations of Rio Grande silvery minnow in the wild (e.g., natural flow regime, river connectivity, functional floodplains etc.) will assist in achieving the ultimate goal of long-term recovery.

ACKNOWLEDGMENTS

Many people collaborated with us to make this project possible. W. Howard Brandenburg, Michael A. Farrington, Lee E. Renfro, and Nathan B. Zerbe (American Southwest Ichthyological Researchers, L.L.C.) were instrumental in field and laboratory portions of this study. Continued assistance with all aspects of curation of specimens and database management was provided by Alexandra M. Snyder (Museum of Southwestern Biology-UNM). Gary C. White (Colorado State University) provided assistance in the analysis of Rio Grande silvery minnow spatial relationships among sites over time. Much of the technical and logistical support for this project was provided by Gary L. Dean and Michael D. Porter (U. S. Bureau of Reclamation). This work was funded as part of the Middle Rio Grande Endangered Species Act Collaborative Program and administered by the U. S. Bureau of Reclamation (Albuquerque and Salt Lake City Area Offices).

LITERATURE CITED

- Akaike, H. 1973. Information theory as an extension of the maximum likelihood principle. *In*: B. N. Petrov and F. Csaki (eds.). Second International Symposium on Information Theory. Akademiai, Budapest.
- Alò, D., and T. F. Turner. 2005. Effects of habitat fragmentation on effective population size in the endangered Rio Grande silvery minnow. *Conservation Biology* 19:1138–1148.
- Burnham, K. P., and D. R. Anderson. 2002. Model selection and multimodel inference: a practical information-theoretic approach. 2nd Edition. Springer-Verlag, New York, New York, USA. 488 pp.
- Dudley, R. K., and S. P. Platania. 1997. Habitat use of Rio Grande silvery minnow. Report to the New Mexico Department of Game and Fish, Santa Fe, and U. S. Bureau of Reclamation (Albuquerque Projects Office), Albuquerque, NM. 96 pp.

- Dudley, R. K. and S. P. Platania. 2007. Rio Grande silvery minnow population monitoring program results from October 2005 to October 2006. Report to the U. S. Bureau of Reclamation (Albuquerque Projects Office), Albuquerque, NM. 195 pp.
- Gold, R. L., and L. P. Denis. 1985. National water summary-New Mexico surface-water resources. U. S. Geological Survey water-supply paper 2300:341-346.
- Lagasse, P. F. 1980. An assessment of the response of the Rio Grande to dam construction-Cochiti to Isleta reach. A technical report for the U.S. Army Engineer District, Albuquerque, Corps of Engineers, Albuquerque, New Mexico. 133 pp.
- Littell, R.C., G. A. Milliken, W. W. Stroup, R. D. Wolfinger, and O. Schabenberger. 2006. SAS System for Mixed Models, 2nd edition, SAS Institute, Cary, North Carolina. 840 pp.
- Makar, P., Massong, T., Bauer, T., Tashjian, P., and Oliver, K J. 2006. Channel Width and Flow Regime Changes along the Middle Rio Grande NM. Joint 8th Federal Interagency Sedimentation Conference and 3rd Federal Interagency Hydrologic Modeling Conference, Reno, NV.
- Massong, T., P. Tashjian, and P. Makar. 2006. Recent Channel Incision and Floodplain Evolution within the Middle Rio Grande, NM. Joint 8th Federal Interagency Sedimentation Conference and 3rd Federal Interagency Hydrologic Modeling Conference, Reno, NV.
- Nelson, J. S., E. J. Crossman, H. Espinosa-Peréz, L. T. Findley, C. R. Gilbert, R. N. Lea, and J. D. Williams. 2004. Common and scientific names of fishes from the United States, Canada, and Mexico. American Fisheries Society, Special Publication 29, Bethesda, Maryland. 386 pp.
- Pease, A. A. 2004. An assessment of critical nursery habitat features for larval and juvenile fishes in the Middle Rio Grande, New Mexico. Unpublished M.S. thesis, University of New Mexico, Albuquerque, New Mexico. 34 pp.
- Platania, S. P. 1993a. The fishes of the Rio Grande between Velarde and Elephant Butte Reservoir and their habitat associations. Report to the New Mexico Department of Game and Fish, Santa Fe, and U. S. Bureau of Reclamation (Albuquerque Projects Office), Albuquerque, NM. 188 pp.
- Platania, S. P. 1993b. Ichthyofaunal survey of the Rio Grande and Santa Fe River, Cochiti Pueblo, New Mexico, July 1993. Report to the U. S. Army Corps of Engineers, Albuquerque, NM. 28 pp.
- Platania, S. P. 1995. Ichthyofaunal survey of the Rio Grande, Santo Domingo and San Felipe pueblos, New Mexico, July 1994. Report to the U. S. Army Corps of Engineers, Albuquerque, NM. 56 pp.
- Platania, S. P., and C. S. Altenbach. 1998. Reproductive strategies and egg types of seven Rio Grande Basin cyprinids. *Copeia* 1998: 559-569.

- Platania, S. P., and R. K. Dudley. 2006. Spatial spawning periodicity of Rio Grande silvery minnow during 2006. Report to the U. S. Bureau of Reclamation (Albuquerque Projects Office), Albuquerque, NM. 35 pp.
- Platania, S. P., M. A. Farrington, W. H. Brandenburg, S. J. Gottlieb, and R. K. Dudley. 2002. Movement patterns of Rio Grande silvery minnow, *Hybognathus amarus*, in the San Acacia Reach of the Rio Grande during 2002. Final report to the U. S. Bureau of Reclamation, Albuquerque, NM. 31 pp.
- U. S. Department of the Interior. 1994. Endangered and threatened wildlife and plants: final rule to list the Rio Grande silvery minnow as an endangered species. Federal Register 59: 36988-36995.
- U. S. Fish and Wildlife Service. 1999. Rio Grande silvery minnow recovery plan. Albuquerque, NM. 141 pp.
- Welcomme, R. L. 1979. The fisheries ecology of floodplain rivers. Longman, London. 317 pp.
- Zar, J. H. 1984. Biostatistical Analysis. 2nd edition. Prentice Hall, Englewood Hills, NJ. 718 pp.

Appendix A.

Middle Rio Grande fish collection localities

Table A-1. Collection localities for December 2006 to October 2007 population monitoring of Rio Grande silvery minnow.

Site #	Site Locality
ANGOSTURA REACH SITES	
0	New Mexico, Sandoval County, Rio Grande, directly below Angostura Diversion Dam, Algodones. River Mile 209.7 SAN FELIPE PUEBLO QUADRANGLE UTM Easting: 363811 UTM Northing: 3916006 Zone: 13
1	New Mexico, Sandoval County, Rio Grande, at NM State Highway 44 bridge crossing, Bernalillo. River Mile 203.8 BERNALILLO QUADRANGLE UTM Easting: 358543 UTM Northing: 3909722 Zone: 13
2	New Mexico, Sandoval County, Rio Grande, ca. 4.0 miles downstream of NM State Highway 44 bridge crossing, at Rio Rancho Wastewater Treatment Plant, Rio Rancho. River Mile 200.0 BERNALILLO QUADRANGLE UTM Easting: 354772 UTM Northing: 3905355 Zone: 13
3	New Mexico, Bernalillo County, Rio Grande, at Central Avenue bridge crossing (US Highway 66), Albuquerque. River Mile 183.4 ALBUQUERQUE WEST QUADRANGLE UTM Easting: 346840 UTM Northing: 3884094 Zone: 13
4	New Mexico, Bernalillo County, Rio Grande, at Rio Bravo Boulevard bridge crossing, (NM State Highway 500), Albuquerque. River Mile 178.3 ALBUQUERQUE WEST QUADRANGLE UTM Easting: 347554 UTM Northing: 3877163 Zone: 13
ISLETA REACH SITES	
5	New Mexico, Valencia County, Rio Grande at Los Lunas bridge crossing (NM State Highway 49), Los Lunas. River Mile 161.4 LOS LUNAS QUADRANGLE UTM Easting: 342898 UTM Northing: 3852531 Zone: 13
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 UTM Easting: 339972 UTM Northing: 3837061 Zone: 13
7	New Mexico, Valencia County, Rio Grande, ca. 2.2 miles upstream of NM State Highway 346 bridge crossing, Jarales. River Mile 143.2 VEGUITA QUADRANGLE UTM Easting: 338136 UTM Northing: 3827329 Zone: 13
8	New Mexico, Socorro County, Rio Grande, at US Highway 60 bridge crossing, Bernardo. River Mile 130.6 ABEYTAS QUADRANGLE UTM Easting: 334604 UTM Northing: 3809726 Zone: 13

Table A-1. Collection localities for December 2006 to October 2007 population monitoring of Rio Grande silvery minnow (continued).

Site #	Site Locality
ISLETA REACH SITES (continued)	
9	New Mexico, Socorro County, Rio Grande, ca. 3.5 miles downstream of US Highway 60 bridge crossing, Bernardo. River Mile 127.0 ABEYTAS QUADRANGLE UTM Easting: 331094 UTM Northing: 3805229 Zone: 13
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 UTM Easting: 327902 UTM Northing: 3792603 Zone: 13
SAN ACACIA REACH SITES	
10	New Mexico, Socorro County, Rio Grande, directly below San Acacia Diversion Dam, San Acacia. River Mile 116.2 SAN ACACIA QUADRANGLE UTM Easting: 326162 UTM Northing: 3791977 Zone: 13
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 UTM Easting: 325263 UTM Northing: 3790442 Zone: 13
12	New Mexico, Socorro County, Rio Grande, east of Socorro, 0.5 miles upstream of the Socorro Low Flow Conveyance Channel bridge; east and upstream of Socorro Wastewater Treatment Plant, Socorro. River Mile 99.5 LOMA DE LAS CANAS QUADRANGLE UTM Easting: 327097 UTM Northing: 3771043 Zone: 13
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 UTM Easting: 328140 UTM Northing: 3761283 Zone: 13
14	New Mexico, Socorro County, Rio Grande, at US Highway 380 bridge crossing, San Antonio. River Mile 87.1 SAN ANTONIO QUADRANGLE UTM Easting: 328914 UTM Northing: 3754471 Zone: 13
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 UTM Easting: 327055 UTM Northing: 3740839 Zone: 13
16	New Mexico, Socorro County, Rio Grande, at San Marcial Railroad bridge crossing, San Marcial. River Mile 68.6 SAN MARCIAL QUADRANGLE UTM Easting: 315284 UTM Northing: 3728347 Zone: 13

Table A-1. Collection localities for December 2006 to October 2007 population monitoring of Rio Grande silvery minnow (continued).

Site #	Site Locality
SAN ACACIA REACH SITES	
17	New Mexico, Socorro County, Rio Grande, at its former confluence with the Low Flow Conveyance Channel; ca. 8 miles downstream of San Marcial Railroad bridge crossing. River Mile 60.5 PARAJE WELL QUADRANGLE UTM Easting: 309487 UTM Northing: 3718178 Zone: 13
18	New Mexico, Socorro County, Rio Grande, ca. 10 miles downstream of San Marcial Railroad bridge crossing. River Mile 57.7 PARAJE WELL QUADRANGLE UTM Easting: 307380 UTM Northing: 3714740 Zone: 13

Appendix B.

Ichthyofaunal composition of the December 2006 to October 2007
Rio Grande silvery minnow population monitoring collections¹

Monthly trip reports and associated data are available at:
<http://msb-fish.unm.edu/rgsm2006/>
and
<http://msb-fish.unm.edu/rgsm2007/>

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

New Mexico: Sandoval Co., Rio Grande Drainage

Rio Grande, directly below Angostura Diversion Dam, Algodones.

Site Number: 0

08 December 2006

RKD06-310

River Mile: 209.7

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

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

Effort: 654.0 sq. m

FAMILY

NO FISH

N

0

New Mexico: Sandoval Co., Rio Grande Drainage

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

Site Number: 1

08 December 2006

RKD06-311

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

76 *Platygobio gracilis*

N

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

76 *Cyprinella lutrensis*

76 *Hybognathus amarus**

212 *Gambusia affinis*

N

5

1

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

<u>FAMILY</u>		<u>N</u>
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

River Mile: 178.3

07 December 2006

RKD06-307

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

<u>FAMILY</u>		<u>N</u>
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.

07 December 2006

RKD06-306

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

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

Site Number: 5

River Mile: 161.4

Effort: 655.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	32
76	<i>Hybognathus amarus</i> *	4
76	<i>Platygobio gracilis</i>	4
81	<i>Ictiobus bubalus</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.

07 December 2006

RKD06-305

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

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

Site Number: 6

River Mile: 151.5

Effort: 563.0 sq. m

<u>FAMILY</u>		<u>N</u>
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>Carpionodes carpio</i>	1
81	<i>Catostomus commersoni</i>	1
81	<i>Ictiobus bubalus</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

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	650
76	<i>Hybognathus amarus*</i>	6
76	<i>Pimephales promelas</i>	16
81	<i>Carpoides carpio</i>	1
81	<i>Ictiobus bubalus</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

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	879
76	<i>Pimephales promelas</i>	8
76	<i>Platygobio gracilis</i>	2
81	<i>Carpoides carpio</i>	3
81	<i>Ictiobus bubalus</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.

06 December 2006

RKD06-302

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

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

Site Number: 9

River Mile: 127.0

Effort: 468.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	426
76	<i>Hybognathus amarus</i> *	7
76	<i>Pimephales promelas</i>	3
81	<i>Carpionotus carpio</i>	1
81	<i>Ictiobus bubalus</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

06 December 2006

RKD06-301

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

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

Site Number: 9.5

River Mile: 116.8

Effort: 686.9 sq. m

<u>FAMILY</u>		<u>N</u>
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

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	20
76	<i>Hybognathus amarus</i> *	1
76	<i>Platygobio gracilis</i>	7
81	<i>Carpiondes 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

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	14
76	<i>Hybognathus amarus</i> *	4
76	<i>Platygobio gracilis</i>	21
81	<i>Carpiondes 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

<u>FAMILY</u>		<u>N</u>
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

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

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	21
76	<i>Hybognathus amarus</i> *	6
76	<i>Pimephales promelas</i>	1
81	<i>Ictiobus bubalus</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 Headquarters.

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

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	3
76	<i>Hybognathus amarus</i> *	1
81	<i>Ictiobus bubalus</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.

04 December 2006

RKD06-294

Site Number: 16

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

<u>FAMILY</u>		<u>N</u>
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.

04 December 2006

RKD06-293

Site Number: 17

River Mile: 60.5

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

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	12
76	<i>Hybognathus amarus</i> *	75
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	2
81	<i>Ictiobus bubalus</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

04 December 2006

RKD06-292

Site Number: 18

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

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	7
76	<i>Hybognathus amarus</i> *	26
76	<i>Platygobio gracilis</i>	2
81	<i>Ictiobus bubalus</i>	1

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

age-0: 13

age-1: 13

age-2:

Rio Grande silvery minnow Population Monitoring
February 2007

New Mexico: Sandoval Co., Rio Grande Drainage

Rio Grande, directly below Angostura Diversion Dam, Algodones.

Site Number: 0

05 February 2007

RKD07-019

River Mile: 209.7

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

R.K. Dudley, W.H. Brandenburg, L.E. Renfro

Effort: 535.0 sq. m

FAMILY

NO FISH

N

0

New Mexico: Sandoval Co., Rio Grande Drainage

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

Site Number: 1

05 February 2007

RKD07-020

River Mile: 203.8

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

R.K. Dudley, W.H. Brandenburg, L.E. Renfro

Effort: 616.8 sq. m

FAMILY

76

Cyprinella lutrensis

N

1

**Rio Grande silvery minnow Population Monitoring
February 2007**

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

05 February 2007

RKD07-021

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

R.K. Dudley, W.H. Brandenburg, L.E. Renfro

Effort: 623.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	35
76	<i>Hybognathus amarus</i> *	3
76	<i>Platygobio gracilis</i>	50

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

age-0:

age-1: 3

age-2:

New Mexico: Bernalillo Co., Rio Grande Drainage

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

Site Number: 3

08 February 2007

RKD07-017

River Mile: 183.4

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

R.K. Dudley, M.A. Farrington, N.B. Zerbe

Effort: 485.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Hybognathus amarus</i> *	2
76	<i>Platygobio gracilis</i>	1

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

age-0:

age-1: 2

age-2:

**Rio Grande silvery minnow Population Monitoring
February 2007**

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

08 February 2007

RKD07-016

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

R.K. Dudley, M.A. Farrington, N.B. Zerbe

Effort: 620.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Hybognathus amarus*</i>	1
76	<i>Platygobio gracilis</i>	1
93	<i>Ictalurus punctatus</i>	1

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

age-0:

age-1: 1

age-2:

New Mexico: Valencia Co., Rio Grande Drainage

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

Site Number: 5

River Mile: 161.4

08 February 2007

RKD07-015

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

R.K. Dudley, M.A. Farrington, N.B. Zerbe

Effort: 561.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	194
76	<i>Hybognathus amarus*</i>	2
76	<i>Pimephales promelas</i>	8
76	<i>Platygobio gracilis</i>	3
81	<i>Carpoides carpio</i>	1

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

age-0:

age-1: 2

age-2:

Rio Grande silvery minnow Population Monitoring
February 2007

New Mexico: Valencia Co., Rio Grande Drainage

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

08 February 2007

RKD07-014

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

R.K. Dudley, M.A. Farrington, N.B. Zerbe

Site Number: 6

River Mile: 151.5

Effort: 506.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	601
76	<i>Hybognathus amarus</i> *	2
76	<i>Pimephales promelas</i>	14
76	<i>Platygobio gracilis</i>	8
81	<i>Carpoides carpio</i>	4
212	<i>Gambusia affinis</i>	8

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

age-0:

age-1: 2

age-2:

New Mexico: Valencia Co., Rio Grande Drainage

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

08 February 2007

RKD07-013

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

R.K. Dudley, M.A. Farrington, N.B. Zerbe

Site Number: 7

River Mile: 143.2

Effort: 419.8 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	503
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus</i> *	2
76	<i>Pimephales promelas</i>	5
212	<i>Gambusia affinis</i>	14

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

age-0:

age-1: 2

age-2:

**Rio Grande silvery minnow Population Monitoring
February 2007**

New Mexico: Socorro Co., Rio Grande Drainage

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

07 February 2007

RKD07-012

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

R.K. Dudley, M.A. Farrington, N.B. Zerbe

Site Number: 8

River Mile: 130.6

Effort: 414.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	367
76	<i>Hybognathus amarus</i> *	2
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	1
81	<i>Carpoides carpio</i>	2
81	<i>Catostomus commersoni</i>	1

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

age-0:

age-1: 2

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

07 February 2007

RKD07-011

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

R.K. Dudley, M.A. Farrington, N.B. Zerbe

Site Number: 9

River Mile: 127.0

Effort: 573.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	454
76	<i>Hybognathus amarus</i> *	5
76	<i>Pimephales promelas</i>	10
81	<i>Carpoides carpio</i>	1
93	<i>Ictalurus punctatus</i>	5

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

age-0:

age-1: 4

age-2: 1

**Rio Grande silvery minnow Population Monitoring
February 2007**

New Mexico: Socorro Co., Rio Grande Drainage

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

07 February 2007

RKD07-010

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

R.K. Dudley, M.A. Farrington, N.B. Zerbe

Site Number: 9.5

River Mile: 116.8

Effort: 670.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	106
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	19
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	11
81	<i>Carpodes carpio</i>	2

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

age-0:

age-1: 19

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

07 February 2007

RKD07-009

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

R.K. Dudley, M.A. Farrington, N.B. Zerbe

Site Number: 10

River Mile: 116.2

Effort: 474.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	60
76	<i>Hybognathus amarus*</i>	10
76	<i>Platygobio gracilis</i>	18
76	<i>Rhinichthys cataractae</i>	1
81	<i>Carpodes carpio</i>	1

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

age-0:

age-1: 8

age-2: 2

Rio Grande silvery minnow Population Monitoring
February 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

06 February 2007

RKD07-008

Site Number: 11

River Mile: 114.6

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

W.H. Brandenburg, M.A. Farrington, N.B. Zerbe

Effort: 472.8 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	31
76	<i>Hybognathus amarus</i> *	7
76	<i>Platygobio gracilis</i>	8

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

age-0:

age-1: 7

age-2:

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,

06 February 2007

RKD07-007

Site Number: 12

River Mile: 99.5

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

W.H. Brandenburg, M.A. Farrington, N.B. Zerbe

Effort: 661.8 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	237
76	<i>Hybognathus amarus</i> *	17
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	10
81	<i>Carpoides carpio</i>	1

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

age-0:

age-1: 16

age-2: 1

Rio Grande silvery minnow Population Monitoring
February 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

06 February 2007

RKD07-006

Site Number: 13

River Mile: 91.7

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

W.H. Brandenburg, M.A. Farrington, N.B. Zerbe

Effort: 687.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	235
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus</i> *	6
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	5
93	<i>Ameiurus natalis</i>	1

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

age-0:

age-1: 5

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

06 February 2007

RKD07-005

Site Number: 14

River Mile: 87.1

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

W.H. Brandenburg, M.A. Farrington, N.B. Zerbe

Effort: 711.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	5
76	<i>Hybognathus amarus</i> *	1
76	<i>Platygobio gracilis</i>	2

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

age-0:

age-1: 1

age-2:

**Rio Grande silvery minnow Population Monitoring
February 2007**

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, directly east of Bosque del Apache National Wildlife Refuge Headquarters. Site Number: 15

05 February 2007

RKD07-004

River Mile: 79.1

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

W.H. Brandenburg, L.E. Renfro, N.B. Zerbe

Effort: 662.8 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	2
76	<i>Hybognathus amarus</i> *	5
76	<i>Platygobio gracilis</i>	1

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

age-0:

age-1: 4

age-2: 1

New Mexico: Socorro Co., Rio Grande Drainage

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

Site Number: 16

05 February 2007

RKD07-003

River Mile: 68.6

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

W.H. Brandenburg, L.E. Renfro, N.B. Zerbe

Effort: 774.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	26
76	<i>Hybognathus amarus</i> *	13
76	<i>Platygobio gracilis</i>	1

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

age-0:

age-1: 12

age-2: 1

Rio Grande silvery minnow Population Monitoring
February 2007

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

05 February 2007

RKD07-002

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

W.H. Brandenburg, L.E. Renfro, N.B. Zerbe

Effort: 598.8 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	8
76	<i>Hybognathus amarus</i> *	48

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

age-0:
age-1: 46
age-2: 2

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, ca. 10 mi downstream of the San Marcial railroad bridge crossing Site Number: 18
River Mile: 58.8

05 February 2007

RKD07-001

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

W.H. Brandenburg, L.E. Renfro, N.B. Zerbe

Effort: 566.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	6
76	<i>Hybognathus amarus</i> *	13
81	<i>Carpoides carpio</i>	3
93	<i>Ictalurus punctatus</i>	1

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

age-0:
age-1: 11
age-2: 2

Rio Grande silvery minnow Population Monitoring
April 2007

New Mexico: Sandoval Co., Rio Grande Drainage

Rio Grande, directly below Angostura Diversion Dam, Algodones.

Site Number: 0

04 April 2007

RKD07-031

River Mile: 209.7

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

M.A. Farrington, W.H. Brandenburg, L.E. Renfro

Effort: 481.4 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Hybognathus amarus*</i>	1
76	<i>Platygobio gracilis</i>	1
76	<i>Rhinichthys cataractae</i>	5
81	<i>Catostomus commersoni</i>	8
212	<i>Gambusia affinis</i>	1

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

age-0:

age-1:

age-2: 1

New Mexico: Sandoval Co., Rio Grande Drainage

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

Site Number: 1

04 April 2007

RKD07-032

River Mile: 203.8

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

M.A. Farrington, W.H. Brandenburg, L.E. Renfro

Effort: 523.4 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	1
76	<i>Hybognathus amarus*</i>	1
76	<i>Platygobio gracilis</i>	16
76	<i>Rhinichthys cataractae</i>	13

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

age-0:

age-1: 1

age-2:

**Rio Grande silvery minnow Population Monitoring
April 2007**

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

04 April 2007

RKD07-033

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

M.A. Farrington, W.H. Brandenburg, L.E. Renfro

Effort: 448.9 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	3
76	<i>Hybognathus amarus</i> *	4
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	26
76	<i>Rhinichthys cataractae</i>	30

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

age-0:

age-1: 1

age-2: 3

New Mexico: Bernalillo Co., Rio Grande Drainage

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

Site Number: 3

River Mile: 183.4

06 April 2007

RKD07-042

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

M.A. Farrington, L.E. Renfro, N.B. Zerbe

Effort: 496.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	25
76	<i>Hybognathus amarus</i> *	15
76	<i>Pimephales promelas</i>	7
76	<i>Platygobio gracilis</i>	25
76	<i>Rhinichthys cataractae</i>	1
81	<i>Carpoides carpio</i>	1
93	<i>Ictalurus punctatus</i>	1

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

age-0:

age-1: 15

age-2:

**Rio Grande silvery minnow Population Monitoring
April 2007**

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

06 April 2007

RKD07-041

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

M.A. Farrington, L.E. Renfro, N.B. Zerbe

Effort: 502.4 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	7
76	<i>Hybognathus amarus*</i>	4
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	20
81	<i>Catostomus commersoni</i>	1
93	<i>Ictalurus punctatus</i>	2
212	<i>Gambusia affinis</i>	2

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

age-0:

age-1: 3

age-2: 1

New Mexico: Valencia Co., Rio Grande Drainage

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

Site Number: 5

06 April 2007

RKD07-040

River Mile: 161.4

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

M.A. Farrington, L.E. Renfro, N.B. Zerbe

Effort: 531.2 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	166
76	<i>Hybognathus amarus*</i>	6
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	8
93	<i>Ictalurus punctatus</i>	3

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

age-0:

age-1: 3

age-2: 3

**Rio Grande silvery minnow Population Monitoring
April 2007**

New Mexico: Valencia Co., Rio Grande Drainage

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

06 April 2007

RKD07-039

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

M.A. Farrington, L.E. Renfro, N.B. Zerbe

Site Number: 6

River Mile: 151.5

Effort: 399.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	906
76	<i>Hybognathus amarus</i> *	1
76	<i>Pimephales promelas</i>	9
76	<i>Platygobio gracilis</i>	1
76	<i>Rhinichthys cataractae</i>	1
212	<i>Gambusia affinis</i>	9

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

age-0:

age-1: 1

age-2:

New Mexico: Valencia Co., Rio Grande Drainage

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

05 April 2007

RKD07-038

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

M.A. Farrington, W.H. Brandenburg, N.B. Zerbe

Site Number: 7

River Mile: 143.2

Effort: 414.1 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	956
76	<i>Hybognathus amarus</i> *	2
76	<i>Pimephales promelas</i>	11
76	<i>Platygobio gracilis</i>	1
93	<i>Ameiurus melas</i>	1
93	<i>Ameiurus natalis</i>	1
212	<i>Gambusia affinis</i>	26

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

age-0:

age-1: 2

age-2:

Rio Grande silvery minnow Population Monitoring
April 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

05 April 2007

RKD07-037

Site Number: 8

River Mile: 130.6

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

M.A. Farrington, W.H. Brandenburg, N.B. Zerbe

Effort: 434.6 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	642
76	<i>Platygobio gracilis</i>	2
81	<i>Catostomus commersoni</i>	1
93	<i>Ameiurus melas</i>	2
93	<i>Ictalurus punctatus</i>	7
212	<i>Gambusia affinis</i>	5
294	<i>Lepomis macrochirus</i>	1

New Mexico: Socorro Co., Rio Grande Drainage

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

05 April 2007

RKD07-036

Site Number: 9

River Mile: 127.0

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

M.A. Farrington, W.H. Brandenburg, N.B. Zerbe

Effort: 503.1 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	157
76	<i>Hybognathus amarus*</i>	13
81	<i>Carpiodes carpio</i>	2
93	<i>Ictalurus punctatus</i>	12

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

age-0:

age-1: 12

age-2: 1

**Rio Grande silvery minnow Population Monitoring
April 2007**

New Mexico: Socorro Co., Rio Grande Drainage

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

05 April 2007

RKD07-035

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

M.A. Farrington, W.H. Brandenburg, N.B. Zerbe

Site Number: 9.5

River Mile: 116.8

Effort: 470.7 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	65
76	<i>Platygobio gracilis</i>	42
93	<i>Ictalurus punctatus</i>	2

New Mexico: Socorro Co., Rio Grande Drainage

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

05 April 2007

RKD07-034

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

M.A. Farrington, W.H. Brandenburg, N.B. Zerbe

Site Number: 10

River Mile: 116.2

Effort: 466.8 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	17
76	<i>Hybognathus amarus*</i>	3
76	<i>Platygobio gracilis</i>	8
93	<i>Ictalurus punctatus</i>	4
212	<i>Gambusia affinis</i>	1

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

age-0:

age-1: 1

age-2: 2

Rio Grande silvery minnow Population Monitoring
April 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

03 April 2007

RKD07-029

Site Number: 11

River Mile: 114.6

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

M.A. Farrington, W.H. Brandenburg, N.B. Zerbe

Effort: 501.2 sq. m

<u>FAMILY</u>		<u>N</u>
69	<i>Dorosoma cepedianum</i>	2
76	<i>Cyprinella lutrensis</i>	74
76	<i>Hybognathus amarus*</i>	19
76	<i>Platygobio gracilis</i>	21
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	1

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

age-0:

age-1: 16

age-2: 3

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,

03 April 2007

RKD07-028

Site Number: 12

River Mile: 99.5

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

M.A. Farrington, W.H. Brandenburg, N.B. Zerbe

Effort: 565.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	292
76	<i>Hybognathus amarus*</i>	4
76	<i>Platygobio gracilis</i>	22
81	<i>Carpoides carpio</i>	1
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	1

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

age-0:

age-1: 2

age-2: 2

Rio Grande silvery minnow Population Monitoring
April 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

Site Number: 13

03 April 2007

RKD07-027

River Mile: 91.7

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

M.A. Farrington, W.H. Brandenburg, N.B. Zerbe

Effort: 507.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	111
76	<i>Platygobio gracilis</i>	7

New Mexico: Socorro Co., Rio Grande Drainage

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

Site Number: 14

03 April 2007

RKD07-026

River Mile: 87.1

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

M.A. Farrington, W.H. Brandenburg, N.B. Zerbe

Effort: 416.9 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	32
76	<i>Platygobio gracilis</i>	25
76	<i>Rhinichthys cataractae</i>	1
93	<i>Ictalurus punctatus</i>	2

New Mexico: Socorro Co., Rio Grande Drainage

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

Site Number: 15

02 April 2007

RKD07-025

River Mile: 79.1

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

M.A. Farrington, L.E. Renfro, N.B. Zerbe

Effort: 513.4 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	44
76	<i>Hybognathus amarus</i> *	1
76	<i>Platygobio gracilis</i>	2

* *Hybognathus amarus* by age class:

age-0:

age-1: 1

age-2:

**Rio Grande silvery minnow Population Monitoring
April 2007**

New Mexico: Socorro Co., Rio Grande Drainage

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

02 April 2007

RKD07-024

Site Number: 16

River Mile: 68.6

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

M.A. Farrington, L.E. Renfro, N.B. Zerbe

Effort: 409.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	19
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	3
76	<i>Platygobio gracilis</i>	2
81	<i>Carpiodes carpio</i>	1
93	<i>Ictalurus punctatus</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.

02 April 2007

RKD07-023

Site Number: 17

River Mile: 60.5

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

M.A. Farrington, L.E. Renfro, N.B. Zerbe

Effort: 501.6 sq. m

<u>FAMILY</u>		<u>N</u>
69	<i>Dorosoma cepedianum</i>	1
76	<i>Cyprinella lutrensis</i>	50
76	<i>Hybognathus amarus*</i>	3
76	<i>Pimephales promelas</i>	2
81	<i>Carpiodes carpio</i>	1

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

age-0:

age-1: 3

age-2:

Rio Grande silvery minnow Population Monitoring
April 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

02 April 2007

RKD07-022

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

M.A. Farrington, L.E. Renfro, N.B. Zerbe

Site Number: 18

River Mile: 58.8

Effort: 428.6 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	20
76	<i>Platygobio gracilis</i>	1
93	<i>Ictalurus punctatus</i>	1
143	<i>Oncorhynchus mykiss</i>	1

Rio Grande silvery minnow Population Monitoring
May 2007

New Mexico: Sandoval Co., Rio Grande Drainage

Rio Grande, directly below Angostura Diversion Dam, Algodones.

Site Number: 0

11 May 2007

RKD07-061

River Mile: 209.7

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

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

Effort: 467.7 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Platygobio gracilis</i>	1
76	<i>Rhinichthys cataractae</i>	4
81	<i>Catostomus commersoni</i>	188

New Mexico: Sandoval Co., Rio Grande Drainage

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

Site Number: 1

11 May 2007

RKD07-062

River Mile: 203.8

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

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

Effort: 560.2 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Platygobio gracilis</i>	6
76	<i>Rhinichthys cataractae</i>	17
81	<i>Catostomus commersoni</i>	94

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

11 May 2007

RKD07-063

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

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

Effort: 468.7 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	8
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	24
76	<i>Rhinichthys cataractae</i>	13
81	<i>Catostomus commersoni</i>	139
212	<i>Gambusia affinis</i>	1

Rio Grande silvery minnow Population Monitoring
May 2007

New Mexico: Bernalillo Co., Rio Grande Drainage

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

Site Number: 3

10 May 2007

RKD07-059

River Mile: 183.4

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

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

Effort: 506.9 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	5
76	<i>Platygobio gracilis</i>	6
81	<i>Catostomus commersoni</i>	19

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

10 May 2007

RKD07-058

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

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

Effort: 469.4 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	12
76	<i>Hybognathus amarus</i> *	1
76	<i>Platygobio gracilis</i>	6
76	<i>Rhinichthys cataractae</i>	2
81	<i>Catostomus commersoni</i>	34

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

age-0:

age-1: 1

age-2:

**Rio Grande silvery minnow Population Monitoring
May 2007**

New Mexico: Valencia Co., Rio Grande Drainage

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

10 May 2007

RKD07-057

Site Number: 5

River Mile: 161.4

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

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

Effort: 531.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	54
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	3
81	<i>Carpionodes carpio</i>	1
81	<i>Catostomus commersoni</i>	1
93	<i>Ictalurus punctatus</i>	2

New Mexico: Valencia Co., Rio Grande Drainage

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

10 May 2007

RKD07-056

Site Number: 6

River Mile: 151.5

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

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

Effort: 430.9 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	297
76	<i>Hybognathus amarus*</i>	1
81	<i>Carpionodes carpio</i>	1
81	<i>Catostomus commersoni</i>	10
93	<i>Ictalurus punctatus</i>	1

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

age-0:

age-1:

age-2: 1

**Rio Grande silvery minnow Population Monitoring
May 2007**

New Mexico: Valencia Co., Rio Grande Drainage

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

09 May 2007

RKD07-055

Site Number: 7

River Mile: 143.2

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

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

Effort: 441.1 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	139
76	<i>Pimephales promelas</i>	14
76	<i>Platygobio gracilis</i>	1
81	<i>Carpoides carpio</i>	2
212	<i>Gambusia affinis</i>	23

New Mexico: Socorro Co., Rio Grande Drainage

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

09 May 2007

RKD07-054

Site Number: 8

River Mile: 130.6

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

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

Effort: 503.2 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	340
76	<i>Hybognathus amarus*</i>	2
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	1

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

age-0:

age-1:

age-2: 2

Rio Grande silvery minnow Population Monitoring
May 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

09 May 2007

RKD07-053

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

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

Site Number: 9

River Mile: 127.0

Effort: 386.6 sq. m

FAMILY

N

76 *Cyprinella lutrensis*

16

76 *Platygobio gracilis*

2

New Mexico: Socorro Co., Rio Grande Drainage

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

09 May 2007

RKD07-052

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

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

Site Number: 9.5

River Mile: 116.8

Effort: 573.2 sq. m

FAMILY

N

76 *Cyprinella lutrensis*

93

76 *Platygobio gracilis*

49

93 *Ictalurus punctatus*

2

**Rio Grande silvery minnow Population Monitoring
May 2007**

New Mexico: Socorro Co., Rio Grande Drainage

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

09 May 2007

RKD07-051

Site Number: 10

River Mile: 116.2

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

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

Effort: 515.4 sq. m

<u>FAMILY</u>		<u>N</u>
69	<i>Dorosoma cepedianum</i>	5
76	<i>Cyprinella lutrensis</i>	41
76	<i>Hybognathus amarus*</i>	2
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	2
81	<i>Catostomus commersoni</i>	2
93	<i>Ictalurus punctatus</i>	2
295	<i>Sander vitreus</i>	2

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

age-0:

age-1: 2

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

08 May 2007

RKD07-050

Site Number: 11

River Mile: 114.6

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

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

Effort: 519.2 sq. m

<u>FAMILY</u>		<u>N</u>
69	<i>Dorosoma cepedianum</i>	1
76	<i>Cyprinella lutrensis</i>	56
76	<i>Hybognathus amarus*</i>	19
76	<i>Platygobio gracilis</i>	11
76	<i>Rhinichthys cataractae</i>	13
81	<i>Carpionodes carpio</i>	1
81	<i>Catostomus commersoni</i>	7
212	<i>Gambusia affinis</i>	1

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

age-0:

age-1: 13

age-2: 6

Rio Grande silvery minnow Population Monitoring
May 2007

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

08 May 2007

RKD07-049

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

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

Effort: 467.3 sq. m

FAMILY

N

76	<i>Cyprinella lutrensis</i>	113
76	<i>Platygobio gracilis</i>	15
93	<i>Ictalurus punctatus</i>	2

New Mexico: Socorro Co., Rio Grande Drainage

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

Site Number: 13

08 May 2007

RKD07-048

River Mile: 91.7

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

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

Effort: 461.7 sq. m

FAMILY

N

76	<i>Cyprinella lutrensis</i>	220
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	16

New Mexico: Socorro Co., Rio Grande Drainage

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

Site Number: 14

08 May 2007

RKD07-047

River Mile: 87.1

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

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

Effort: 527.5 sq. m

FAMILY

N

76	<i>Cyprinella lutrensis</i>	84
76	<i>Platygobio gracilis</i>	18
93	<i>Ictalurus punctatus</i>	1

**Rio Grande silvery minnow Population Monitoring
May 2007**

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, directly east of Bosque del Apache National Wildlife Refuge Headquarters. Site Number: 15

07 May 2007

RKD07-046

River Mile: 79.1

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

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

Effort: 488.6 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	3
76	<i>Hybognathus amarus</i> *	1
76	<i>Platygobio gracilis</i>	2

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

age-0:

age-1:

age-2: 1

New Mexico: Socorro Co., Rio Grande Drainage

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

Site Number: 16

07 May 2007

RKD07-045

River Mile: 68.6

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

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

Effort: 430.4 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	81
76	<i>Cyprinus carpio</i>	3
76	<i>Hybognathus amarus</i> *	4
93	<i>Ameiurus natalis</i>	1

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

age-0:

age-1: 2

age-2: 2

**Rio Grande silvery minnow Population Monitoring
May 2007**

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

07 May 2007

RKD07-044

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

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

Effort: 446.4 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	41
76	<i>Hybognathus amarus</i> *	12
93	<i>Ictalurus punctatus</i>	2

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

age-0:

age-1: 11

age-2: 1

New Mexico: Socorro Co., Rio Grande Drainage

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

Site Number: 18

River Mile: 58.8

07 May 2007

RKD07-043

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

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

Effort: 426.7 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	93
76	<i>Hybognathus amarus</i> *	1
212	<i>Gambusia affinis</i>	2

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

age-0:

age-1: 1

age-2:

Rio Grande silvery minnow Population Monitoring
June 2007

New Mexico: Sandoval Co., Rio Grande Drainage

Rio Grande, directly below Angostura Diversion Dam, Algodones.

Site Number: 0

08 June 2007

RKD07-082

River Mile: 209.7

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

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

Effort: 473.4 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Platygobio gracilis</i>	2
76	<i>Rhinichthys cataractae</i>	10
81	<i>Catostomus commersoni</i>	397
294	<i>Micropterus salmoides</i>	1

New Mexico: Sandoval Co., Rio Grande Drainage

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

Site Number: 1

08 June 2007

RKD07-083

River Mile: 203.8

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

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

Effort: 539.1 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	14
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	1
76	<i>Platygobio gracilis</i>	4
76	<i>Rhinichthys cataractae</i>	3
81	<i>Catostomus commersoni</i>	270

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

age-0: 1

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
June 2007**

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 June 2007

RKD07-084

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

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

Effort: 487.2 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Hybognathus amarus*</i>	118
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	2
76	<i>Rhinichthys cataractae</i>	5
81	<i>Catostomus commersoni</i>	129

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

age-0: 118

age-1:

age-2:

New Mexico: Bernalillo Co., Rio Grande Drainage

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

Site Number: 3

07 June 2007

RKD07-080

River Mile: 183.4

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

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

Effort: 504.6 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	150
76	<i>Cyprinus carpio</i>	4
76	<i>Hybognathus amarus*</i>	69
76	<i>Platygobio gracilis</i>	11
81	<i>Carpoides carpio</i>	1
81	<i>Catostomus commersoni</i>	496
295	<i>Perca flavescens</i>	1

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

age-0: 61

age-1: 8

age-2:

Rio Grande silvery minnow Population Monitoring
June 2007

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

07 June 2007

RKD07-079

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

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

Effort: 524.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	35
76	<i>Cyprinus carpio</i>	11
76	<i>Hybognathus amarus</i> *	483
76	<i>Pimephales promelas</i>	8
76	<i>Platygobio gracilis</i>	1
76	<i>Rhinichthys cataractae</i>	2
81	<i>Carpoides carpio</i>	1
81	<i>Catostomus commersoni</i>	84

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

age-0: 477

age-1: 6

age-2:

Rio Grande silvery minnow Population Monitoring
June 2007

New Mexico: Valencia Co., Rio Grande Drainage

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

07 June 2007

RKD07-078

Site Number: 5

River Mile: 161.4

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

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

Effort: 521.4 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	113
76	<i>Cyprinus carpio</i>	6
76	<i>Hybognathus amarus*</i>	373
76	<i>Pimephales promelas</i>	3
76	<i>Platygobio gracilis</i>	1
76	<i>Rhinichthys cataractae</i>	1
81	<i>Carpoides carpio</i>	5
81	<i>Catostomus commersoni</i>	17
212	<i>Gambusia affinis</i>	1

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

age-0: 373

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
June 2007

New Mexico: Valencia Co., Rio Grande Drainage

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

07 June 2007

RKD07-077

Site Number: 6

River Mile: 151.5

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

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

Effort: 500.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	316
76	<i>Cyprinus carpio</i>	8
76	<i>Hybognathus amarus*</i>	489
76	<i>Pimephales promelas</i>	4
76	<i>Rhinichthys cataractae</i>	1
81	<i>Carpionodes carpio</i>	4
81	<i>Catostomus commersoni</i>	1
212	<i>Gambusia affinis</i>	20

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

age-0: 487

age-1: 2

age-2:

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

06 June 2007

RKD07-076

Site Number: 7

River Mile: 143.2

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

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

Effort: 469.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	300
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	369
76	<i>Platygobio gracilis</i>	1
81	<i>Carpionodes carpio</i>	1
81	<i>Catostomus commersoni</i>	7
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	1

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

age-0: 369

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
June 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

06 June 2007

RKD07-075

Site Number: 8

River Mile: 130.6

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

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

Effort: 438.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	156
76	<i>Cyprinus carpio</i>	26
76	<i>Hybognathus amarus*</i>	83
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	5
76	<i>Rhinichthys cataractae</i>	1
81	<i>Carpoides carpio</i>	1
81	<i>Catostomus commersoni</i>	13
212	<i>Gambusia affinis</i>	2

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

age-0: 82

age-1: 1

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

06 June 2007

RKD07-074

Site Number: 9

River Mile: 127.0

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

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

Effort: 441.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	107
76	<i>Cyprinus carpio</i>	74
76	<i>Hybognathus amarus*</i>	170
76	<i>Pimephales promelas</i>	7
76	<i>Platygobio gracilis</i>	2
81	<i>Catostomus commersoni</i>	9
212	<i>Gambusia affinis</i>	8

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

age-0: 169

age-1: 1

age-2:

Rio Grande silvery minnow Population Monitoring
June 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

06 June 2007

RKD07-073

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

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

Site Number: 9.5

River Mile: 116.8

Effort: 517.9 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	23
76	<i>Cyprinus carpio</i>	14
76	<i>Hybognathus amarus</i> *	478
76	<i>Pimephales promelas</i>	3
76	<i>Platygobio gracilis</i>	6
76	<i>Rhinichthys cataractae</i>	5
81	<i>Carpoides carpio</i>	2
212	<i>Gambusia affinis</i>	21

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

age-0: 478

age-1:

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

06 June 2007

RKD07-072

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

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

Site Number: 10

River Mile: 116.2

Effort: 432.5 sq. m

<u>FAMILY</u>		<u>N</u>
69	<i>Dorosoma cepedianum</i>	1
76	<i>Cyprinella lutrensis</i>	80
76	<i>Cyprinus carpio</i>	6
76	<i>Hybognathus amarus</i> *	1
76	<i>Platygobio gracilis</i>	15
81	<i>Carpoides carpio</i>	5
212	<i>Gambusia affinis</i>	1

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

age-0:

age-1: 1

age-2:

Rio Grande silvery minnow Population Monitoring
June 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

05 June 2007

RKD07-071

Site Number: 11

River Mile: 114.6

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

R.K. Dudley, W.H. Brandenburg, M.A. Farrington, T.J. Krabbenhoft

Effort: 506.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	61
76	<i>Cyprinus carpio</i>	17
76	<i>Hybognathus amarus</i> *	63
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	47
93	<i>Ictalurus punctatus</i>	1

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

age-0: 58

age-1: 4

age-2: 1

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,

05 June 2007

RKD07-070

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, M.A. Farrington, T.J. Krabbenhoft

Effort: 525.8 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	100
76	<i>Cyprinus carpio</i>	38
76	<i>Hybognathus amarus</i> *	352
76	<i>Pimephales promelas</i>	5
76	<i>Platygobio gracilis</i>	18
81	<i>Carpoides carpio</i>	46
212	<i>Gambusia affinis</i>	1

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

age-0: 352

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
June 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

05 June 2007

RKD07-069

Site Number: 13

River Mile: 91.7

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

R.K. Dudley, W.H. Brandenburg, M.A. Farrington, T.J. Krabbenhoft

Effort: 584.1 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	82
76	<i>Cyprinus carpio</i>	18
76	<i>Hybognathus amarus</i> *	16
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	6

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

age-0: 16

age-1:

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

05 June 2007

RKD07-068

Site Number: 14

River Mile: 87.1

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

R.K. Dudley, W.H. Brandenburg, M.A. Farrington, T.J. Krabbenhoft

Effort: 627.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	78
76	<i>Cyprinus carpio</i>	33
76	<i>Hybognathus amarus</i> *	89
76	<i>Platygobio gracilis</i>	5
81	<i>Carpoides carpio</i>	2
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	2

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

age-0: 89

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
June 2007

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, directly east of Bosque del Apache National Wildlife Refuge Headquarters. Site Number: 15

04 June 2007 **RKD07-067** River Mile: 79.1

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

R.K. Dudley, W.H. Brandenburg, M.A. Farrington Effort: 521.6 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	9
76	<i>Cyprinus carpio</i>	5
76	<i>Hybognathus amarus</i> *	8
76	<i>Platygobio gracilis</i>	11
93	<i>Ictalurus punctatus</i>	3
212	<i>Gambusia affinis</i>	4

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

age-0: 5

age-1: 3

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

Site Number: 16

04 June 2007 **RKD07-066** River Mile: 68.6

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

R.K. Dudley, W.H. Brandenburg, M.A. Farrington Effort: 415.8 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	397
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus</i> *	7
76	<i>Platygobio gracilis</i>	4
81	<i>Carpoides carpio</i>	4
212	<i>Gambusia affinis</i>	12

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

age-0: 6

age-1: 1

age-2:

Rio Grande silvery minnow Population Monitoring
June 2007

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 June 2007

RKD07-065

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

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

Effort: 441.5 sq. m

<u>FAMILY</u>		<u>N</u>
69	<i>Dorosoma petenense</i>	1
76	<i>Cyprinella lutrensis</i>	110
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus</i> *	5
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	2
212	<i>Gambusia affinis</i>	8

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

age-0: 5

age-1:

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

Site Number: 18

04 June 2007

RKD07-064

River Mile: 58.8

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

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

Effort: 458.7 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	22
76	<i>Cyprinus carpio</i>	3
212	<i>Gambusia affinis</i>	1

Rio Grande silvery minnow Population Monitoring
July 2007

New Mexico: Sandoval Co., Rio Grande Drainage

Rio Grande, directly below Angostura Diversion Dam, Algodones.

Site Number: 0

13 July 2007

RKD07-103

River Mile: 209.7

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

R.K. Dudley, W.H. Brandenburg, A.L. Fitzgerald

Effort: 482.3 sq. m

<u>FAMILY</u>	<u>N</u>
76 <i>Cyprinella lutrensis</i>	1
76 <i>Hybognathus amarus*</i>	17
76 <i>Pimephales promelas</i>	11
76 <i>Platygobio gracilis</i>	2
76 <i>Rhinichthys cataractae</i>	53
81 <i>Carpionodes carpio</i>	2
81 <i>Catostomus commersoni</i>	105
143 <i>Salmo trutta</i>	1
212 <i>Gambusia affinis</i>	16
294 <i>Lepomis macrochirus</i>	1
294 <i>Micropterus salmoides</i>	4
294 <i>Pomoxis annularis</i>	5
295 <i>Perca flavescens</i>	1

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

age-0: 16

age-1: 1

age-2:

Rio Grande silvery minnow Population Monitoring
July 2007

New Mexico: Sandoval Co., Rio Grande Drainage

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

13 July 2007

RKD07-104

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

R.K. Dudley, W.H. Brandenburg, A.L. Fitzgerald

Site Number: 1

River Mile: 203.8

Effort: 415.2 sq. m

<u>FAMILY</u>	<u>N</u>
76 <i>Cyprinella lutrensis</i>	1
76 <i>Hybognathus amarus</i> *	62
76 <i>Pimephales promelas</i>	8
76 <i>Platygobio gracilis</i>	19
76 <i>Rhinichthys cataractae</i>	41
81 <i>Catostomus commersoni</i>	211
212 <i>Gambusia affinis</i>	1
294 <i>Lepomis macrochirus</i>	1
294 <i>Micropterus salmoides</i>	2
294 <i>Pomoxis annularis</i>	1

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

age-0: 61

age-1:

age-2: 1

Rio Grande silvery minnow Population Monitoring
July 2007

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

13 July 2007

RKD07-105

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

R.K. Dudley, W.H. Brandenburg, A.L. Fitzgerald

Effort: 461.0 sq. m

<u>FAMILY</u>	<u>N</u>
76 <i>Cyprinella lutrensis</i>	8
76 <i>Cyprinus carpio</i>	8
76 <i>Hybognathus amarus</i> *	348
76 <i>Pimephales promelas</i>	38
76 <i>Platygobio gracilis</i>	9
76 <i>Rhinichthys cataractae</i>	44
81 <i>Carpoides carpio</i>	2
81 <i>Catostomus commersoni</i>	244
93 <i>Ictalurus punctatus</i>	2
212 <i>Gambusia affinis</i>	50
283 <i>Morone chrysops</i>	1
294 <i>Micropterus salmoides</i>	2

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

age-0: 348

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
July 2007

New Mexico: Bernalillo Co., Rio Grande Drainage

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

Site Number: 3

12 July 2007

RKD07-098

River Mile: 183.4

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

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

Effort: 578.0 sq. m

<u>FAMILY</u>	<u>N</u>
76 <i>Cyprinella lutrensis</i>	2
76 <i>Cyprinus carpio</i>	10
76 <i>Hybognathus amarus*</i>	285
76 <i>Pimephales promelas</i>	3
76 <i>Platygobio gracilis</i>	12
76 <i>Rhinichthys cataractae</i>	3
81 <i>Carpoides carpio</i>	68
81 <i>Catostomus commersoni</i>	33
212 <i>Gambusia affinis</i>	1
294 <i>Micropterus salmoides</i>	2

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

age-0: 285

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
July 2007**

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

12 July 2007

RKD07-099

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

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

Effort: 469.1 sq. m

<u>FAMILY</u>	<u>N</u>
76 <i>Cyprinella lutrensis</i>	1
76 <i>Cyprinus carpio</i>	2
76 <i>Hybognathus amarus</i> *	91
76 <i>Pimephales promelas</i>	1
76 <i>Platygobio gracilis</i>	6
81 <i>Carpionodes carpio</i>	7
81 <i>Catostomus commersoni</i>	35
93 <i>Ictalurus punctatus</i>	7
212 <i>Gambusia affinis</i>	5
294 <i>Pomoxis annularis</i>	1

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

age-0: 91

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
July 2007

New Mexico: Valencia Co., Rio Grande Drainage

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

12 July 2007

RKD07-100

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

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

Site Number: 5

River Mile: 161.4

Effort: 463.6 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	271
76	<i>Hybognathus amarus*</i>	36
76	<i>Pimephales promelas</i>	5
81	<i>Carpoides carpio</i>	165
81	<i>Catostomus commersoni</i>	2
93	<i>Ictalurus punctatus</i>	5
212	<i>Gambusia affinis</i>	9

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

age-0: 36

age-1:

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.

12 July 2007

RKD07-101

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

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

Site Number: 6

River Mile: 151.5

Effort: 408.6 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	210
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	123
76	<i>Pimephales promelas</i>	11
81	<i>Carpoides carpio</i>	75
81	<i>Catostomus commersoni</i>	1
93	<i>Ictalurus punctatus</i>	5
212	<i>Gambusia affinis</i>	35

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

age-0: 123

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
July 2007

New Mexico: Valencia Co., Rio Grande Drainage

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

11 July 2007

RKD07-097

Site Number: 7

River Mile: 143.2

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

W.H. Brandenburg, M.A. Farrington, A.L. Fitzgerald

Effort: 497.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	120
76	<i>Cyprinus carpio</i>	4
76	<i>Hybognathus amarus*</i>	116
76	<i>Pimephales promelas</i>	5
81	<i>Carpionotus carpio</i>	42
81	<i>Catostomus commersoni</i>	1
93	<i>Ictalurus punctatus</i>	2
212	<i>Gambusia affinis</i>	80

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

age-0: 116

age-1:

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

11 July 2007

RKD07-096

Site Number: 8

River Mile: 130.6

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

W.H. Brandenburg, M.A. Farrington, A.L. Fitzgerald

Effort: 482.6 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	1072
76	<i>Cyprinus carpio</i>	8
76	<i>Hybognathus amarus*</i>	332
76	<i>Pimephales promelas</i>	27
81	<i>Carpionotus carpio</i>	83
93	<i>Ictalurus punctatus</i>	17
212	<i>Gambusia affinis</i>	107

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

age-0: 332

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
July 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

11 July 2007

RKD07-095

Site Number: 9

River Mile: 127.0

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

W.H. Brandenburg, M.A. Farrington, A.L. Fitzgerald

Effort: 436.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	1146
76	<i>Cyprinus carpio</i>	3
76	<i>Hybognathus amarus*</i>	295
76	<i>Pimephales promelas</i>	8
81	<i>Carpoides carpio</i>	33
93	<i>Ictalurus punctatus</i>	3
212	<i>Gambusia affinis</i>	45

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

age-0: 295

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

11 July 2007

RKD07-094

Site Number: 9.5

River Mile: 116.8

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

W.H. Brandenburg, M.A. Farrington, A.L. Fitzgerald

Effort: 565.2 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	359
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	405
76	<i>Pimephales promelas</i>	7
76	<i>Platygobio gracilis</i>	123
93	<i>Ameiurus melas</i>	1
93	<i>Ictalurus punctatus</i>	141
212	<i>Gambusia affinis</i>	10

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

age-0: 405

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
July 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

11 July 2007

RKD07-093

Site Number: 10

River Mile: 116.2

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

W.H. Brandenburg, M.A. Farrington, A.L. Fitzgerald

Effort: 558.6 sq. m

<u>FAMILY</u>	<u>N</u>
69 <i>Dorosoma petenense</i>	1
76 <i>Cyprinella lutrensis</i>	131
76 <i>Cyprinus carpio</i>	1
76 <i>Hybognathus amarus</i> *	21
76 <i>Pimephales promelas</i>	8
76 <i>Platygobio gracilis</i>	50
76 <i>Rhinichthys cataractae</i>	4
81 <i>Carpiondes carpio</i>	11
81 <i>Catostomus commersoni</i>	2
93 <i>Ictalurus punctatus</i>	89
212 <i>Gambusia affinis</i>	1

* *Hybognathus amarus* by age class:

age-0: 21

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
July 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

10 July 2007

RKD07-092

Site Number: 11

River Mile: 114.6

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

W.H. Brandenburg, M.A. Farrington, A.L. Fitzgerald

Effort: 446.9 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	118
76	<i>Hybognathus amarus</i> *	224
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	188
76	<i>Rhinichthys cataractae</i>	1
81	<i>Carpiodes carpio</i>	19
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	153

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

age-0: 224

age-1:

age-2:

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,

10 July 2007

RKD07-091

Site Number: 12

River Mile: 99.5

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

W.H. Brandenburg, M.A. Farrington, A.L. Fitzgerald

Effort: 550.6 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	395
76	<i>Hybognathus amarus</i> *	169
76	<i>Platygobio gracilis</i>	36
81	<i>Carpiodes carpio</i>	43
93	<i>Ictalurus punctatus</i>	149

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

age-0: 169

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
July 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

Site Number: 13

10 July 2007

RKD07-090

River Mile: 91.7

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

W.H. Brandenburg, M.A. Farrington, A.L. Fitzgerald

Effort: 554.2 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	1074
76	<i>Cyprinus carpio</i>	14
76	<i>Hybognathus amarus*</i>	127
76	<i>Pimephales promelas</i>	23
76	<i>Platygobio gracilis</i>	28
81	<i>Carpionodes carpio</i>	502
81	<i>Catostomus commersoni</i>	1
81	<i>Ictiobus bubalus</i>	1
93	<i>Ictalurus punctatus</i>	48
212	<i>Gambusia affinis</i>	4

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

age-0: 127

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
July 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

10 July 2007

RKD07-089

Site Number: 14

River Mile: 87.1

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

W.H. Brandenburg, M.A. Farrington, A.L. Fitzgerald

Effort: 721.1 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	749
76	<i>Cyprinus carpio</i>	2
76	<i>Hybognathus amarus*</i>	11
76	<i>Pimephales promelas</i>	6
76	<i>Platygobio gracilis</i>	21
81	<i>Carpionodes carpio</i>	152
81	<i>Ictiobus bubalus</i>	1
93	<i>Ictalurus punctatus</i>	228
212	<i>Gambusia affinis</i>	2

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

age-0: 10

age-1: 1

age-2:

Rio Grande silvery minnow Population Monitoring
July 2007

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, directly east of Bosque del Apache National Wildlife Refuge Headquarters. Site Number: 15

09 July 2007

RKD07-088

River Mile: 79.1

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

W.H. Brandenburg, M.A. Farrington, A.L. Fitzgerald

Effort: 550.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	51
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus</i> *	15
76	<i>Pimephales promelas</i>	4
76	<i>Platygobio gracilis</i>	1
81	<i>Carpionodes carpio</i>	38
93	<i>Ictalurus punctatus</i>	39
212	<i>Gambusia affinis</i>	6

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

age-0: 14

age-1: 1

age-2:

Rio Grande silvery minnow Population Monitoring
July 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

09 July 2007

RKD07-087

Site Number: 16

River Mile: 68.6

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

W.H. Brandenburg, M.A. Farrington, A.L. Fitzgerald

Effort: 634.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	415
76	<i>Cyprinus carpio</i>	4
76	<i>Hybognathus amarus*</i>	2
76	<i>Pimephales promelas</i>	4
76	<i>Platygobio gracilis</i>	40
81	<i>Carpionodes carpio</i>	83
81	<i>Ictiobus bubalus</i>	21
93	<i>Ictalurus punctatus</i>	42
212	<i>Gambusia affinis</i>	6

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

age-0: 2

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
July 2007

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

09 July 2007

RKD07-086

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

W.H. Brandenburg, M.A. Farrington, A.L. Fitzgerald

Effort: 528.4 sq. m

<u>FAMILY</u>		<u>N</u>
69	<i>Dorosoma cepedianum</i>	2
76	<i>Cyprinella lutrensis</i>	27
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	2
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	79
76	<i>Rhinichthys cataractae</i>	1
81	<i>Carpionotus carpio</i>	13
81	<i>Ictiobus bubalus</i>	17
93	<i>Ictalurus punctatus</i>	41
212	<i>Gambusia affinis</i>	14

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

age-0: 2

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
July 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

09 July 2007

RKD07-085

Site Number: 18

River Mile: 58.8

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

W.H. Brandenburg, M.A. Farrington, A.L. Fitzgerald

Effort: 534.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	178
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus</i> *	4
76	<i>Pimephales promelas</i>	4
76	<i>Platygobio gracilis</i>	1
81	<i>Carpionodes carpio</i>	16
93	<i>Ictalurus punctatus</i>	71
212	<i>Gambusia affinis</i>	32
294	<i>Micropterus salmoides</i>	1

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

age-0: 4

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2007**

New Mexico: Sandoval Co., Rio Grande Drainage

Rio Grande, directly below Angostura Diversion Dam, Algodones.

Site Number: 0

11 August 2007

RKD07-124

River Mile: 209.7

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

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

Effort: 358.3 sq. m

<u>FAMILY</u>	<u>N</u>
76 <i>Cyprinella lutrensis</i>	5
76 <i>Hybognathus amarus</i> *	319
76 <i>Pimephales promelas</i>	5
76 <i>Platygobio gracilis</i>	2
76 <i>Rhinichthys cataractae</i>	7
81 <i>Catostomus commersoni</i>	22
212 <i>Gambusia affinis</i>	110
294 <i>Lepomis macrochirus</i>	2
294 <i>Micropterus salmoides</i>	1

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

age-0: 319

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2007**

New Mexico: Sandoval Co., Rio Grande Drainage

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

11 August 2007

RKD07-125

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

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

Site Number: 1

River Mile: 203.8

Effort: 454.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	2
76	<i>Hybognathus amarus</i> *	31
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	29
76	<i>Rhinichthys cataractae</i>	31
81	<i>Catostomus commersoni</i>	16
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	3
212	<i>Gambusia affinis</i>	28

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

age-0: 31

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2007**

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

11 August 2007

RKD07-126

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

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

Effort: 456.1 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	25
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus</i> *	40
76	<i>Pimephales promelas</i>	8
76	<i>Platygobio gracilis</i>	31
76	<i>Rhinichthys cataractae</i>	3
81	<i>Carpionodes carpio</i>	1
81	<i>Catostomus commersoni</i>	6
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	90
294	<i>Pomoxis annularis</i>	3

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

age-0: 40

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2007**

New Mexico: Bernalillo Co., Rio Grande Drainage

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

Site Number: 3

15 August 2007

RKD07-114

River Mile: 183.4

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

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

Effort: 711.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	59
76	<i>Hybognathus amarus</i> *	195
76	<i>Platygobio gracilis</i>	6
76	<i>Rhinichthys cataractae</i>	6
81	<i>Carpionodes carpio</i>	29
81	<i>Catostomus commersoni</i>	4
93	<i>Ictalurus punctatus</i>	5
212	<i>Gambusia affinis</i>	9

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

age-0: 195

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2007**

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

15 August 2007

RKD07-115

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

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

Effort: 518.4 sq. m

<u>FAMILY</u>	<u>N</u>
76 <i>Cyprinella lutrensis</i>	43
76 <i>Cyprinus carpio</i>	2
76 <i>Hybognathus amarus</i> *	12
76 <i>Pimephales promelas</i>	3
76 <i>Platygobio gracilis</i>	6
76 <i>Rhinichthys cataractae</i>	1
81 <i>Carpionodes carpio</i>	37
81 <i>Catostomus commersoni</i>	7
93 <i>Ictalurus punctatus</i>	14
212 <i>Gambusia affinis</i>	11
294 <i>Micropterus salmoides</i>	2
294 <i>Pomoxis annularis</i>	1

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

age-0: 12

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2007**

New Mexico: Valencia Co., Rio Grande Drainage

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

15 August 2007

RKD07-116

Site Number: 5

River Mile: 161.4

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

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

Effort: 541.9 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	461
76	<i>Hybognathus amarus*</i>	85
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	1
81	<i>Carpoides carpio</i>	34
93	<i>Ictalurus punctatus</i>	7
212	<i>Gambusia affinis</i>	14

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

age-0: 84

age-1: 1

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.

15 August 2007

RKD07-117

Site Number: 6

River Mile: 151.5

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

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

Effort: 549.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	679
76	<i>Hybognathus amarus*</i>	34
76	<i>Pimephales promelas</i>	19
76	<i>Platygobio gracilis</i>	2
81	<i>Carpoides carpio</i>	79
81	<i>Catostomus commersoni</i>	26
93	<i>Ictalurus punctatus</i>	16
212	<i>Gambusia affinis</i>	115

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

age-0: 34

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2007**

New Mexico: Valencia Co., Rio Grande Drainage

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

16 August 2007

RKD07-122

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

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

Site Number: 7

River Mile: 143.2

Effort: 448.2 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	480
76	<i>Hybognathus amarus*</i>	28
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	1
81	<i>Carpionodes carpio</i>	10
93	<i>Ictalurus punctatus</i>	14
212	<i>Gambusia affinis</i>	181

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

age-0: 28

age-1:

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

16 August 2007

RKD07-121

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

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

Site Number: 8

River Mile: 130.6

Effort: 517.4 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	500
76	<i>Hybognathus amarus*</i>	28
76	<i>Pimephales promelas</i>	5
81	<i>Carpionodes carpio</i>	32
93	<i>Ictalurus punctatus</i>	14
212	<i>Gambusia affinis</i>	56

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

age-0: 28

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2007**

New Mexico: Socorro Co., Rio Grande Drainage

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

16 August 2007

RKD07-120

Site Number: 9

River Mile: 127.0

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

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

Effort: 448.7 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	567
76	<i>Hybognathus amarus*</i>	19
76	<i>Pimephales promelas</i>	7
81	<i>Carpionotus carpio</i>	31
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	6
212	<i>Gambusia affinis</i>	123

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

age-0: 19

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

16 August 2007

RKD07-119

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, M.A. Farrington

Effort: 558.8 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	8
76	<i>Hybognathus amarus*</i>	39
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	72
93	<i>Ictalurus punctatus</i>	9
212	<i>Gambusia affinis</i>	2

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

age-0: 39

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2007**

New Mexico: Socorro Co., Rio Grande Drainage

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

16 August 2007

RKD07-118

Site Number: 10

River Mile: 116.2

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

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

Effort: 467.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	5
76	<i>Hybognathus amarus</i> *	52
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	84
76	<i>Rhinichthys cataractae</i>	5
93	<i>Ameiurus melas</i>	1
93	<i>Ictalurus punctatus</i>	35

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

age-0: 52

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.

14 August 2007

RKD07-113

Site Number: 11

River Mile: 114.6

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

R.K. Dudley, W.H. Brandenburg, J.R. Brooks

Effort: 584.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	31
76	<i>Hybognathus amarus</i> *	21
76	<i>Platygobio gracilis</i>	80
93	<i>Ictalurus punctatus</i>	17

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

age-0: 21

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2007**

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

14 August 2007

RKD07-112

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

R.K. Dudley, W.H. Brandenburg, J.R. Brooks

Effort: 581.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	140
76	<i>Hybognathus amarus</i> *	50
76	<i>Platygobio gracilis</i>	15
93	<i>Ictalurus punctatus</i>	3

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

age-0: 50

age-1:

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

14 August 2007

RKD07-111

River Mile: 91.7

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

R.K. Dudley, W.H. Brandenburg, J.R. Brooks

Effort: 520.9 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	47
76	<i>Hybognathus amarus</i> *	57
76	<i>Platygobio gracilis</i>	10
81	<i>Carpionodes carpio</i>	1
93	<i>Ictalurus punctatus</i>	6
212	<i>Gambusia affinis</i>	2

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

age-0: 57

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2007**

New Mexico: Socorro Co., Rio Grande Drainage

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

Site Number: 14

14 August 2007

RKD07-110

River Mile: 87.1

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

R.K. Dudley, W.H. Brandenburg, J.R. Brooks

Effort: 606.4 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	94
76	<i>Hybognathus amarus</i> *	11
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	5
93	<i>Ictalurus punctatus</i>	9
212	<i>Gambusia affinis</i>	5

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

age-0: 11

age-1:

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

Site Number: 15

13 August 2007

RKD07-109

River Mile: 79.1

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

R.K. Dudley, W.H. Brandenburg, J.R. Brooks

Effort: 568.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	4
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus</i> *	35
76	<i>Pimephales promelas</i>	1
93	<i>Ictalurus punctatus</i>	3
212	<i>Gambusia affinis</i>	2

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

age-0: 35

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2007**

New Mexico: Socorro Co., Rio Grande Drainage

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

13 August 2007

RKD07-108

Site Number: 16

River Mile: 68.6

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

R.K. Dudley, W.H. Brandenburg, J.R. Brooks

Effort: 528.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	204
76	<i>Cyprinus carpio</i>	2
76	<i>Hybognathus amarus*</i>	52
76	<i>Pimephales promelas</i>	8
76	<i>Platygobio gracilis</i>	9
81	<i>Carpionotus carpio</i>	1
212	<i>Gambusia affinis</i>	4

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

age-0: 52

age-1:

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.

13 August 2007

RKD07-107

Site Number: 17

River Mile: 60.5

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

R.K. Dudley, W.H. Brandenburg, J.R. Brooks

Effort: 555.9 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	115
76	<i>Hybognathus amarus*</i>	12
76	<i>Pimephales promelas</i>	11
76	<i>Platygobio gracilis</i>	26
81	<i>Carpionotus carpio</i>	1
93	<i>Ictalurus punctatus</i>	41
212	<i>Gambusia affinis</i>	12

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

age-0: 12

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2007**

New Mexico: Socorro Co., Rio Grande Drainage

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

13 August 2007

RKD07-106

Site Number: 18

River Mile: 58.8

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

R.K. Dudley, W.H. Brandenburg, J.R. Brooks

Effort: 531.8 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	35
76	<i>Hybognathus amarus</i> *	2
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	5
93	<i>Ictalurus punctatus</i>	20
212	<i>Gambusia affinis</i>	16

* *Hybognathus amarus* by age class:

age-0: 2

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
September 2007

New Mexico: Sandoval Co., Rio Grande Drainage

Rio Grande, directly below Angostura Diversion Dam, Algodones.

Site Number: 0

18 September 2007

RKD07-145

River Mile: 209.7

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

W.H. Brandenburg, M.A. Farrington, C.C. McBride

Effort: 455.2 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	15
76	<i>Hybognathus amarus</i> *	80
76	<i>Pimephales promelas</i>	55
76	<i>Platygobio gracilis</i>	14
76	<i>Rhinichthys cataractae</i>	6
81	<i>Catostomus commersoni</i>	8
93	<i>Ictalurus punctatus</i>	2
212	<i>Gambusia affinis</i>	135
294	<i>Micropterus salmoides</i>	6

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

age-0: 80

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
September 2007

New Mexico: Sandoval Co., Rio Grande Drainage

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

18 September 2007

RKD07-146

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

W.H. Brandenburg, M.A. Farrington, C.C. McBride

Site Number: 1

River Mile: 203.8

Effort: 447.2 sq. m

<u>FAMILY</u>	<u>N</u>
76 <i>Cyprinella lutrensis</i>	64
76 <i>Cyprinus carpio</i>	4
76 <i>Hybognathus amarus*</i>	249
76 <i>Pimephales promelas</i>	9
76 <i>Platygobio gracilis</i>	53
76 <i>Rhinichthys cataractae</i>	94
81 <i>Carpoides carpio</i>	1
81 <i>Catostomus commersoni</i>	22
93 <i>Ameiurus natalis</i>	1
93 <i>Ictalurus punctatus</i>	19
212 <i>Gambusia affinis</i>	33
294 <i>Micropterus salmoides</i>	1
295 <i>Sander vitreus</i>	1

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

age-0: 246

age-1: 3

age-2:

Rio Grande silvery minnow Population Monitoring
September 2007

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

18 September 2007

RKD07-147

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

W.H. Brandenburg, M.A. Farrington, C.C. McBride

Effort: 374.4 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	16
76	<i>Hybognathus amarus</i> *	112
76	<i>Pimephales promelas</i>	3
76	<i>Platygobio gracilis</i>	6
76	<i>Rhinichthys cataractae</i>	5
81	<i>Carpionodes carpio</i>	31
81	<i>Catostomus commersoni</i>	7
93	<i>Ictalurus punctatus</i>	12
212	<i>Gambusia affinis</i>	45

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

age-0: 112

age-1:

age-2:

New Mexico: Bernalillo Co., Rio Grande Drainage

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

Site Number: 3

17 September 2007

RKD07-139

River Mile: 183.4

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

R.K. Dudley, M.A. Farrington, C.C. McBride

Effort: 607.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	64
76	<i>Hybognathus amarus</i> *	15
76	<i>Platygobio gracilis</i>	32
93	<i>Ameiurus melas</i>	1
93	<i>Ictalurus punctatus</i>	24
212	<i>Gambusia affinis</i>	33

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

age-0: 15

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
September 2007

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

17 September 2007

RKD07-140

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

R.K. Dudley, M.A. Farrington, C.C. McBride

Effort: 555.1 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	58
76	<i>Hybognathus amarus*</i>	12
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	3
81	<i>Carpionotus carpio</i>	9
93	<i>Ictalurus punctatus</i>	4
212	<i>Gambusia affinis</i>	9

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

age-0: 12

age-1:

age-2:

New Mexico: Valencia Co., Rio Grande Drainage

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

Site Number: 5

17 September 2007

RKD07-141

River Mile: 161.4

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

R.K. Dudley, M.A. Farrington, C.C. McBride

Effort: 407.2 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	498
76	<i>Hybognathus amarus*</i>	15
76	<i>Pimephales promelas</i>	19
76	<i>Platygobio gracilis</i>	3
81	<i>Carpionotus carpio</i>	14
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	17
212	<i>Gambusia affinis</i>	37

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

age-0: 14

age-1: 1

age-2:

Rio Grande silvery minnow Population Monitoring
September 2007

New Mexico: Valencia Co., Rio Grande Drainage

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

17 September 2007

RKD07-142

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

R.K. Dudley, M.A. Farrington, C.C. McBride

Site Number: 6

River Mile: 151.5

Effort: 428.2 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	1809
76	<i>Hybognathus amarus*</i>	72
76	<i>Pimephales promelas</i>	5
76	<i>Platygobio gracilis</i>	1
81	<i>Carpionodes carpio</i>	14
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	57

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

age-0: 72

age-1:

age-2:

New Mexico: Valencia Co., Rio Grande Drainage

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

17 September 2007

RKD07-143

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

R.K. Dudley, M.A. Farrington, C.C. McBride

Site Number: 7

River Mile: 143.2

Effort: 432.7 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	631
76	<i>Hybognathus amarus*</i>	154
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	1
81	<i>Carpionodes carpio</i>	8
93	<i>Ictalurus punctatus</i>	3
212	<i>Gambusia affinis</i>	48

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

age-0: 154

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
September 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

14 September 2007

RKD07-138

Site Number: 8

River Mile: 130.6

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

W.H. Brandenburg, M.A. Farrington, C.C. McBride

Effort: 383.4 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	1016
76	<i>Cyprinus carpio</i>	14
76	<i>Hybognathus amarus*</i>	83
76	<i>Pimephales promelas</i>	5
76	<i>Platygobio gracilis</i>	2
81	<i>Carpionotus carpio</i>	27
93	<i>Ictalurus punctatus</i>	2
212	<i>Gambusia affinis</i>	141

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

age-0: 83

age-1:

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

14 September 2007

RKD07-137

Site Number: 9

River Mile: 127.0

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

W.H. Brandenburg, M.A. Farrington, C.C. McBride

Effort: 449.4 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	803
76	<i>Hybognathus amarus*</i>	134
76	<i>Pimephales promelas</i>	18
81	<i>Carpionotus carpio</i>	7
93	<i>Ictalurus punctatus</i>	39
212	<i>Gambusia affinis</i>	244

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

age-0: 134

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
September 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

14 September 2007

RKD07-136

Site Number: 9.5

River Mile: 116.8

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

W.H. Brandenburg, M.A. Farrington, C.C. McBride

Effort: 674.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	7
76	<i>Hybognathus amarus</i> *	13
76	<i>Platygobio gracilis</i>	68
93	<i>Ictalurus punctatus</i>	8

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

age-0: 13

age-1:

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

14 September 2007

RKD07-135

Site Number: 10

River Mile: 116.2

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

W.H. Brandenburg, M.A. Farrington, C.C. McBride

Effort: 494.4 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	29
76	<i>Hybognathus amarus</i> *	7
76	<i>Platygobio gracilis</i>	73
81	<i>Catostomus commersoni</i>	1
93	<i>Ictalurus punctatus</i>	21

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

age-0: 6

age-1: 1

age-2:

Rio Grande silvery minnow Population Monitoring
September 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

13 September 2007

RKD07-134

Site Number: 11

River Mile: 114.6

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

W.H. Brandenburg, M.A. Farrington, C.C. McBride

Effort: 537.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	11
76	<i>Hybognathus amarus</i> *	4
76	<i>Platygobio gracilis</i>	57
93	<i>Ictalurus punctatus</i>	9

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

age-0: 4

age-1:

age-2:

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,

13 September 2007

RKD07-133

Site Number: 12

River Mile: 99.5

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

W.H. Brandenburg, M.A. Farrington, C.C. McBride

Effort: 589.6 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	249
76	<i>Hybognathus amarus</i> *	41
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	16

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

age-0: 41

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
September 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

13 September 2007

RKD07-132

Site Number: 13

River Mile: 91.7

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

W.H. Brandenburg, M.A. Farrington, C.C. McBride

Effort: 585.2 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	98
76	<i>Hybognathus amarus</i> *	17
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	3

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

age-0: 17

age-1:

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

13 September 2007

RKD07-131

Site Number: 14

River Mile: 87.1

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

W.H. Brandenburg, M.A. Farrington, C.C. McBride

Effort: 575.1 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	21
76	<i>Hybognathus amarus</i> *	6
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	1
212	<i>Gambusia affinis</i>	1

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

age-0: 6

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
September 2007

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, directly east of Bosque del Apache National Wildlife Refuge Headquarters. Site Number: 15

12 September 2007

RKD07-130

River Mile: 79.1

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

W.H. Brandenburg, M.A. Farrington, C.C. McBride

Effort: 578.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	21
76	<i>Hybognathus amarus</i> *	9
76	<i>Platygobio gracilis</i>	2
212	<i>Gambusia affinis</i>	4

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

age-0: 9

age-1:

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

Site Number: 16

12 September 2007

RKD07-129

River Mile: 68.6

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

W.H. Brandenburg, M.A. Farrington, C.C. McBride

Effort: 604.6 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	577
76	<i>Hybognathus amarus</i> *	5
76	<i>Pimephales promelas</i>	5
76	<i>Platygobio gracilis</i>	2
93	<i>Ictalurus punctatus</i>	2
212	<i>Gambusia affinis</i>	12

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

age-0: 5

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
September 2007

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

12 September 2007

RKD07-128

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

W.H. Brandenburg, M.A. Farrington, C.C. McBride

Effort: 567.9 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	316
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	2
76	<i>Platygobio gracilis</i>	4
93	<i>Ictalurus punctatus</i>	17
212	<i>Gambusia affinis</i>	2

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

age-0: 2

age-1:

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

Rio Grande, ca. 10 mi downstream of the San Marcial railroad bridge crossing Site Number: 18
River Mile: 58.8

12 September 2007

RKD07-127

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

W.H. Brandenburg, M.A. Farrington, C.C. McBride

Effort: 585.1 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	116
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	4
93	<i>Ictalurus punctatus</i>	10
212	<i>Gambusia affinis</i>	3

Rio Grande silvery minnow Population Monitoring
October 2007

New Mexico: Sandoval Co., Rio Grande Drainage

Rio Grande, directly below Angostura Diversion Dam, Algodones.

Site Number: 0

11 October 2007

RKD07-149

River Mile: 209.7

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

R.K.Dudley, W.H. Brandenburg, A.L. Barkalow

Effort: 506.5 sq. m

<u>FAMILY</u>	<u>N</u>
76 <i>Cyprinella lutrensis</i>	33
76 <i>Cyprinus carpio</i>	1
76 <i>Hybognathus amarus*</i>	48
76 <i>Pimephales promelas</i>	10
76 <i>Platygobio gracilis</i>	4
76 <i>Rhinichthys cataractae</i>	12
81 <i>Catostomus commersoni</i>	2
93 <i>Ictalurus punctatus</i>	1
212 <i>Gambusia affinis</i>	64
294 <i>Micropterus salmoides</i>	3

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

age-0: 48

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
October 2007**

New Mexico: Sandoval Co., Rio Grande Drainage

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

11 October 2007

RKD07-150

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

R.K.Dudley, W.H. Brandenburg, A.L. Barkalow

Site Number: 1

River Mile: 203.8

Effort: 470.2 sq. m

<u>FAMILY</u>	<u>N</u>
76 <i>Cyprinella lutrensis</i>	20
76 <i>Hybognathus amarus</i> *	311
76 <i>Pimephales promelas</i>	14
76 <i>Platygobio gracilis</i>	52
76 <i>Rhinichthys cataractae</i>	19
81 <i>Catostomus commersoni</i>	8
93 <i>Ictalurus punctatus</i>	7
212 <i>Gambusia affinis</i>	28
283 <i>Morone chrysops</i>	1
294 <i>Lepomis macrochirus</i>	1

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

age-0: 310

age-1: 1

age-2:

**Rio Grande silvery minnow Population Monitoring
October 2007**

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

11 October 2007

RKD07-151

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

R.K.Dudley, W.H. Brandenburg, A.L. Barkalow

Effort: 560.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	56
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus</i> *	126
76	<i>Pimephales promelas</i>	3
76	<i>Platygobio gracilis</i>	25
76	<i>Rhinichthys cataractae</i>	2
81	<i>Catostomus commersoni</i>	6
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	31

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

age-0: 126

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
October 2007

New Mexico: Bernalillo Co., Rio Grande Drainage

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

Site Number: 3

11 October 2007

RKD07-153

River Mile: 183.4

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

R.K.Dudley, W.H. Brandenburg, A.L. Barkalow

Effort: 584.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	107
76	<i>Hybognathus amarus</i> *	32
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	4
76	<i>Rhinichthys cataractae</i>	11
81	<i>Carpionodes carpio</i>	2
93	<i>Ictalurus punctatus</i>	32

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

age-0: 32

age-1:

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

River Mile: 178.3

11 October 2007

RKD07-152

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

R.K.Dudley, W.H. Brandenburg, A.L. Barkalow

Effort: 640.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	119
76	<i>Hybognathus amarus</i> *	84
76	<i>Pimephales promelas</i>	3
76	<i>Platygobio gracilis</i>	14
81	<i>Carpionodes carpio</i>	19
81	<i>Catostomus commersoni</i>	2
93	<i>Ictalurus punctatus</i>	26
212	<i>Gambusia affinis</i>	12

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

age-0: 84

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
October 2007

New Mexico: Valencia Co., Rio Grande Drainage

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

12 October 2007

RKD07-163

Site Number: 5

River Mile: 161.4

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

M.A.Farrington, W.H.Brandenburg, C.C.McBride, A.L.Barkalow

Effort: 553.0 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	420
76	<i>Hybognathus amarus*</i>	233
76	<i>Pimephales promelas</i>	46
76	<i>Platygobio gracilis</i>	1
81	<i>Carpionodes carpio</i>	51
93	<i>Ictalurus punctatus</i>	17
212	<i>Gambusia affinis</i>	121
294	<i>Pomoxis annularis</i>	1

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

age-0: 233

age-1:

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.

12 October 2007

RKD07-162

Site Number: 6

River Mile: 151.5

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

M.A.Farrington, W.H.Brandenburg, C.C.McBride, A.L.Barkalow

Effort: 544.8 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	595
76	<i>Hybognathus amarus*</i>	91
76	<i>Pimephales promelas</i>	4
81	<i>Carpionodes carpio</i>	30
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	16
212	<i>Gambusia affinis</i>	53

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

age-0: 81

age-1: 10

age-2:

Rio Grande silvery minnow Population Monitoring
October 2007

New Mexico: Valencia Co., Rio Grande Drainage

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

12 October 2007

RKD07-161

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

M.A.Farrington, W.H.Brandenburg, C.C.McBride, A.L.Barkalow

Site Number: 7

River Mile: 143.2

Effort: 548.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	1081
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	76
76	<i>Pimephales promelas</i>	5
76	<i>Platygobio gracilis</i>	1
81	<i>Carpionodes carpio</i>	20
93	<i>Ictalurus punctatus</i>	11
212	<i>Gambusia affinis</i>	64

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

age-0: 76

age-1:

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

12 October 2007

RKD07-160

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

M.A.Farrington, W.H.Brandenburg, C.C.McBride, A.L.Barkalow

Site Number: 8

River Mile: 130.6

Effort: 604.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	611
76	<i>Hybognathus amarus*</i>	18
76	<i>Pimephales promelas</i>	13
81	<i>Carpionodes carpio</i>	9
93	<i>Ictalurus punctatus</i>	16
212	<i>Gambusia affinis</i>	87

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

age-0: 16

age-1: 2

age-2:

**Rio Grande silvery minnow Population Monitoring
October 2007**

New Mexico: Socorro Co., Rio Grande Drainage

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

12 October 2007

RKD07-159

Site Number: 9

River Mile: 127.0

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

M.A.Farrington, W.H.Brandenburg, C.C.McBride, A.L.Barkalow

Effort: 522.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	881
76	<i>Cyprinus carpio</i>	2
76	<i>Hybognathus amarus*</i>	40
76	<i>Pimephales promelas</i>	11
81	<i>Carpionotus carpio</i>	7
93	<i>Ictalurus punctatus</i>	13
212	<i>Gambusia affinis</i>	53

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

age-0: 37

age-1: 3

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

12 October 2007

RKD07-168

Site Number: 9.5

River Mile: 116.8

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

R.K.Dudley, S.P.Platania, L.E.Renfro, M.R.Cummer

Effort: 688.8 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	17
76	<i>Hybognathus amarus*</i>	5
76	<i>Platygobio gracilis</i>	52
93	<i>Ictalurus punctatus</i>	16
212	<i>Gambusia affinis</i>	1

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

age-0: 5

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
October 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

12 October 2007

RKD07-167

Site Number: 10

River Mile: 116.2

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

R.K.Dudley, S.P.Platania, L.E.Renfro, M.R.Cummer

Effort: 609.8 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	629
76	<i>Hybognathus amarus*</i>	19
76	<i>Pimephales promelas</i>	16
76	<i>Platygobio gracilis</i>	296
76	<i>Rhinichthys cataractae</i>	10
81	<i>Carpionodes carpio</i>	2
93	<i>Ictalurus punctatus</i>	8
212	<i>Gambusia affinis</i>	1

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

age-0: 19

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.

12 October 2007

RKD07-166

Site Number: 11

River Mile: 114.6

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

R.K.Dudley, S.P.Platania, L.E.Renfro, M.R.Cummer

Effort: 629.7 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	51
76	<i>Hybognathus amarus*</i>	10
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	51
81	<i>Carpionodes carpio</i>	1
93	<i>Ictalurus punctatus</i>	3
212	<i>Gambusia affinis</i>	5

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

age-0: 10

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
October 2007**

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

12 October 2007

RKD07-165

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

R.K.Dudley, S.P.Platania, L.E.Renfro, M.R.Cummer

Effort: 653.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	140
76	<i>Hybognathus amarus</i> *	46
76	<i>Platygobio gracilis</i>	19
93	<i>Ictalurus punctatus</i>	3

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

age-0: 46

age-1:

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

12 October 2007

RKD07-164

River Mile: 91.7

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

R.K.Dudley, S.P.Platania, L.E.Renfro, M.R.Cummer

Effort: 575.8 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	41
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus</i> *	14
76	<i>Platygobio gracilis</i>	1
76	<i>Rhinichthys cataractae</i>	1
212	<i>Gambusia affinis</i>	5

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

age-0: 14

age-1:

age-2:

Rio Grande silvery minnow Population Monitoring
October 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

Site Number: 14

11 October 2007

RKD07-158

River Mile: 87.1

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

M.A.Farrington, L.E.Renfro, C.C.McBride

Effort: 648.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	65
76	<i>Hybognathus amarus</i> *	13
76	<i>Platygobio gracilis</i>	6
212	<i>Gambusia affinis</i>	11

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

age-0: 13

age-1:

age-2:

New Mexico: Socorro Co., Rio Grande Drainage

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

Site Number: 15

11 October 2007

RKD07-157

River Mile: 79.1

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

M.A.Farrington, L.E.Renfro, C.C.McBride

Effort: 570.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	4
93	<i>Ictalurus punctatus</i>	1

Rio Grande silvery minnow Population Monitoring
October 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

Site Number: 16

11 October 2007

RKD07-156

River Mile: 68.6

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

M.A.Farrington, L.E.Renfro, C.C.McBride

Effort: 648.7 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	201
76	<i>Platygobio gracilis</i>	14
81	<i>Carpionodes carpio</i>	1
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	1

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

11 October 2007

RKD07-155

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

M.A.Farrington, L.E.Renfro, C.C.McBride

Effort: 591.5 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	127
76	<i>Pimephales promelas</i>	1
76	<i>Pimephales vigilax</i>	1
76	<i>Platygobio gracilis</i>	3
81	<i>Catostomus commersoni</i>	1

Rio Grande silvery minnow Population Monitoring
October 2007

New Mexico: Socorro Co., Rio Grande Drainage

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

11 October 2007

RKD07-154

Site Number: 18

River Mile: 58.8

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

M.A.Farrington, L.E.Renfro, C.C.McBride

Effort: 553.3 sq. m

<u>FAMILY</u>		<u>N</u>
76	<i>Cyprinella lutrensis</i>	89
76	<i>Pimephales promelas</i>	1
93	<i>Ictalurus punctatus</i>	2
212	<i>Gambusia affinis</i>	20