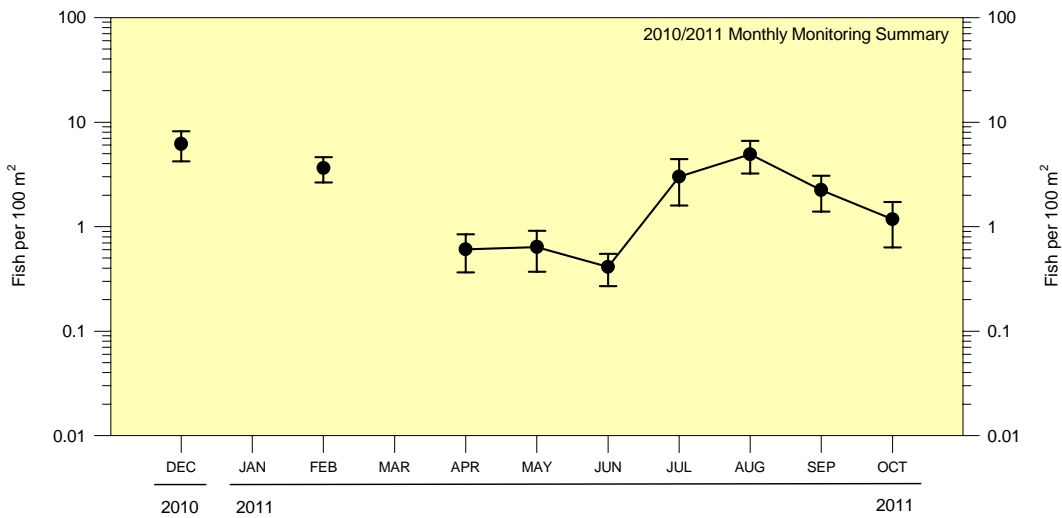
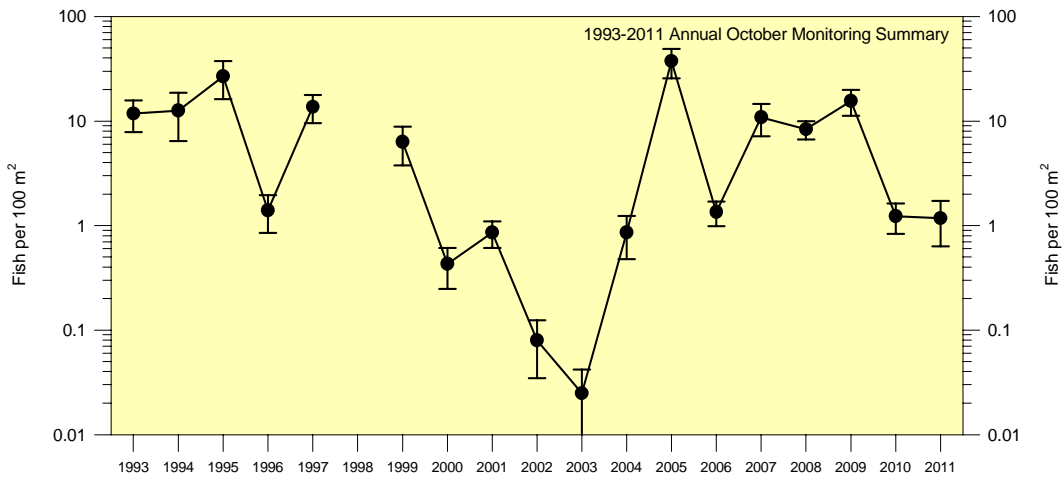


**RIO GRANDE SILVERY MINNOW
POPULATION MONITORING PROGRAM RESULTS FROM
DECEMBER 2010 TO OCTOBER 2011**

FINAL

**A Middle Rio Grande Endangered Species
Collaborative Program Funded Research Project**



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6 April 2012

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EXECUTIVE SUMMARY

Population data on Rio Grande silvery minnow and the associated ichthyofaunal community in the Middle Rio Grande (Rio Grande between Velarde, New Mexico and Elephant Butte Reservoir) have been gathered systematically since 1993. The primary objective of the December 2010 to October 2011 sampling activities was to monitor temporal trends in the abundance of Rio Grande silvery minnow at twenty sites throughout the Middle Rio Grande. Additional objectives included evaluating the influence of discharge patterns on population fluctuations, determining general habitat use patterns, documenting changes in relative abundance among fish species over time, and determining site-specific sampling variation. Seasonal and spatial differences in population structure and abundance of native and nonnative Middle Rio Grande fishes were also examined.

Rio Grande silvery minnow October densities (1993-1997, 1999-2011) were significantly different among sampling years ($df=17$, $F=17.5$, $p<0.0001$) with the highest densities in 2005 and the lowest densities in 2003. October population monitoring efforts in 2011 demonstrated that Rio Grande silvery minnow density was significantly lower ($p<0.05$) than in recent years (e.g., 2007, 2008, and 2009) but not significantly higher ($p>0.05$) than in the lowest density years (e.g., 2002 and 2003). Also, October population monitoring samples illustrate that there was no significant change ($p>0.05$) in Rio Grande silvery minnow densities from 2010 to 2011.

Few Rio Grande silvery minnow were collected at the sampling sites during October 2011 ($N=118$; $9,403.2$ m²). This species composed 2.9% of the total catch and was present in 36 of the 249 seine hauls that yielded any fish. Rio Grande silvery minnow was present at 8 of 20 localities. The October cumulative catch of Rio Grande silvery minnow was composed mostly of individuals from the San Acacia Reach with the lowest numbers in the Angostura Reach.

Linear regression analyses of October densities of Rio Grande silvery minnow from 1993-1997, 1999-2011 revealed significant associations with hydraulic variables. The relationships that explained the most variation in mean density were number of days with discharge $>2,000$ cfs or $>3,000$ cfs (72% and 75%, respectively), as measured at the Albuquerque gauge. October densities of Rio Grande silvery minnow also increased significantly ($p<0.001$) with delayed onset of low flows and increased mean daily discharge (as measured at the San Marcial gauge). There were also significant negative relationships ($p<0.001$) between Rio Grande silvery minnow densities and number of days with discharge below a certain threshold value (i.e., <200 and <100 cfs), as measured at the San Marcial gauge.

The overall distribution of sampled mesohabitats did not differ notably among the three fragmented river reaches. The actual habitats occupied by Rio Grande silvery minnow were diverse and included all of the habitats sampled. Habitats most frequently used by Rio Grande silvery minnow (relative to those sampled) included pools, shoreline pools, and shoreline runs.

The native ichthyofauna consisted of eleven species (red shiner, Rio Grande chub, Rio Grande silvery minnow, fathead minnow, flathead chub, longnose dace, river carpsucker, smallmouth buffalo, blue catfish, flathead catfish, and bluegill). Red shiner was the most abundant native species collected ($N=22,863$), followed by flathead chub ($N=3,313$), Rio Grande silvery minnow ($N=2,314$), river carpsucker ($N=1,079$), and fathead minnow ($N=847$). The most abundant introduced species were white sucker ($N=3,254$), western mosquitofish ($N=2,393$), channel catfish ($N=744$), and common carp ($N=562$).

Rio Grande silvery minnow had increased from being the 10th most common focal species in 2003 to being the most common focal species in 2005. While the rank abundance of Rio Grande silvery minnow increased notably from 2002-2003 (10th) to 2007-2009 (2nd), it dropped precipitously in 2010 (5th). The coefficient of concordance ($W=0.72$) for focal species indicated high overall agreement in ranks ($X^2=64.4$; $p<0.001$) over time (2002-2011) despite broad changes in ranks for some taxa (e.g., Rio Grande silvery minnow, flathead chub, and river carpsucker).

Density of all fish species increased during spring or summer. Rio Grande silvery minnow abundance in samples was highest in July and August and then slowly declined until October. Fathead minnow, flathead chub, and river carpsucker also reached their highest densities in July and August. The highest densities of red shiner were recorded in July although the abundance of this taxon was relatively high throughout the year. An accounting of species-specific temporal abundance revealed similar trends and documented the seasonal occurrence of certain taxa (e.g., gizzard shad and smallmouth buffalo).

Besides temporal variation in the relative abundance of fish species within the community, there were also longitudinal changes in the densities of species among reaches. Longnose dace, white sucker, and channel catfish were most common in the Angostura Reach. The most common species in the Isleta Reach included red shiner, fathead minnow, river carpsucker, and western mosquitofish. Common carp, Rio Grande silvery minnow, and flathead chub were most common in the San Acacia Reach. Rio Grande silvery minnow was more common in the Isleta and San Acacia reaches as compared to the Angostura Reach.

An analysis of sampling variation for the entire study area (20 sites combined) over a four day period in November revealed that the overall coefficient of variation (CV) for Rio Grande silvery minnow was 0.10 in 2011. Also, the exclusion of a single outlying value (e.g., one site on one day) was found to reduce the overall CV estimate to 0.07 for this species. It appears that the Population Monitoring Program sampling protocols are adequate to achieve a relatively high degree of sampling precision, especially when considering the substantial changes in Rio Grande silvery minnow abundance among years.

The dramatic increases and decreases in the abundance of Rio Grande silvery minnow over the past two decades appear to be closely related to the timing, magnitude, and duration of flows during spring and summer. 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. These conditions, combined with the delayed onset of low flows following spring runoff, appear to help ensure the successful recruitment of Rio Grande silvery minnow by prolonging the persistence of warm and productive inundated habitats required by larval fishes to complete their early life history. However, the extensive river channelization, habitat degradation, abandonment of the floodplain, and associated reductions in water turbidity downstream of Cochiti Dam may be limiting the amount of appropriate habitat available for the successful retention and early recruitment of Rio Grande silvery minnow, especially in the Cochiti and Angostura reaches.

The lack of extremely low densities of Rio Grande silvery minnow since 2003 could indicate that current management activities (e.g., stocking, salvage, habitat restoration, LFCC pumping, flow manipulation etc.) are buffering the population against substantial declines similar to those that occurred prior to the implementation of these activities. However, the rapid decline of Rio Grande silvery minnow from 2009 to 2010 appears to indicate that differences in the timing, magnitude, and duration of flows during spring and summer are still resulting in apparently dramatic changes in the annual recruitment success of this species. While the suite of ongoing management activities appear to be providing some degree of protection against population losses, it is currently unclear what additional level of effort or types of activities would be required to yield robust self-sustaining populations of Rio Grande silvery minnow in the Middle Rio Grande over time. Future study of the ecological interactions among fish species and their environment in the Middle Rio Grande should further elucidate the factors that control this complex aquatic ecosystem, which will be essential in providing the information required to develop and implement successful management strategies for the long-term recovery of Rio Grande silvery minnow.

INTRODUCTION

Population data on Rio Grande silvery minnow and the associated ichthyofaunal community in the Middle Rio Grande (Rio Grande between Velarde, New Mexico and Elephant Butte Reservoir) have been gathered 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 (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 studies of the Middle Rio Grande ichthyofauna. Among those studies was the long-term systematic 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 two decades. The abundance of this species has generally decreased during years with low spring discharge combined with prolonged summer low-flow/drying conditions, but has generally increased following years with extended high spring flows and minimal summer low-flow/drying conditions (Dudley et al., 2009; Dudley and Platania, 2011a). While Rio Grande silvery minnow was the focus of monitoring efforts and subsequent hypothesis testing, research activities also provided information about the associated Middle Rio Grande fish community.

The primary objective of the December 2010 to October 2011 sampling activities was to monitor temporal trends in the abundance 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 changes in relative abundance among fish species over time, and determining site-specific sampling variation. 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 factors that influence the 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 rainstorms

periodically augment low flows in discrete reaches, but do not ensure that the river channel will remain wetted in its entirety. 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 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 construction and operation of Cochiti Dam has contributed to floodplain abandonment along with the progressive degradation, armoring, and narrowing of the river channel, particularly in areas up to about 100 km downstream of the dam (Lagasse, 1980; Massong et al., 2006).

The study area (Figure 1) is a portion 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 sites and the Isleta Reach (Isleta Diversion Dam to San Acacia Diversion Dam) had six sampling sites. There were nine sampling sites 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 2010 and 2011, 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 in the southern reaches was lower in 2011 as compared to 2010. During April 2011 and May 2011, flows were particularly low in the San Acacia Reach. Peak flows in 2011 occurred during June. Flow conditions in 2010 and 2011 included periodic intervals of low discharge from July through October. However, summer rains periodically resulted in elevated flow events during 2010 and 2011. As compared with the generalized historical spring runoff (based on mean daily discharge values from 1973 [Cochiti Dam operational] to 2011), the timing of this event was early in 2010 and late in 2011, the flow magnitude was high in 2010 and low in 2011, and the duration was truncated in both years (especially in 2011). Summer flows in both 2010 and 2011 were relatively low over an extended period (especially in 2011) as compared with historical flows (based on mean daily discharge values from 1973 [Cochiti Dam operational] to 2011).

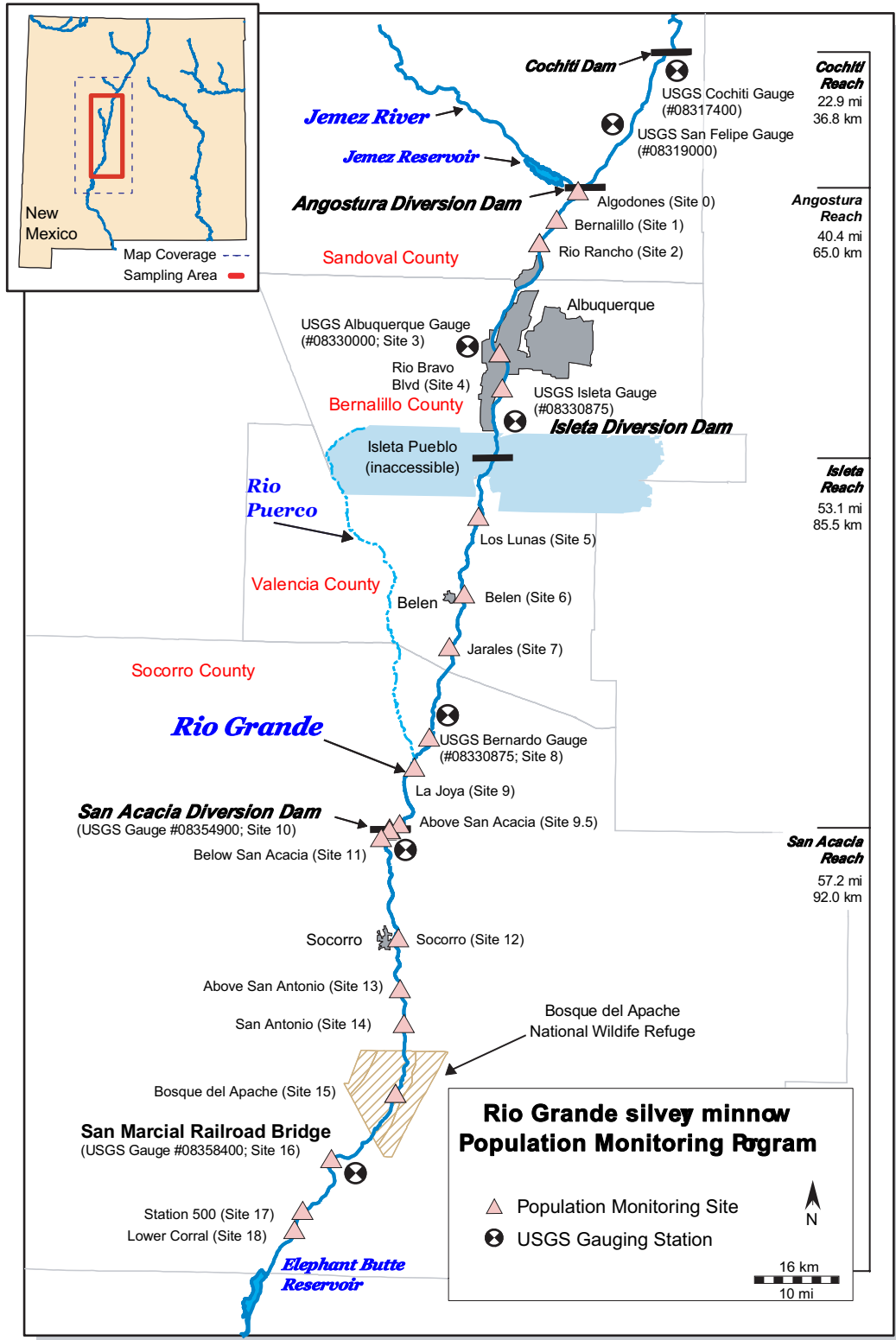


Figure 1. Map of the study area and sampling localities (numbered) for the December 2010 to October 2011 Rio Grande silvery minnow population monitoring program. Sampling locality information is provided in Appendix A (Table A-1).

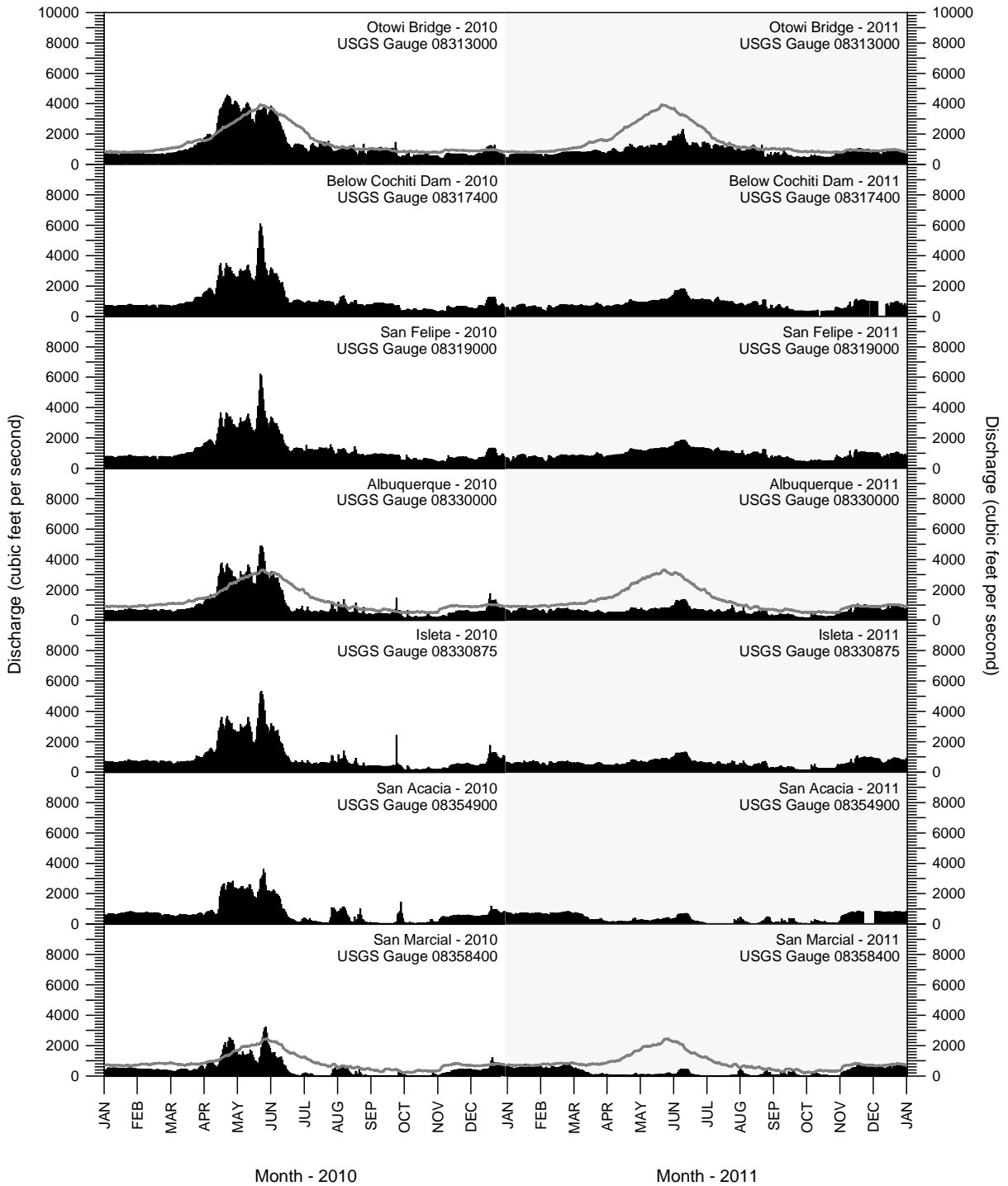


Figure 2. Discharge in the Rio Grande from January 2010 through December 2011 as recorded at seven U. S. Geological Survey (USGS) gauge stations. Solid gray lines are historical mean daily discharge values (from 1973 [Cochiti Dam operational] through 2011) from the upper, middle, and lower portions of the study area. Discharge data are provisional and subject to change.

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 abundance. Sampling was conducted at 20 sites in December 2010, February 2011, and monthly from April 2011 to October 2011. Additional intensive sampling was conducted during November (2011) 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 mesohabitat 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 18 (April to October) to 20 (December and February) discrete mesohabitats (usually <15 m). Runs, pools, and shoreline pools were sampled four times at each site (when available); backwaters and riffles were sampled two times (when available); any remaining samples (to obtain a total of 18 to 20) were taken in shoreline runs. From April to October, 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 (two samples). Mesohabitats with similar conditions, which did not exceed reasonable depths/velocities for efficient seining, were sampled regardless of flow conditions. Density or 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 analyses 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), measured (standard length range), and identified to age-class (based on reach-specific standard length and age-length relationships during the same time of year [Dudley et al., 2009; Horwitz et al., 2011]). Selected water quality parameters (temperature, conductivity, specific conductance, pH, salinity, and dissolved oxygen) were obtained (see Appendix B) 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, 2010). Single-factor analysis of variance, with Tukey-Kramer HSD multiple comparison tests (Zar, 2010), was used to evaluate differences in mean catch rates of Rio Grande silvery minnow among years. Kendall's W (Zar, 2010) was used to test for the degree of concordance among the annual rank abundance of species (including Rio Grande silvery minnow) over time. Linear and polynomial (e.g., quadratic and cubic equations) regression modeling was used to determine the strength of the relationships among autumnal Rio Grande silvery minnow densities (1993-1997, 1999-2011) and hydraulic variables (e.g., peak discharge and days > or < a threshold discharge value). Polynomial regression was employed when a curvilinear model explained a statistically higher percentage ($p < 0.05$) of the variation in the relationships as compared with a linear model (McDonald, 2009). Maximum discharge and days exceeding threshold discharge values in 1,000 cfs increments (days > 1,000, 2,000, 3,000, and 4,000 cubic feet per second, cfs) represented the typical range of spring runoff conditions (May-June). The onset of lower flows (<200 cfs), mean daily discharge, and the lower threshold discharge values (e.g., days < 200 and < 100 cfs) represented some general characteristics of low flow conditions during irrigation season (March through October). A negative or positive relationship between flow variables and Rio Grande silvery minnow densities was defined as occurring when the slope of the regression was significantly different ($p < 0.05$) from zero.

Table 1. Scientific and common names and species codes of fish collected in the Middle Rio Grande from 1993 to 2011.

Scientific Name	Common Name	Code
Order Clupeiformes		
Family Clupeidae		
	herrings	
<i>Dorosoma cepedianum</i>	gizzard shad	(DORCEP)
<i>Dorosoma petenense</i>	threadfin shad	(DORPET)
Order Cypriniformes		
Family Cyprinidae		
	carps and minnows	
<i>Campostoma anomalum</i>	central stoneroller	(CAMANO)
<i>Carassius auratus</i>	goldfish	(CARAUR)
<i>Cyprinella lutrensis</i>	red shiner ¹	(CYPLUT)
<i>Cyprinus carpio</i>	common carp ¹	(CYPCAR)
<i>Gila pandora</i>	Rio Grande chub	(GILPAN)
<i>Hybognathus amarus</i>	Rio Grande	
	silvery minnow ¹	(HYBAMA)
<i>Notemigonus crysoleucas</i>	golden shiner	(NOTCRY)
<i>Pimephales promelas</i>	fathead minnow ¹	(PIMPRO)
<i>Pimephales vigilax</i>	bullhead minnow	(PIMVIG)
<i>Platygobio gracilis</i>	flathead chub ¹	(PLAGRA)
<i>Rhinichthys cataractae</i>	longnose dace ¹	(RHICAT)
Family Catostomidae		
	suckers	
<i>Carpiodes carpio</i>	river carpsucker ¹	(CARCAR)
<i>Catostomus commersonii</i>	white sucker ¹	(CATCOM)
<i>Ictiobus bubalus</i>	smallmouth buffalo	(ICTBUB)
Order Siluriformes		
Family Ictaluridae		
	North American catfishes	
<i>Ameiurus melas</i>	black bullhead	(AMEMEL)
<i>Ameiurus natalis</i>	yellow bullhead	(AMENAT)
<i>Ictalurus furcatus</i>	blue catfish	(ICTFUR)
<i>Ictalurus punctatus</i>	channel catfish ¹	(ICTPUN)
<i>Pylodictis olivaris</i>	flathead catfish	(PYLOLI)
Order Salmoniformes		
Family Salmonidae		
	trouts and salmons	
<i>Oncorhynchus mykiss</i>	rainbow trout	(ONCMYK)
<i>Salmo trutta</i>	brown trout	(SALTRU)

Table 1. Scientific and common names and species codes of fish collected in the Middle Rio Grande from 1993 to 2011 (continued).

Scientific Name	Common Name	Code
Order Cyprinodontiformes		
Family Poeciliidae		
	livebearers	
<i>Gambusia affinis</i>	western mosquitofish ¹	(GAMAFF)
Order Perciformes		
Family Moronidae		
	temperate basses	
<i>Morone chrysops</i>	white bass	(MORCHR)
<i>Morone saxatilis</i>	striped bass	(MORSAX)
Order Perciformes		
Family Centrarchidae		
	sunfishes	
<i>Lepomis cyanellus</i>	green sunfish	(LEPCYA)
<i>Lepomis macrochirus</i>	bluegill	(LEPMAC)
<i>Lepomis megalotis</i>	longear sunfish	(LEPMEG)
<i>Micropterus dolomieu</i>	smallmouth bass	(MICDOL)
<i>Micropterus salmoides</i>	largemouth bass	(MICSAL)
<i>Pomoxis annularis</i>	white crappie	(POMANN)
<i>Pomoxis nigromaculatus</i>	black crappie	(POMNIG)
Family Percidae		
	perches	
<i>Perca flavescens</i>	yellow perch	(PERFLA)
<i>Percina macrolepida</i>	bigscale logperch	(PERMAC)
<i>Sander vitreus</i>	walleye	(SANVIT)

¹ Focal taxa represent the ten most commonly abundant species present in Middle Rio Grande collections; these species are illustrated in monthly plots of data.

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 error to the mean, Pollack et al., 1990) was calculated for the four day sampling period. Values of CV were calculated for sites, reaches, and the study area.

RESULTS

Rio Grande Silvery Minnow

Population status

The December 2010 to October 2011 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 Isleta and San Acacia reaches generally produced the highest post-spawning densities (July-October).

In December 2010, sampling covered 11,437.3 m² and Rio Grande silvery minnow (N=704) composed 30.7% of the total catch. This species was present in 117 of the 236 seine hauls that yielded any fish. Rio Grande silvery minnow was present at 17 of 20 localities and was most abundant in the San Acacia Reach and upper portions of the Angostura and Isleta reaches.

February 2011 population monitoring efforts (10,969.0 m²) yielded a modest number of Rio Grande silvery minnow (N=383). This species composed 31.1% of the total catch and was present in 118 of the 198 seine hauls that yielded any fish. Rio Grande silvery minnow was present at all sampling localities in the Isleta and San Acacia reaches but only at Site #2 in the Angostura Reach.

The April 2011 sampling efforts covered 10,272.2 m². Rio Grande silvery minnow (N=56) was relatively rare, composing 3.6% of the total catch. This species was present in 36 of the 198 seine hauls that yielded any fish. Rio Grande silvery minnow was present in samples at 14 of 20 sampling localities and was most abundant in the San Acacia Reach.

During May 2011, Rio Grande silvery minnow (N=64) was infrequently captured in the 9,796.1 m² of water sampled. This species composed 2.2% of the total fish catch. Rio Grande silvery minnow was present in 32 of the 226 seine hauls that yielded any fish. Rio Grande silvery minnow was present at 11 of 20 localities. The May cumulative catch of Rio Grande silvery minnow was composed mostly of individuals from the San Acacia Reach with lesser numbers in the Isleta and Angostura reaches.

Monitoring of Rio Grande silvery minnow during June 2011 yielded 42 individuals in 10,406.2 m² of aquatic habitat sampled. Rio Grande silvery minnow composed 1.1% of the total catch. This species was present in 25 of the 279 seine hauls that yielded any fish. This species was collected at 9 of the 20 sampling sites. During June, Rio Grande silvery minnow were most abundant in the San Acacia Reach.

Rio Grande silvery minnow was more abundant in July 2011 (N=285; 8,470.7 m²) and composed 2.5% of the total catch. Rio Grande silvery minnow was present in 54 of the 292 seine hauls that yielded any fish. Rio Grande silvery minnow was collected at 12 of 20 sampling sites. The distribution of this species was uneven; the highest densities were recorded in the San Acacia Reach.

The August 2011 sampling effort produced a moderate number of Rio Grande silvery minnow (N=456; 9,739.4 m²). Rio Grande silvery minnow composed 8.6% of the total catch and was present in 83 of the 291 seine hauls that yielded any fish. Individuals were collected at 15 of the 20 sampling sites. The August cumulative catch of Rio Grande silvery minnow was composed mostly of individuals from the San Acacia Reach although modest densities were also observed in the Angostura Reach.

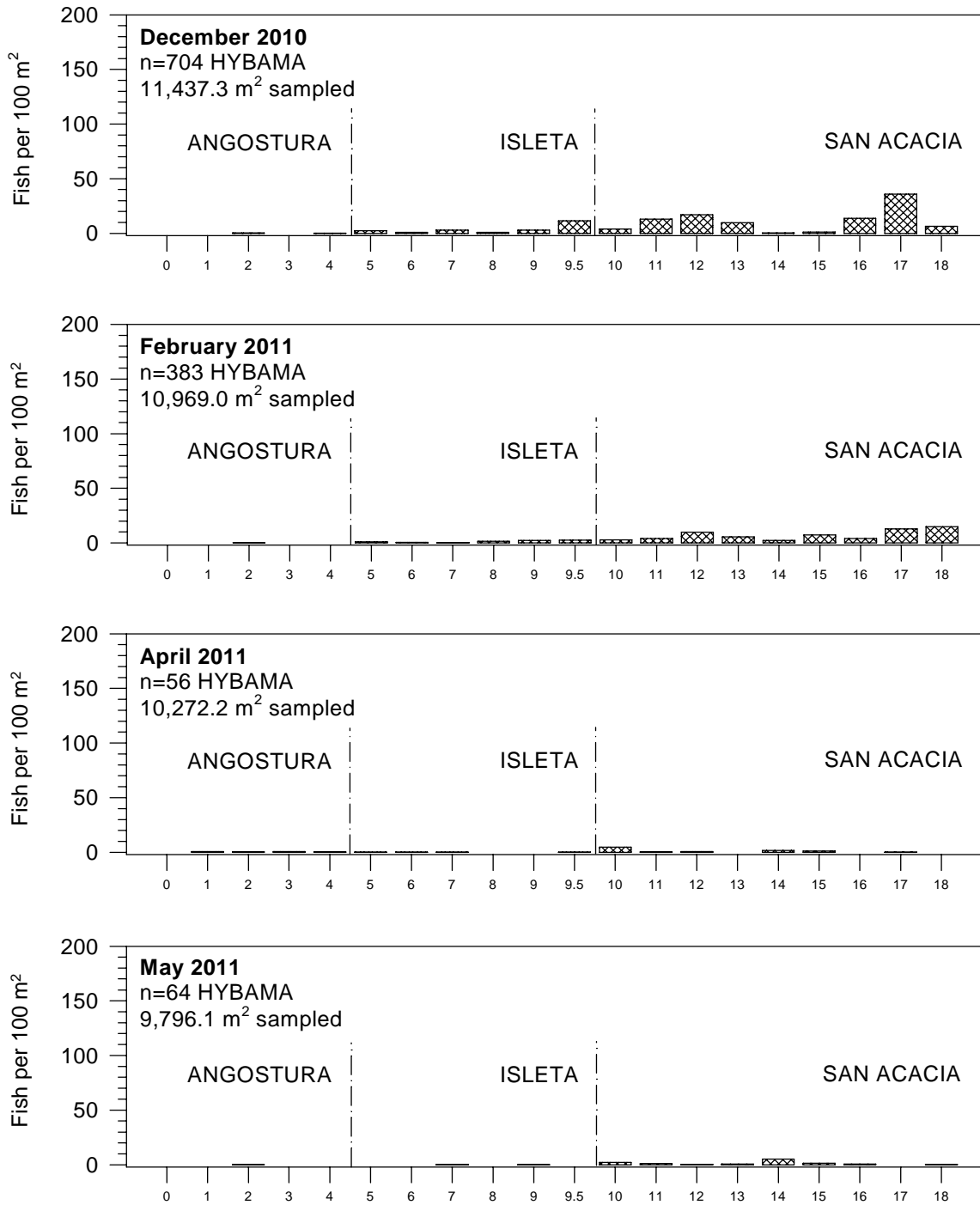


Figure 3. Rio Grande silvery minnow densities (CPUE) from December 2010 to May 2011 for each collection locality in the Middle Rio Grande.

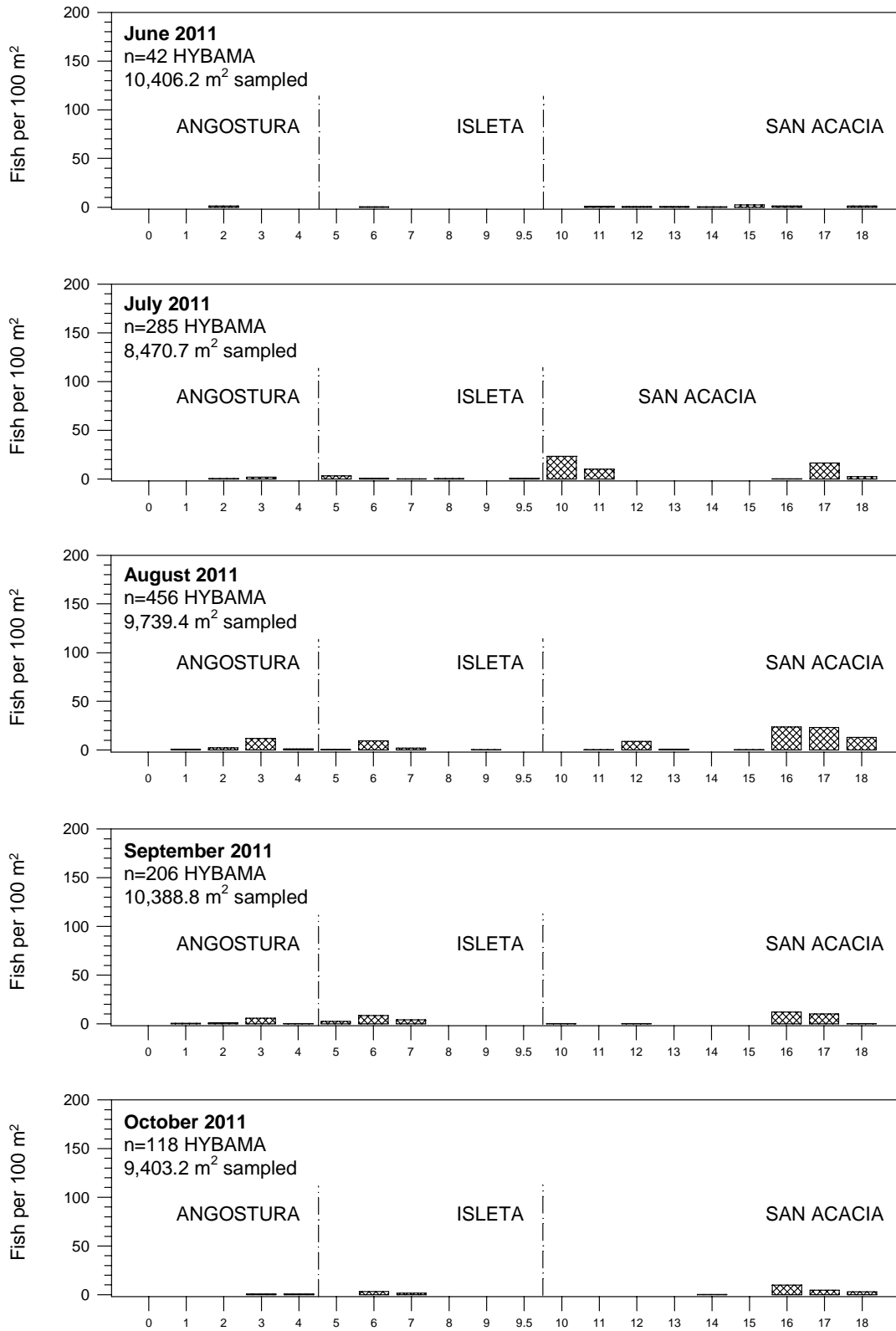


Figure 4. Rio Grande silvery minnow densities (CPUE) from June to October 2011 for each collection locality in the Middle Rio Grande.

Lower numbers of Rio Grande silvery minnow (N=206) were collected during September 2011, as compared to August, in the 10,388.8 m² (surface area) of water sampled. Rio Grande silvery minnow composed 4.0% of the total catch. Rio Grande silvery minnow was present in 57 of the 315 seine hauls that yielded any fish species. Individuals were collected at 12 of the 20 sampling sites. The September cumulative catch of Rio Grande silvery minnow was relatively evenly distributed among the three sampling reaches.

Few Rio Grande silvery minnow were collected at the sampling sites during October 2011 (N=118; 9,403.2 m²). This species composed 2.9% of the total catch and was present in 36 of the 249 seine hauls that yielded any fish. Rio Grande silvery minnow was present at 8 of 20 localities. The October cumulative catch of Rio Grande silvery minnow was composed mostly of individuals from the San Acacia Reach with the lowest numbers in the Angostura Reach.

A month-by-month summary of Rio Grande silvery minnow densities provides reference to trends in relative abundance observed from December 2010 to October 2011 (Table 2). Large numbers of Rio Grande silvery minnow (N = 585) were collected in the San Acacia Reach during December 2010 (although most were recently stocked individuals). The overall abundance of this species declined steadily during the early half of 2011. While the density of Rio Grande silvery minnow increased from June to August 2011, the abundance of this species dropped rapidly from August to October 2011.

Densities of Rio Grande silvery minnow from December 2010 to October 2011 were generally highest in the Isleta and San Acacia reaches. The San Acacia Reach yielded the most individuals (N=1,829) (Figure 5), followed by the Isleta Reach (N=333), and Angostura Reach (N=152). The abundance of Rio Grande silvery minnow was relatively high in the San Acacia Reach by July but didn't peak in the upstream reaches until August. Age-0 individuals composed a large proportion of the catch from July through October (Figure 6). Densities of Rio Grande silvery minnow declined rapidly from August to October.

Rio Grande silvery minnow densities varied widely among sites over the full sampling period in all three sampling reaches (Figure 7). Site #3 consistently yielded the highest number of this species in the Angostura Reach and no individuals were collected at Site #0 all year. The highest densities of Rio Grande silvery minnow tended to be at the upstream and downstream portion of both the Isleta and San Acacia reaches.

Population trends: 1993 to 2011

Rio Grande silvery minnow density, plotted as quarterly collections, has fluctuated dramatically over the past decade (Figure 8). Rio Grande silvery minnow October densities (1993-1997, 1999-2011) were significantly different among sampling years ($df=17$, $F=17.5$, $p<0.0001$) with the highest densities in 2005 and the lowest densities in 2003. Densities have declined or 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 relatively low stable population in 2010 and 2011 (Figures 9 and 10). Decreases were particularly notable in the Angostura Reach from August to October 2011. October population monitoring efforts in 2011 demonstrated that Rio Grande silvery minnow density was significantly lower ($p<0.05$) than in recent years (e.g., 2007, 2008, and 2009) but not significantly higher ($p>0.05$) than in the lowest density years (e.g., 2002 and 2003). Also, October population monitoring samples illustrate that there was no significant change ($p>0.05$) in Rio Grande silvery minnow densities from 2010 to 2011 (Figure 11).

Table 2. Summary of the monthly catch of Rio Grande silvery minnow, by site and reach, from December 2010 to October 2011. Numerals in parenthesis are the number of individuals in a site collection that were marked (subset of the total).

REACH	SITE #	SITE NAME	D E C	F E B	A P R	M A Y	J U N	J U L	A U G	S E P	O C T	T O T A L
Angostura	0	Angostura Dam	-	-	-	-	-	-	-	-	-	0
Angostura	1	Bernalillo	-	-	3	-	-	-	5	2	-	10
Angostura	2	Rio Rancho	2	2	3	1	5	2	9	6	-	30
Angostura	3	Central Ave.	-	-	4	-	-	9	55	28	3	99
Angostura	4	Rio Bravo Blvd.	1	-	2	-	-	-	6	1	3	13
Angostura Totals			3	2	12	1	5	11	75	37	6	152
Isleta	5	Los Lunas	14	7	1	-	-	17	3	11	-	53
Isleta	6	Belen	4	3	1	-	1	3	42	31	15	100
Isleta	7	Jarales	16	2	1	2	-	1	9	17	7	55
Isleta	8	Bernardo	4(1)	8(5)	-	-	-	3	-	-	-	15
Isleta	9	La Joya	15(10)	12(10)	-	1(1)	-	-	1	-	-	29
Isleta	9.5	North of San Acacia	63(5)	14(2)	1	-	-	3	-	-	-	81
Isleta Totals			116	46	4	3	1	27	55	59	22	333
San Acacia	10	San Acacia Dam	24(5)	14(1)	16(1)	9(1)	-	104(2)	-	1	-	168
San Acacia	11	South of San Acacia	70(64)	23(17)	2(1)	6	5(1)	50	1	-	-	157
San Acacia	12	Socorro	101	48	3	2	3	-	45	1	-	203
San Acacia	13	North of San Antonio	65	28	-	4	4	-	5	-	-	106
San Acacia	14	San Antonio	2	14	11(1)	27(1)	1	-	-	-	1	56
San Acacia	15	South of San Antonio	6(6)	46(32)	7(2)	7(1)	11(3)	-	1	-	-	78
San Acacia	16	San Marcial	68(67)	25(3)	-	3	6(1)	1	119	58	52	332
San Acacia	17	South of San Marcial 1	211(171)	60(8)	1	-	-	78	92	49	23	514
San Acacia	18	South of San Marcial 2	38(13)	77(6)	-	2(1)	6	14	63	1	14	215
San Acacia Totals			585	335	40	60	36	247	326	110	90	1,829
MONTHLY TOTALS			704	383	56	64	42	285	456	206	118	2,314

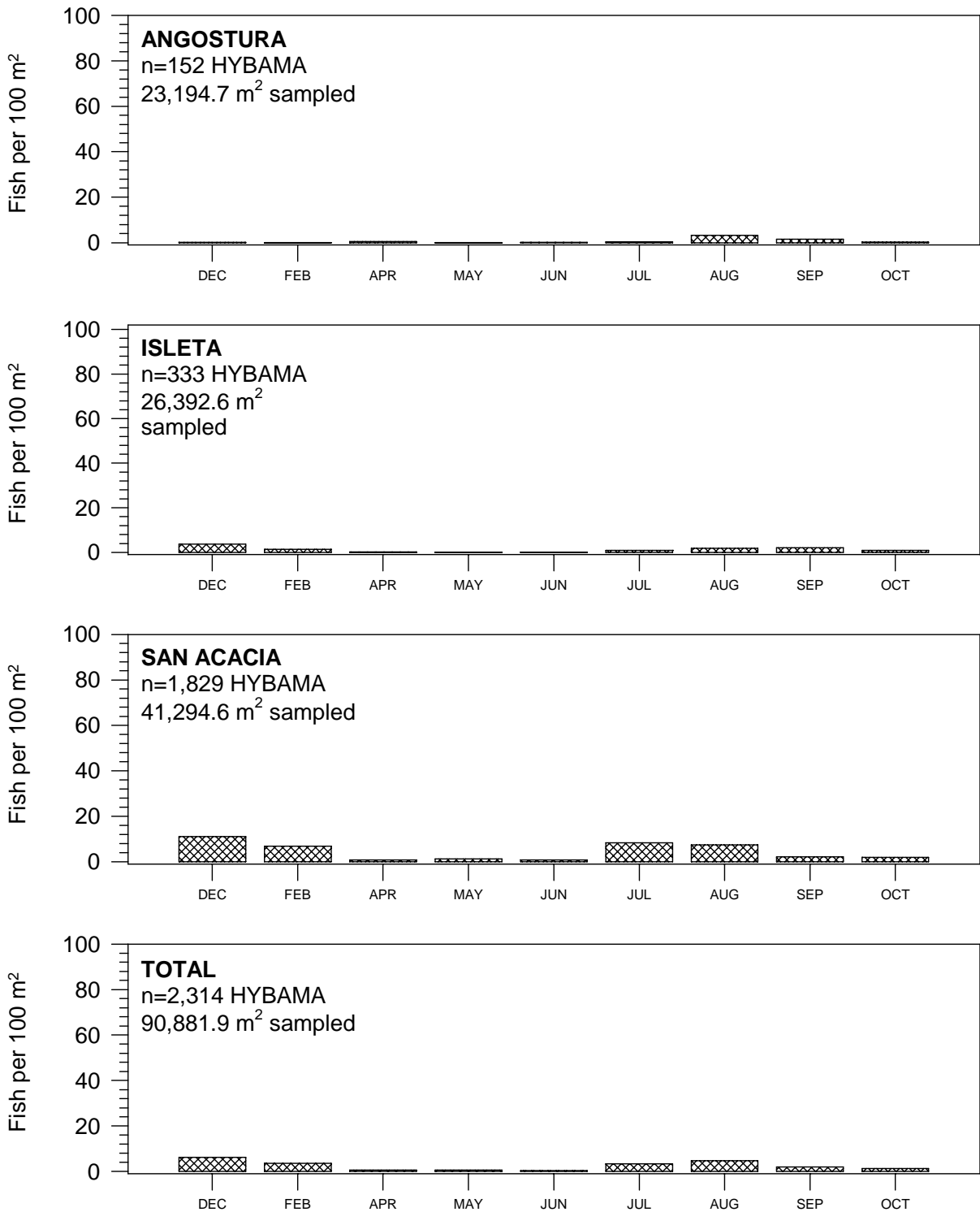


Figure 5. Rio Grande silvery minnow densities (CPUE) by river reach for December 2010 to October 2011 samples in the Middle Rio Grande.

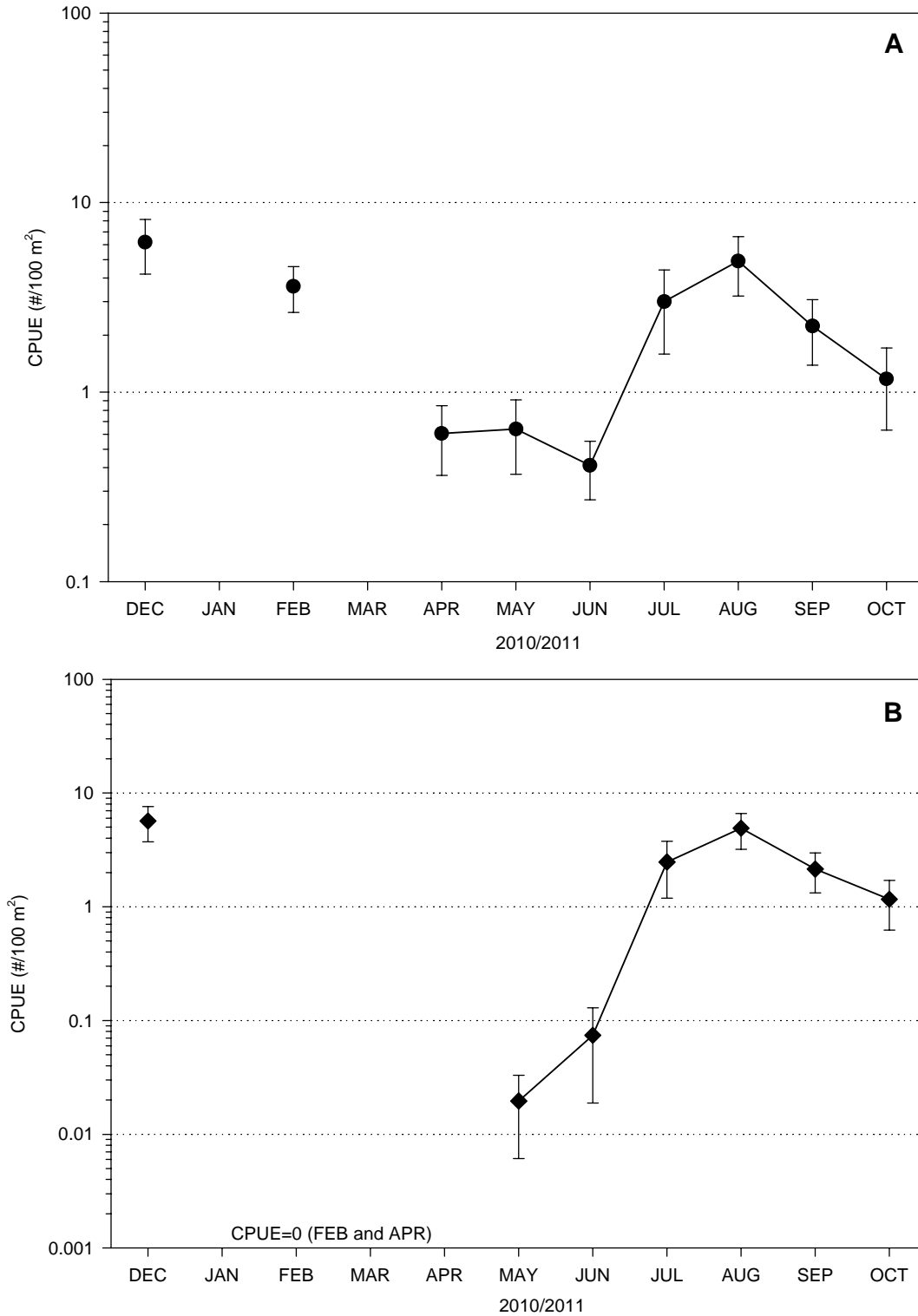


Figure 6. Inter-month fluctuations in densities of Rio Grande silvery minnow from December 2010 to October 2011 (**A**=all age-classes including age-0 [circle]; **B**=age-0 only [diamond]). Symbols represent mean value for all sites sampled (n=20); bars represent the standard error. Dotted horizontal lines represent orders of magnitude.

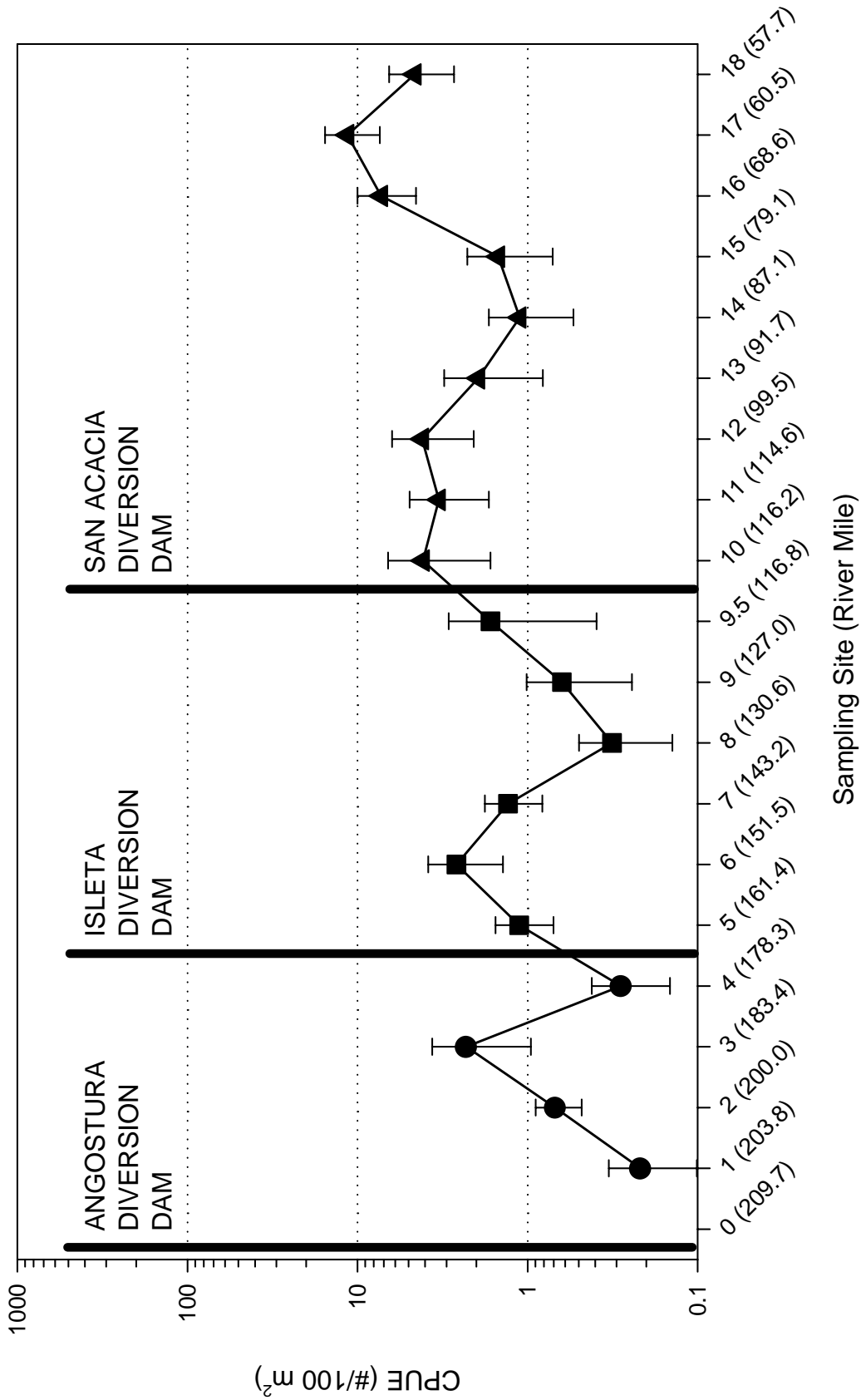


Figure 7. Inter-site comparison of Rio Grande silvery minnow densities (CPUE) by sampling locality (20 sites) and river reach (Angostura=circle, Isleta=square, San Acacia=triangle) from December 2010 to October 2011. Symbols represent mean values for all sampling months and bars represent the standard error. Dotted horizontal lines represent orders of magnitude.

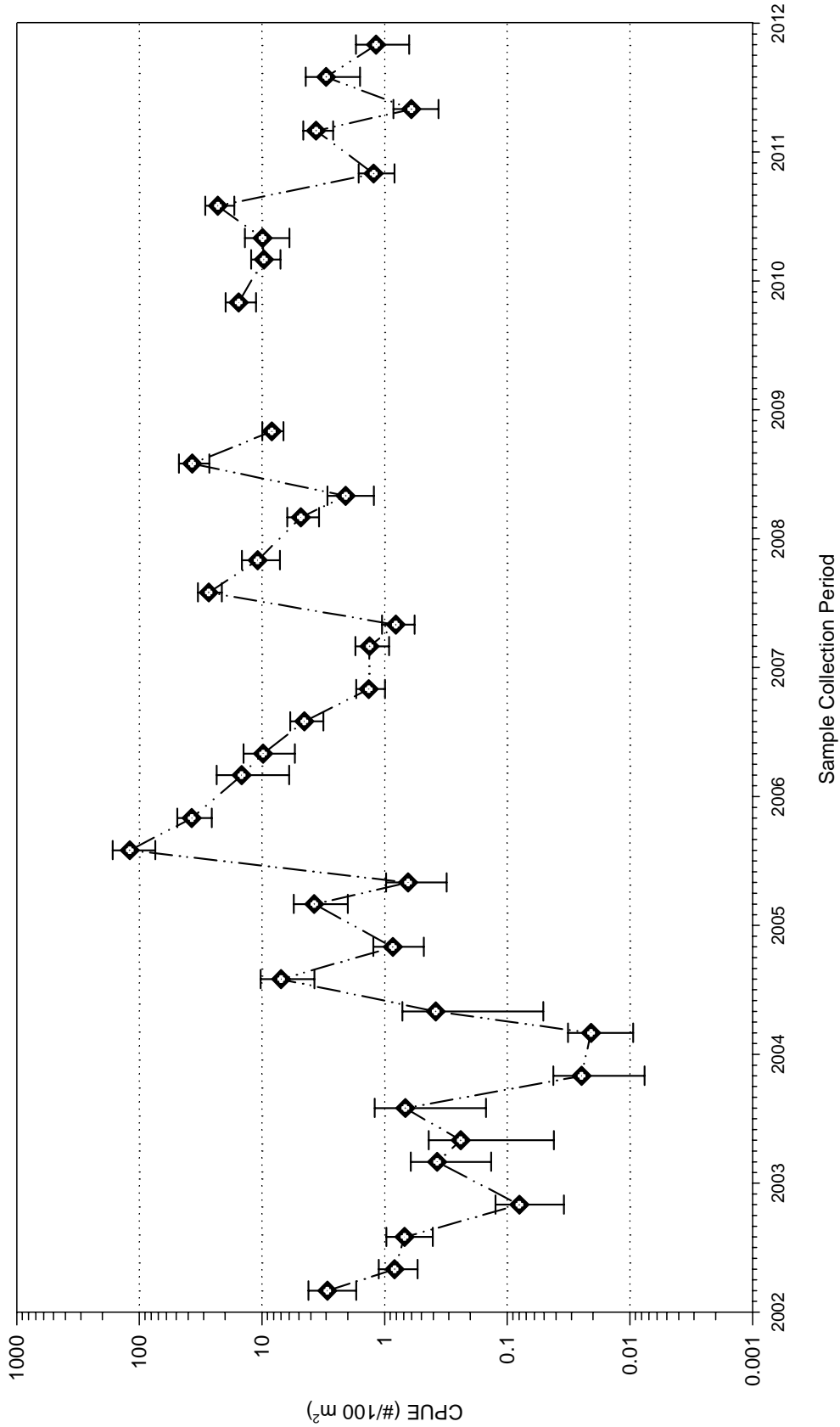


Figure 8. Time sequence of quarterly Rio Grande silvery minnow densities over the past decade (2002-2011) at population monitoring program collection sites. Hollow diamonds indicate sample means for each survey and capped-bars represent the standard error. Dotted horizontal lines represent orders of magnitude.

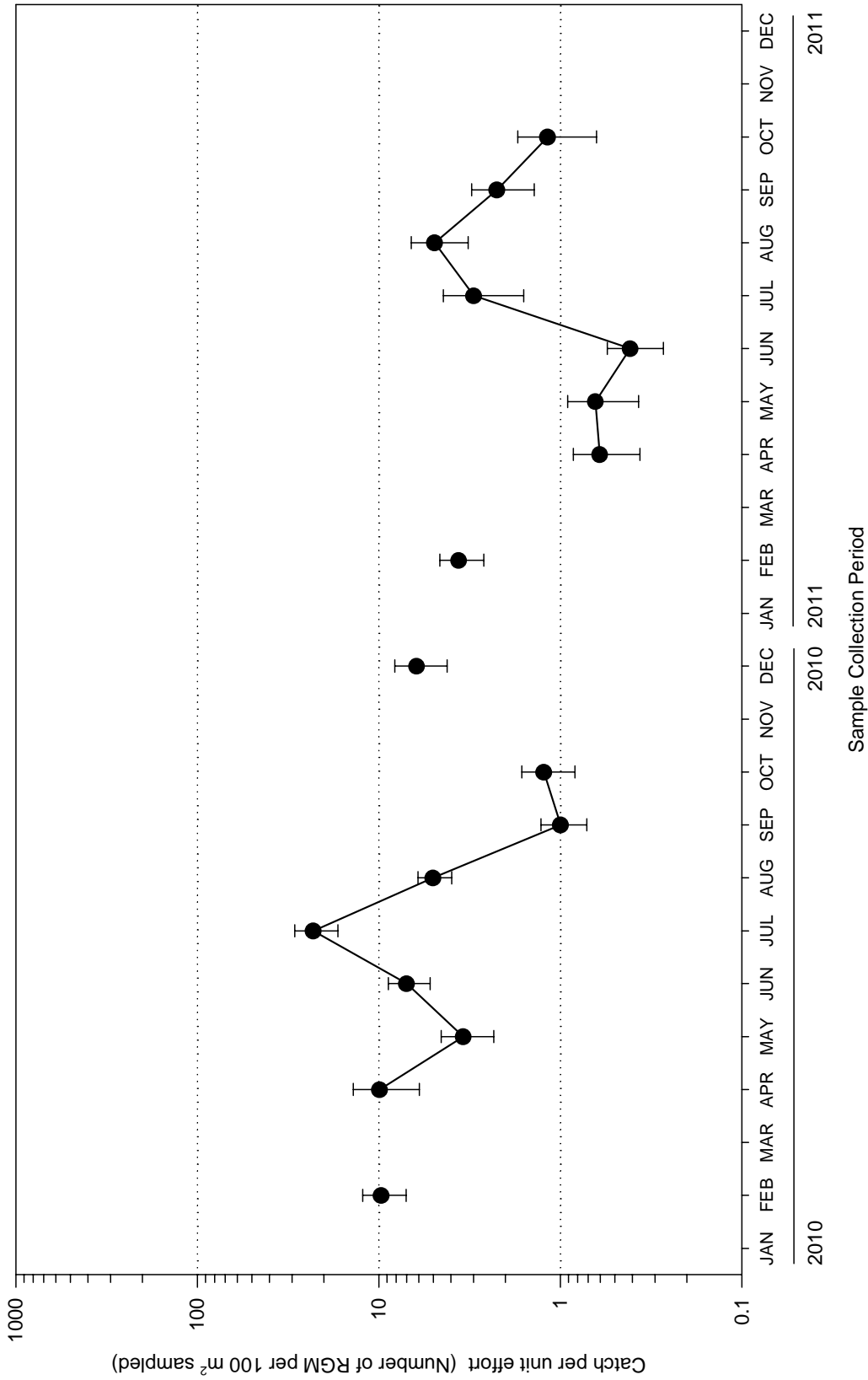


Figure 9. Monthly densities of Rio Grande silvery minnow during 2010 and through October 2011 at population monitoring program collection sites. Solid circles indicate monthly means (n=20 sites per month) and capped-bars represent the standard error. Missing symbols indicate that no individuals were collected in a particular reach during that month (i.e., no sampling). Dotted horizontal lines represent orders of magnitude.

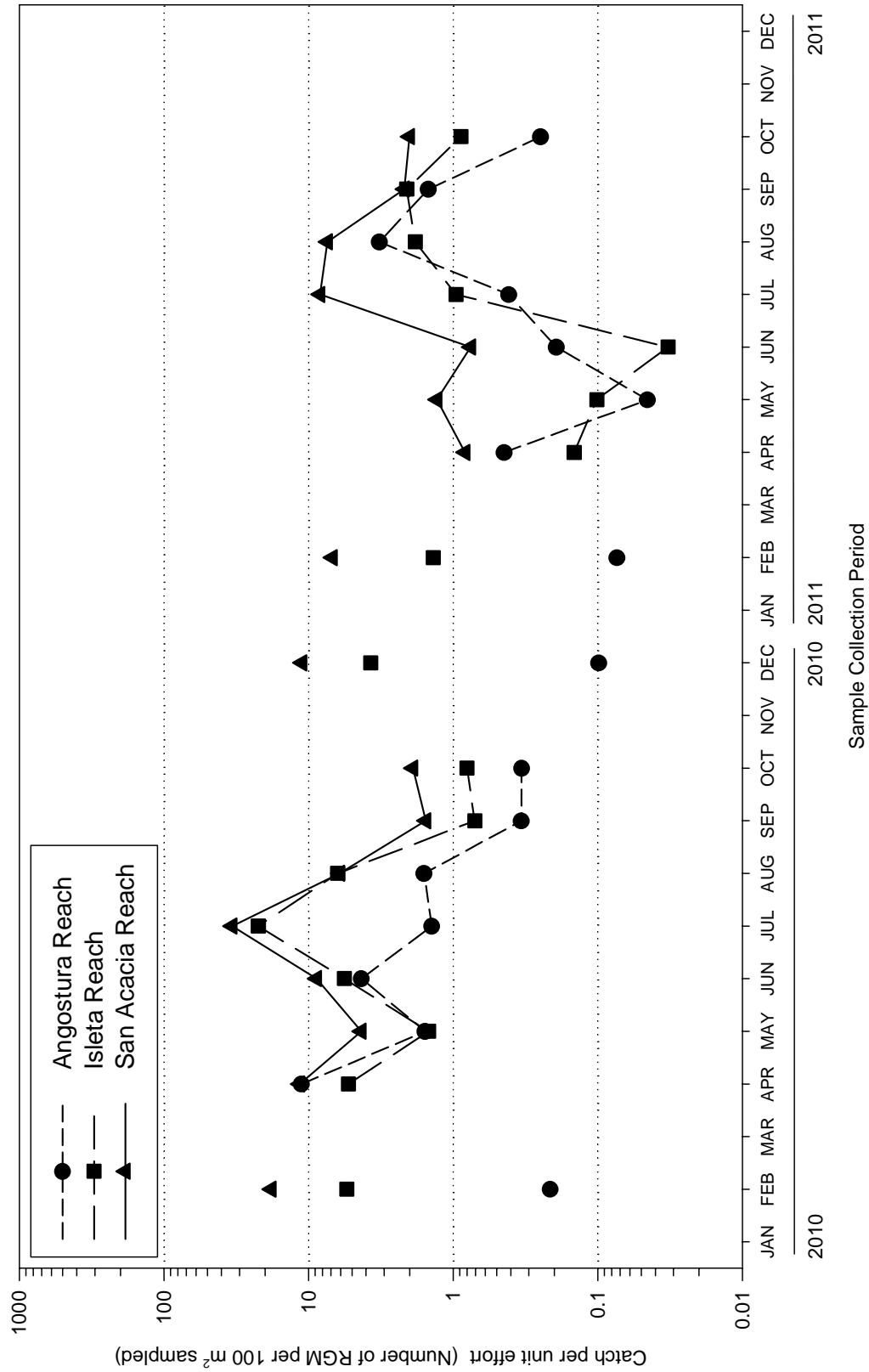


Figure 10. Monthly densities of Rio Grande silvery minnow during 2010 and through October 2011 at population monitoring program collection sites in the Angostura, Isleta, and San Acacia reaches. Missing symbols indicate that no individuals were collected in a particular reach during that month (i.e., not present or no sampling). Dotted horizontal lines represent orders of magnitude.

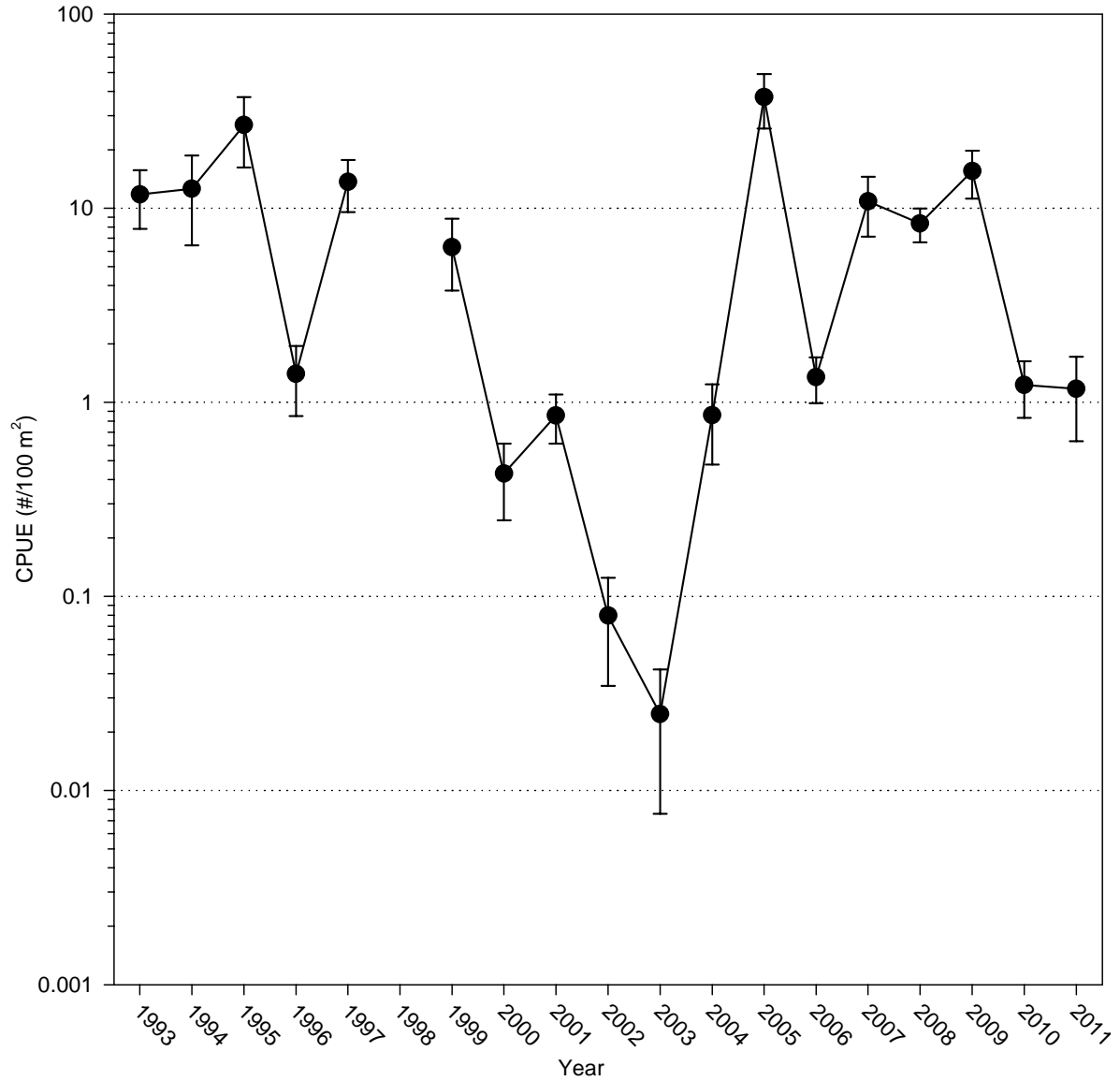


Figure 11. Rio Grande silvery minnow densities (CPUE) during October, at all sampling sites, by sampling year (1993-1997, 1999-2011). Solid circles indicate means and capped-bars represent the standard error. Dotted horizontal lines represent orders of magnitude.

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 2007-2009. These years had a notably different hydrological compared with 1996, 2000-2003, 2006, 2010, and 2011. There were fewer high flow days (e.g., resulting from spring runoff) at downstream sampling sites as compared with upstream sampling sites. Conversely, there were more low flow days (e.g., resulting from higher irrigation demand during summer) at downstream sampling sites as compared with upstream sampling sites.

Linear regression analyses of Rio Grande silvery minnow October densities from 1993-1997, 1999-2011 revealed significant relationships with several hydraulic variables. Density increased significantly ($p < 0.01$) with maximum discharge and all combinations of number of days with discharge (as measured at the Albuquerque gauge) exceeding a threshold value (Figure 12). The relationships that explained the most variation in mean density were number of days with discharge $> 2,000$ cfs or $> 3,000$ cfs (72% and 75%, respectively). October densities of Rio Grande silvery minnow also increased significantly ($p < 0.001$) with delayed onset of low flows and increased mean daily discharge (as measured at the San Marcial gauge; Figure 13). There were also significant negative relationships ($p < 0.001$) between Rio Grande silvery minnow densities and number of days with discharge below a certain threshold value (i.e., < 200 and < 100 cfs). A striking pattern of association between changes in discharge and changes in Rio Grande silvery minnow abundance emerged when plotting the last decade of data (2002 to 2011) on a single graph (Figure 14).

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 15). 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. Habitats most frequently used by Rio Grande silvery minnow (relative to those sampled) included pools, shoreline pools, and shoreline runs.

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; Appendix C). The native ichthyofauna consisted of eleven species (red shiner, Rio Grande chub, Rio Grande silvery minnow, fathead minnow, flathead chub, longnose dace, river carpsucker, smallmouth buffalo, blue catfish, flathead catfish, and bluegill). Rio Grande chub and blue catfish were the least abundant native fishes ($N=1$ for each species). Red shiner was the most abundant native species collected ($N=22,863$), followed by flathead chub ($N=3,313$), Rio Grande silvery minnow ($N=2,314$), river carpsucker ($N=1,079$), and fathead minnow ($N=847$). The most abundant introduced species were white sucker ($N=3,254$), western mosquitofish ($N=2,393$), channel catfish ($N=744$), and common carp ($N=562$). The nine remaining nonnative fish species were present at much lower numbers ($N < 50$ for each taxon) than were the aforementioned nonnative species.

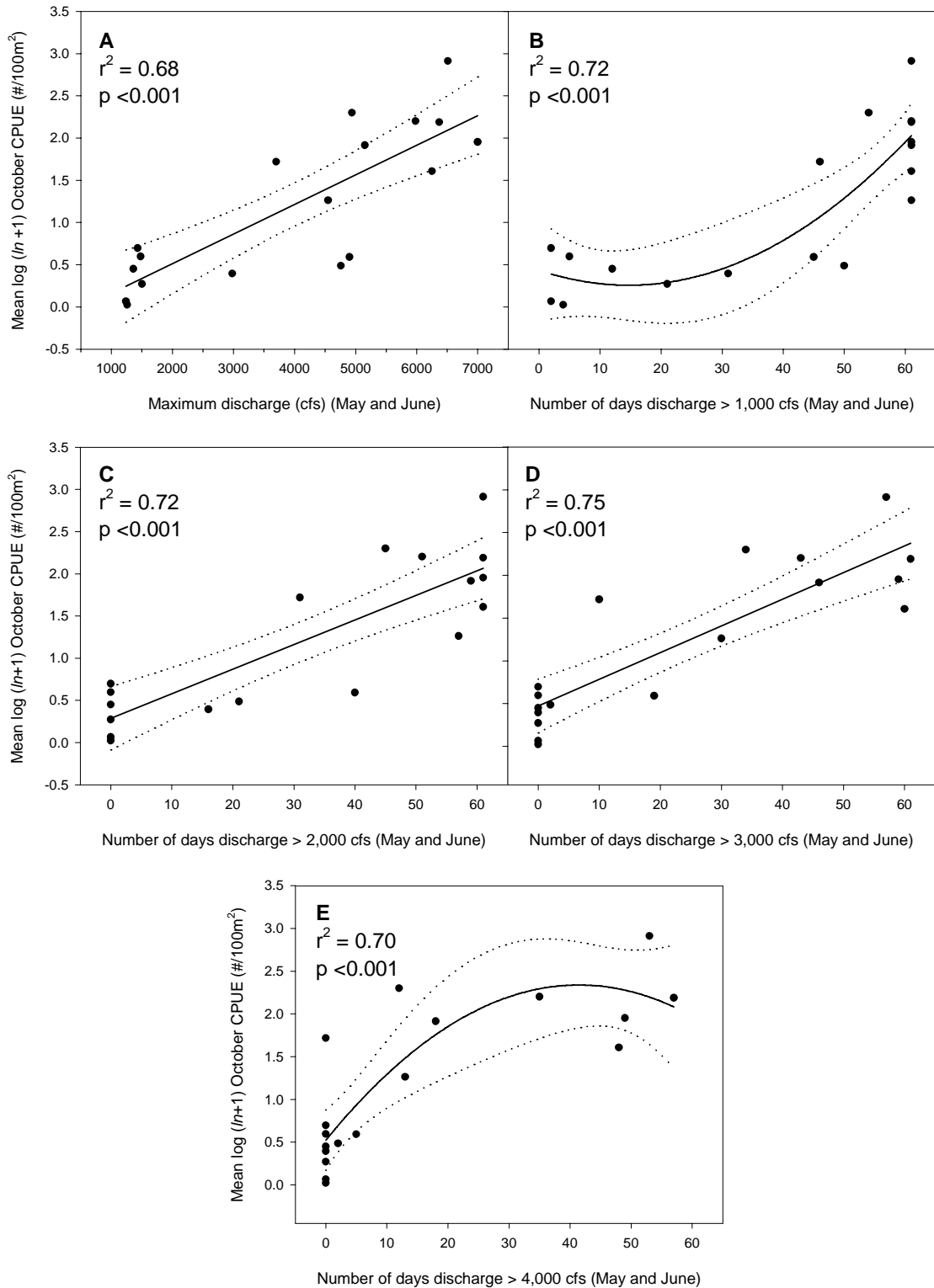


Figure 12 A-E. Regression analysis of Rio Grande silvery minnow log-transformed mean October densities (1993-1997, 1999-2011) and different hydraulic variables (during May and June) for USGS Gauge #08330000 (Rio Grande at Albuquerque, NM). Graph shows regression line (solid) and 95% confidence intervals (dotted).

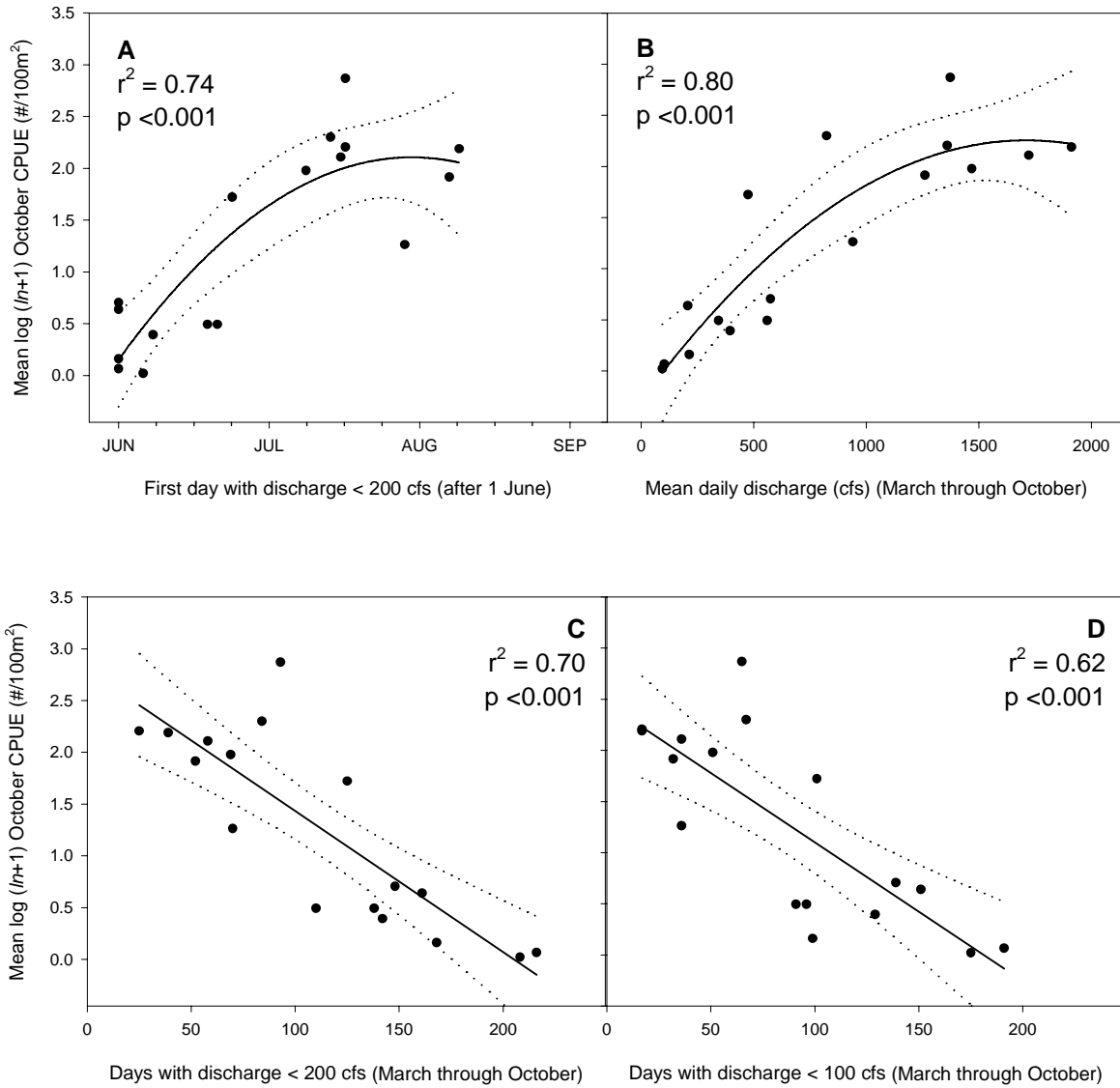


Figure 13 A-D. Regression analysis of Rio Grande silvery minnow log-transformed mean October densities (1993-1997, 1999-2011) and different hydraulic variables for USGS Gauge #08358400 (Rio Grande Floodway at San Marcial, NM). Graph shows regression line (solid) and 95% confidence intervals (dotted).

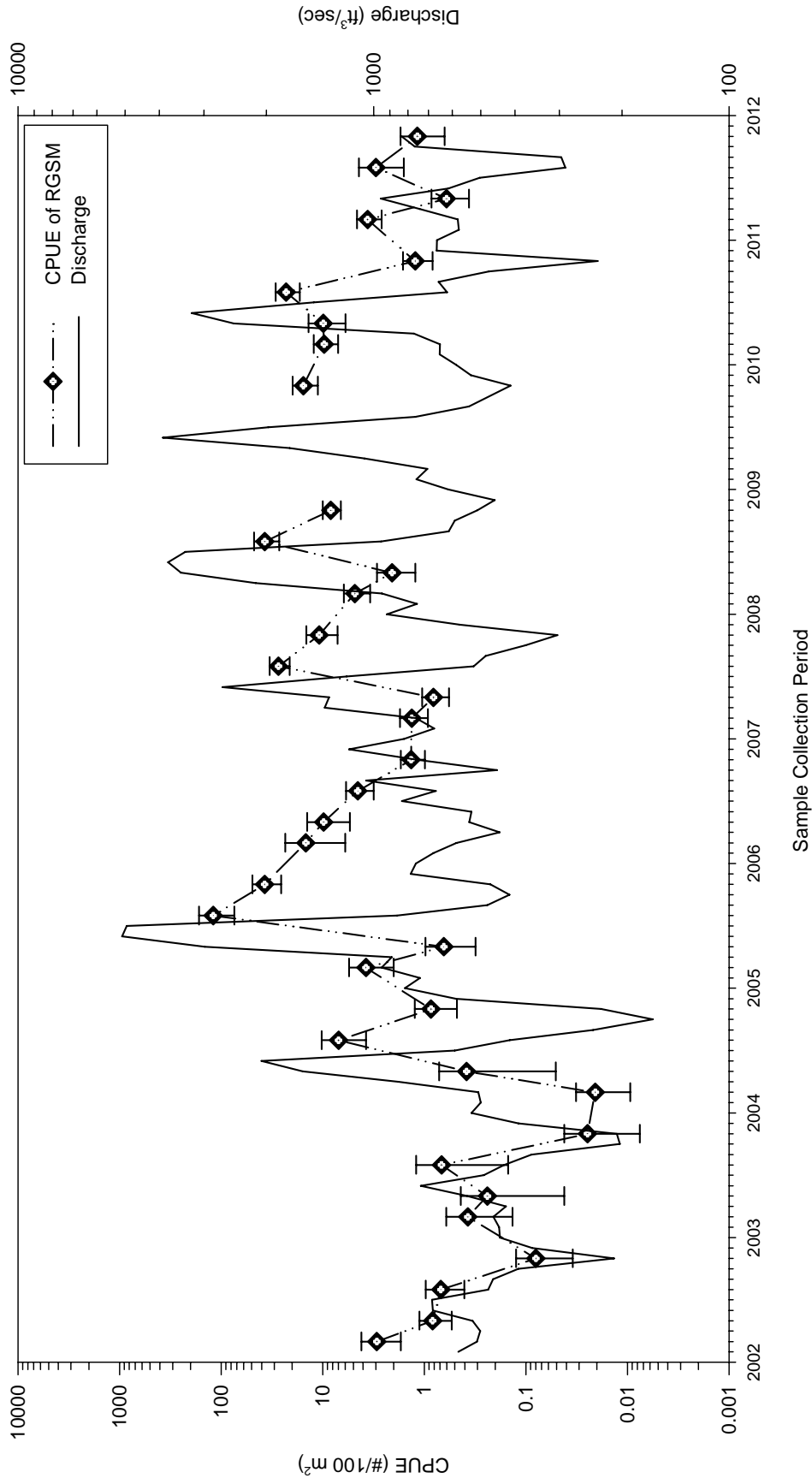


Figure 14. Time sequence of quarterly Rio Grande silvery minnow densities over the past decade (2002-2011) at population monitoring program collection sites and mean monthly discharge at USGS Gauge #08330000 (Rio Grande at Albuquerque, NM). Diamonds indicate sample means for each survey and capped-bars represent the standard error.

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

MESOHABITAT TYPES

Primary

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 piles- any habitat that has associated organic cover (e.g., grasses, woody vegetation etc.).
RI	Riffle- a shallow and high velocity habitat where the water surface is irregular and broken by waves; generally indicates gravel-cobble substrata.

Secondary

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.

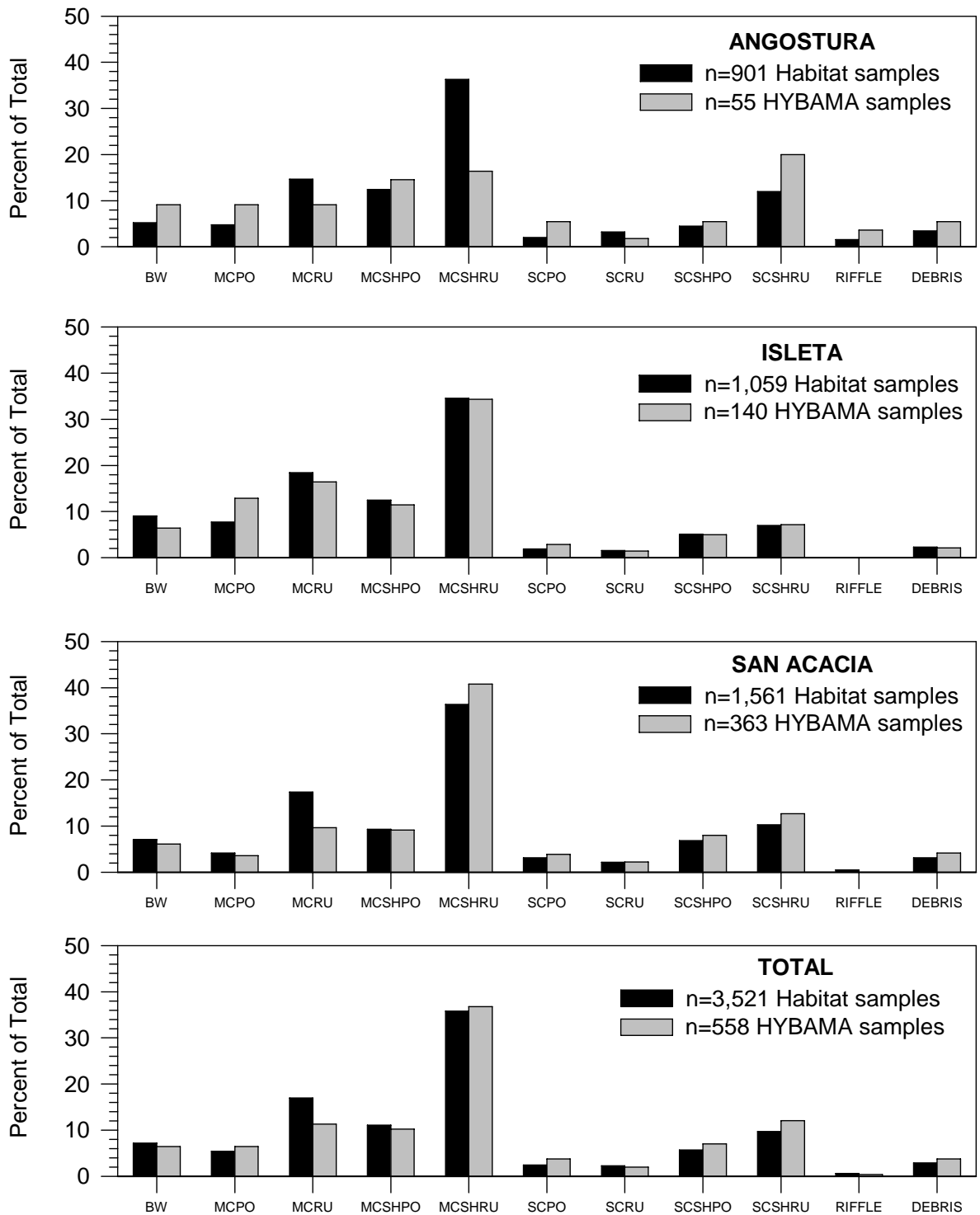


Figure 15. Percent total of mesohabitats (see Table 3 for codes) sampled and those occupied by Rio Grande silvery minnow in the Middle Rio Grande as part of population monitoring from December 2010 to October 2011 for each river reach and the annual total.

Table 4. Summary of the Rio Grande silvery minnow population monitoring program fish collections from December 2010 to October 2011.

FAMILY	SPECIES COMMON NAME	RESIDENCE STATUS ¹	TOTAL NUMBER OF SPECIMENS	PERCENT (%) OF TOTAL	FREQUENCY OF OCCURRENCE ²	% FREQUENCY OCCURRENCE ²
Clupeidae	gizzard shad	N	37	0.1	9	4.09
Clupeidae	threadfin shad	I	-	-	-	-
Cyprinidae	central stoneroller	I	-	-	-	-
Cyprinidae	goldfish	I	-	-	-	-
Cyprinidae	red shiner	N	22,863	60.08	162	73.64
Cyprinidae	common carp	I	562	1.48	58	26.36
Cyprinidae	Rio Grande chub	N	1	0	1	0.45
Cyprinidae	Rio Grande silvery minnow	N	2,314	6.08	114	51.82
Cyprinidae	golden shiner	I	-	-	-	-
Cyprinidae	fathead minnow	N	847	2.23	89	40.45
Cyprinidae	bullhead minnow	I	8	0.02	5	2.27
Cyprinidae	flathead chub	N	3,313	8.71	110	50
Cyprinidae	longnose dace	N	541	1.42	30	13.64
Catostomidae	river carpsucker	N	1,079	2.84	80	36.36
Catostomidae	white sucker	I	3,254	8.55	59	26.82
Catostomidae	smallmouth buffalo	N	17	0.04	2	0.91
Ictaluridae	black bullhead	I	1	0	1	0.45
Ictaluridae	yellow bullhead	I	33	0.09	17	7.73
Ictaluridae	blue catfish	N	1	0	1	0.45
Ictaluridae	channel catfish	I	744	1.96	87	39.55
Ictaluridae	flathead catfish	N	-	-	-	-
Salmonidae	rainbow trout	I	-	-	-	-
Salmonidae	brown trout	I	-	-	-	-
Poeciliidae	western mosquitofish	I	2,393	6.29	92	41.82
Moronidae	white bass	I	1	0	1	0.45
Moronidae	striped bass	I	-	-	-	-
Centrarchidae	green sunfish	I	4	0.01	4	1.82
Centrarchidae	bluegill	N	5	0.01	5	2.27
Centrarchidae	longear sunfish	I	-	-	-	-
Centrarchidae	smallmouth bass	I	-	-	-	-
Centrarchidae	largemouth bass	I	25	0.07	12	5.45
Centrarchidae	white crappie	I	6	0.02	5	2.27
Centrarchidae	black crappie	I	-	-	-	-
Percidae	yellow perch	I	2	0.01	1	0.45
Percidae	bigscale logperch	I	-	-	-	-
Percidae	walleye	I	1	0	1	0.45
TOTAL			38,052			

¹ N = native; I = introduced

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

Rio Grande silvery minnow composed a higher fraction of the total ichthyofaunal community from 2005-2009 than from 2010-2011. While this percentage had dropped precipitously from 1995 to 2000 and remained low through 2004, it improved dramatically in 2005 (Figure 16). There were, however, notable declines from 2005 to 2006 and from 2009 to 2010. 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 17). Rio Grande silvery minnow had increased from being the 10th most common focal species in 2003 to being the most common focal species in 2005 (Table 5).

While the rank abundance of Rio Grande silvery minnow increased notably from 2002-2003 (10th) to 2007-2009 (2nd), it dropped precipitously in 2010 (5th). In 2011, Rio Grande silvery minnow rank abundance increased slightly (4th) as compared with 2010. The coefficient of concordance ($W=0.72$) for focal species indicated high overall agreement in ranks ($X^2=64.4$; $p<0.001$) over time (2002-2011) despite broad changes in ranks for some taxa (e.g., Rio Grande silvery minnow, flathead chub, and river carpsucker).

There were notable seasonal changes in the relative abundance of the 10 focal fish species from December 2010 to October 2011 (Figures 18 and 19). Density of all fish species increased during spring or summer. Rio Grande silvery minnow abundance in samples was highest in July and August and then slowly declined until October. Fathead minnow, flathead chub, and river carpsucker also reached their highest densities in July and August. The highest densities of red shiner were recorded in July although the abundance of this taxon was relatively high throughout the year. An accounting of species-specific temporal abundance revealed similar trends and documented the seasonal occurrence of certain taxa (e.g., gizzard shad and smallmouth buffalo; Table 6).

In addition to temporal variation in the relative abundance of fish species within the community, there were also longitudinal changes in the densities of species among reaches (Figure 20). Longnose dace, white sucker, and channel catfish were most common in the Angostura Reach. The most common species in the Isleta Reach included red shiner, fathead minnow, river carpsucker, and western mosquitofish. Common carp, Rio Grande silvery minnow, and flathead chub were most common in the San Acacia Reach. Rio Grande silvery minnow was more common in the Isleta and San Acacia reaches as compared to the Angostura Reach.

Sampling Variation

November (2011)

Variation in Rio Grande silvery minnow density values was calculated for all 20 sampling sites (Figure 21). In general, sampling variation was most pronounced in the Angostura and San Acacia reaches of the study area. Several localities (Site #8, #9.5, and #14) yielded Rio Grande silvery minnow on only a single occasion, while other localities (Site #0, #10, #13, and #15) yielded no individuals. Sampling variation was highest in areas that had very low densities of Rio Grande silvery minnow, primarily because of the absence of individuals on several sampling occasions. Mean densities at occupied sites ranged from 0.05 (Site #14) to 12.0 (Site #17) individuals per 100 m². The coefficient of variation (CV), at sites where Rio Grande silvery minnow was collected on more than one occasion, was <0.5 except at Sites #5, #11, and #12 (0.52, 0.79, and 0.58, respectively).

Variation in the overall density values, for all fish species combined, was relatively homogeneous among sampling sites (Figure 22). Fish were collected at all sampling sites, except Site #15, and were quite rare at Site #13 and #14. The mean density of all fish species ranged from 0.13 (Site #13) to 70.9 (Site #9) individuals per 100 m². The coefficient of variation (CV) was <0.5 at all sampling sites except Site #5 (0.55).

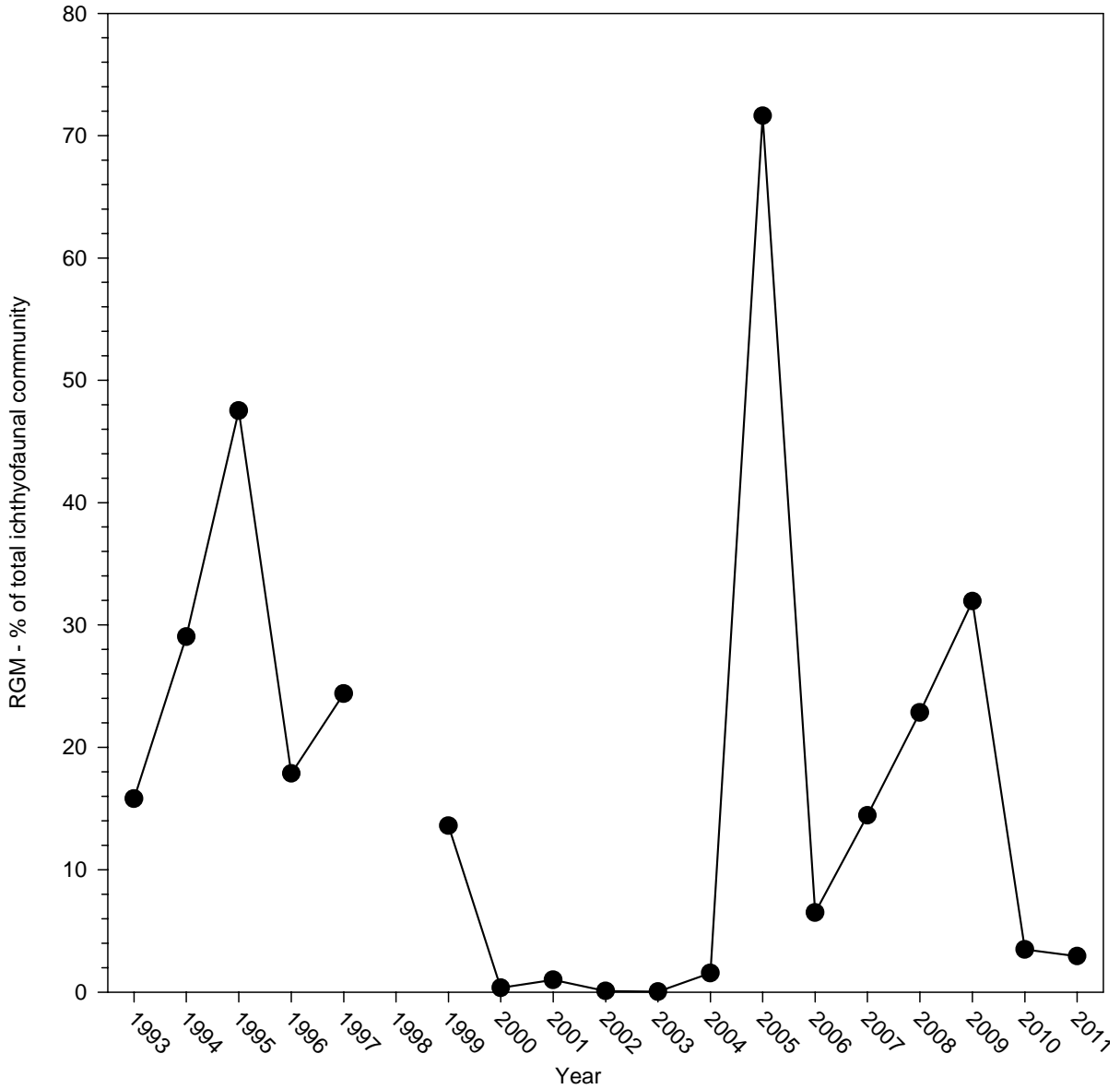


Figure 16. Relative abundance of Rio Grande silvery minnow as a percentage of the total ichthyofaunal community during October, at all sampling sites, by sampling year (1993-1997, 1999-2011).

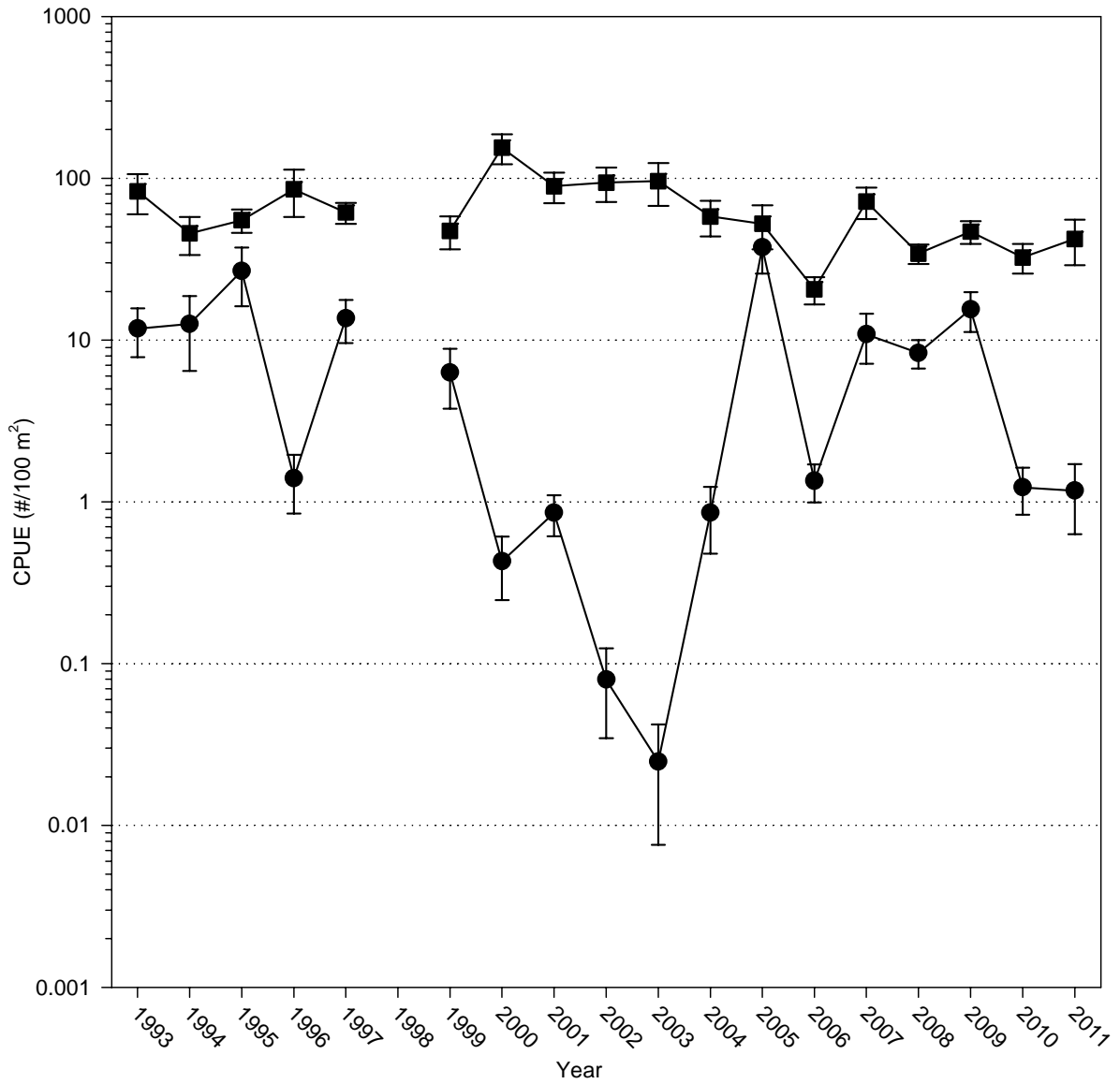


Figure 17. Densities (CPUE) of Rio Grande silvery minnow (circles) and the total ichthyofaunal community (squares) during October, at all sampling sites, by sampling year (1993-1997, 1999-2011). Solid circles or squares indicate means and capped-bars represent the standard error. Dotted horizontal lines represent orders of magnitude.

Table 5. Summary of rank abundance of focal species collected in the Rio Grande during October over the past decade (2002-2011).

SPECIES	2	2	2	2	2	2	2	2	2	2
	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	1
	2	3	4	5	6	7	8	9	0	1
CARPS AND MINNOWS										
red shiner	1	1	1	3	1	1	1	1	1	1
common carp	9	8	9	7	10	10	7	10	9	10
<i>Rio Grande silvery minnow</i>	10	10	5	1	4	2	2	2	5	4
fathead minnow	3	3	3	4	6	7	5	6	6	7
flathead chub	7	4	4	5	2	4	4	5	2	3
longnose dace	5	7	8	8	7	8	8	9	7	8
SUCKERS										
river carpsucker	6	5	7	9	8	6	9	7	8	5
white sucker	8	9	10	9	8	9	10	8	10	9
NORTH AMERICAN CATFISHES										
channel catfish	4	6	6	6	5	5	6	4	4	6
LIVEBEARERS										
western mosquitofish	2	2	2	2	3	3	3	3	3	2

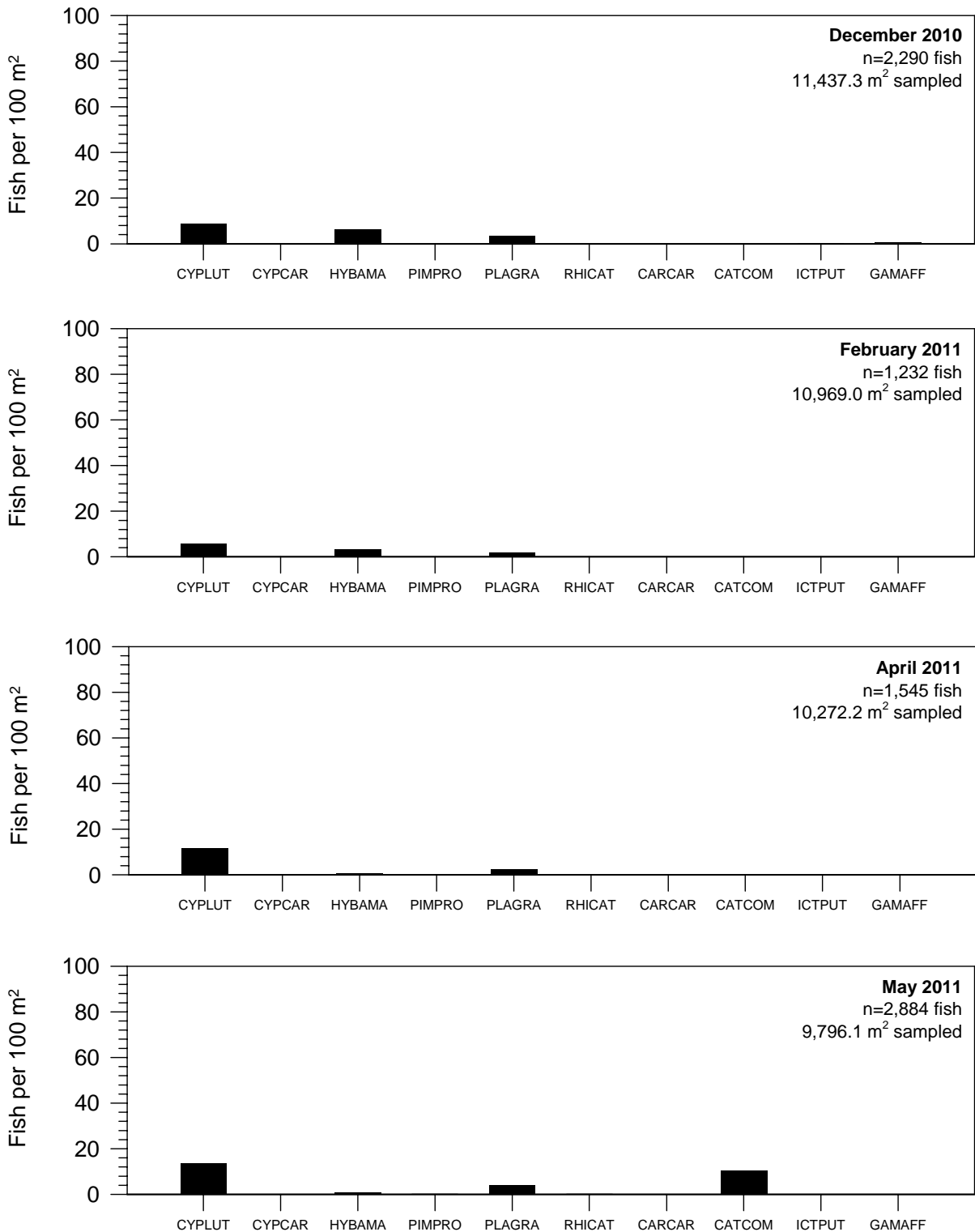


Figure 18. Fish densities (CPUE) from December 2010 to May 2011 for each focal species (see Table 1 for species codes) in the Middle Rio Grande.

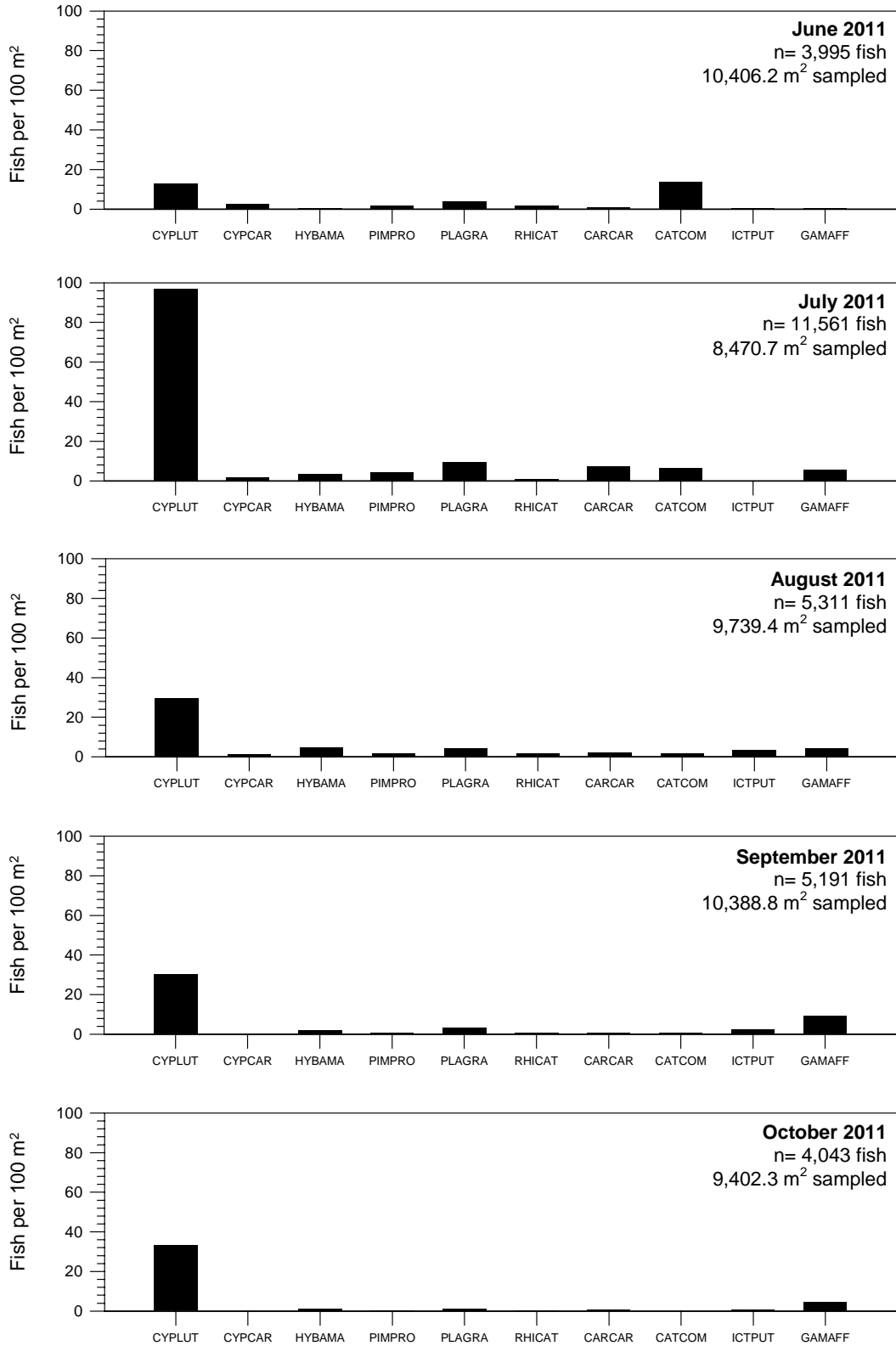


Figure 19. Fish densities (CPUE) from June to October 2011 for each focal species (see Table 1 for species codes) in the Middle Rio Grande.

Table 6. Summary of the December 2010 to October 2011 Rio Grande silvery minnow population monitoring program fish collections.

FAMILY	SPECIES COMMON NAME	D E C	F E B	A P R	M A Y	J U N	J U L	A U G	S E P	O C T	T O T A L
Clupeidae	gizzard shad	-	-	1	7	1	14	14	-	-	37
Clupeidae	threadfin shad	-	-	-	-	-	-	-	-	-	0
Cyprinidae	central stoneroller	-	-	-	-	-	-	-	-	-	0
Cyprinidae	goldfish	-	-	-	-	-	-	-	-	-	0
Cyprinidae	red shiner	1,020	634	1,211	1,322	1,322	8,216	2,859	3,158	3,121	22,863
Cyprinidae	common carp	4	1	5	11	261	142	113	9	16	562
Cyprinidae	Rio Grande chub	-	-	-	-	-	-	-	-	1	1
Cyprinidae	Rio Grande silvery minnow	704	383	56	64	42	285	456	206	118	2,314
Cyprinidae	golden shiner	-	-	-	-	-	-	-	-	-	0
Cyprinidae	fathead minnow	19	6	2	22	178	355	145	76	44	847
Cyprinidae	bullhead minnow	-	-	-	-	3	-	2	2	1	8
Cyprinidae	flathead chub	419	193	232	383	394	792	430	348	122	3,313
Cyprinidae	longnose dace	3	-	16	24	170	73	167	60	28	541
Catostomidae	river carpsucker	9	4	5	9	104	606	186	77	79	1,079
Catostomidae	white sucker	-	2	3	1,018	1,437	554	159	64	17	3,254
Catostomidae	smallmouth buffalo	-	-	-	-	16	-	1	-	-	17
Ictaluridae	black bullhead	-	-	-	-	-	-	-	1	-	1
Ictaluridae	yellow bullhead	-	-	-	-	-	2	18	12	1	33
Ictaluridae	blue catfish	-	-	-	-	-	1	-	-	-	1
Ictaluridae	channel catfish	48	8	11	7	28	16	331	231	64	744
Ictaluridae	flathead catfish	-	-	-	-	-	-	-	-	-	0
Salmonidae	rainbow trout	-	-	-	-	-	-	-	-	-	0
Salmonidae	brown trout	-	-	-	-	-	-	-	-	-	0
Poeciliidae	western mosquitofish	63	-	2	16	38	481	418	945	430	2,393
Moronidae	white bass	-	-	-	1	-	-	-	-	-	1
Moronidae	striped bass	-	-	-	-	-	-	-	-	-	0
Centrarchidae	green sunfish	-	-	-	-	1	2	1	-	-	4
Centrarchidae	bluegill	-	1	1	-	-	-	3	-	-	5
Centrarchidae	longear sunfish	-	-	-	-	-	-	-	-	-	0
Centrarchidae	smallmouth bass	-	-	-	-	-	-	-	-	-	0
Centrarchidae	largemouth bass	-	-	-	-	-	17	6	1	1	25
Centrarchidae	white crappie	1	-	-	-	-	2	2	1	-	6
Centrarchidae	black crappie	-	-	-	-	-	-	-	-	-	0
Percidae	yellow perch	-	-	-	-	-	2	-	-	-	2
Percidae	bigscale logperch	-	-	-	-	-	-	-	-	-	0
Percidae	walleye	-	-	-	-	-	1	-	-	-	1
MONTHLY TOTALS		2,290	1,232	1,545	2,884	3,995	11,561	5,311	5,191	4,043	38,052

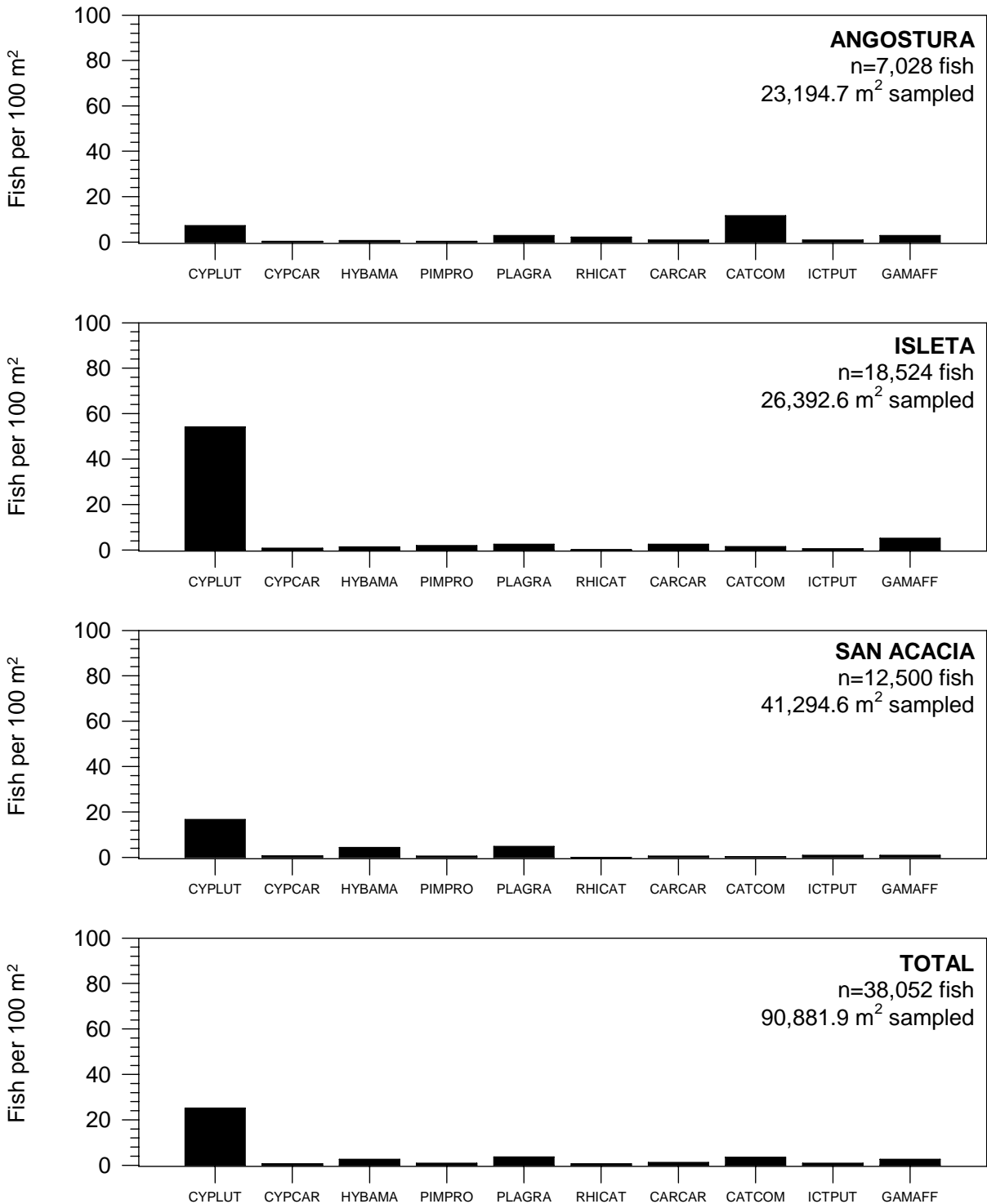


Figure 20. Fish densities (CPUE) by river reach for each focal species (see Table 1 for species codes) in the Middle Rio Grande from December 2010 to October 2011.

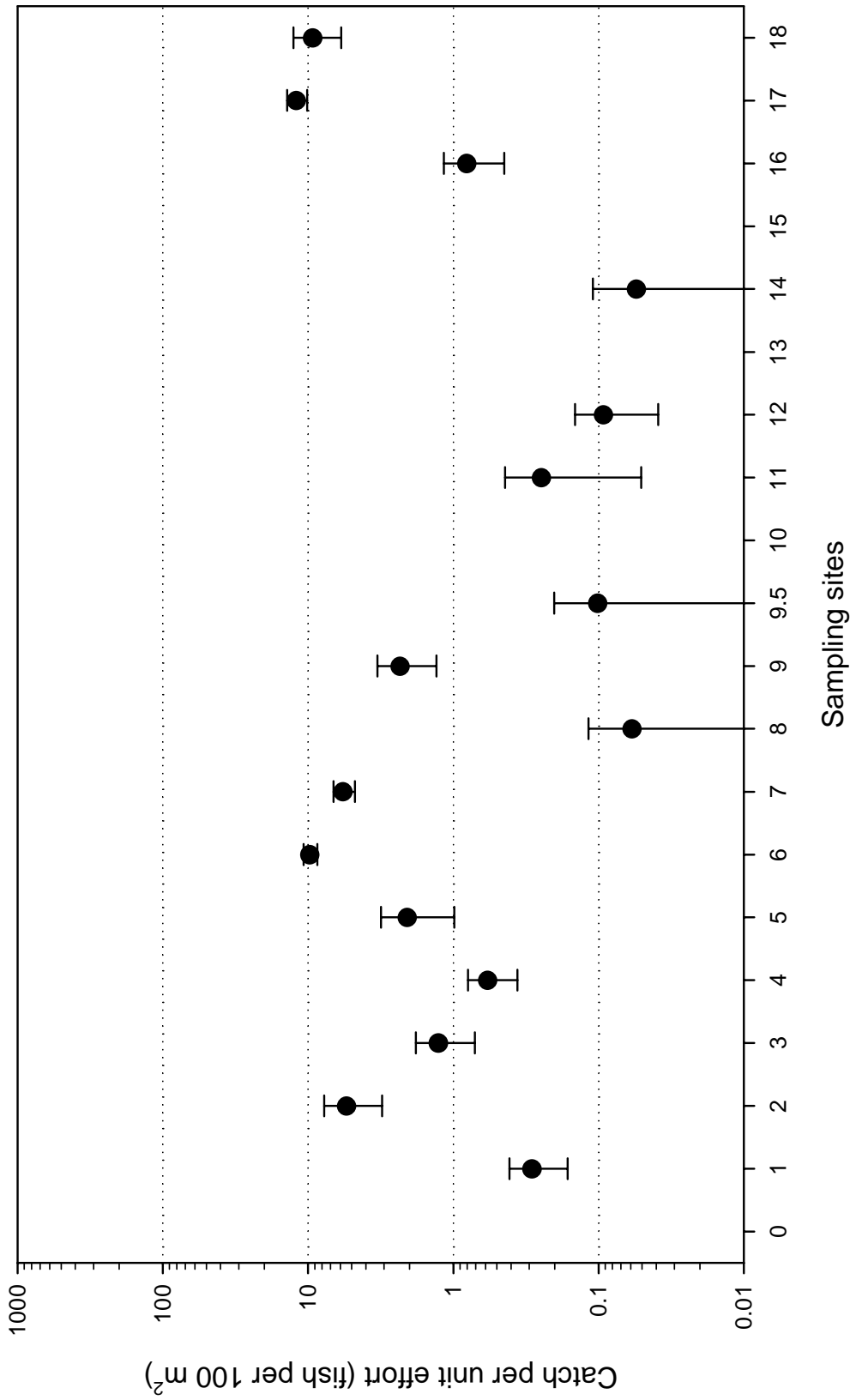


Figure 21. Variation in density values of Rio Grande silvery minnow, for each sampling site, during November 2011. Solid circles indicate means for each sampling site and capped-bars represent the standard error. Dotted horizontal lines represent orders of magnitude.

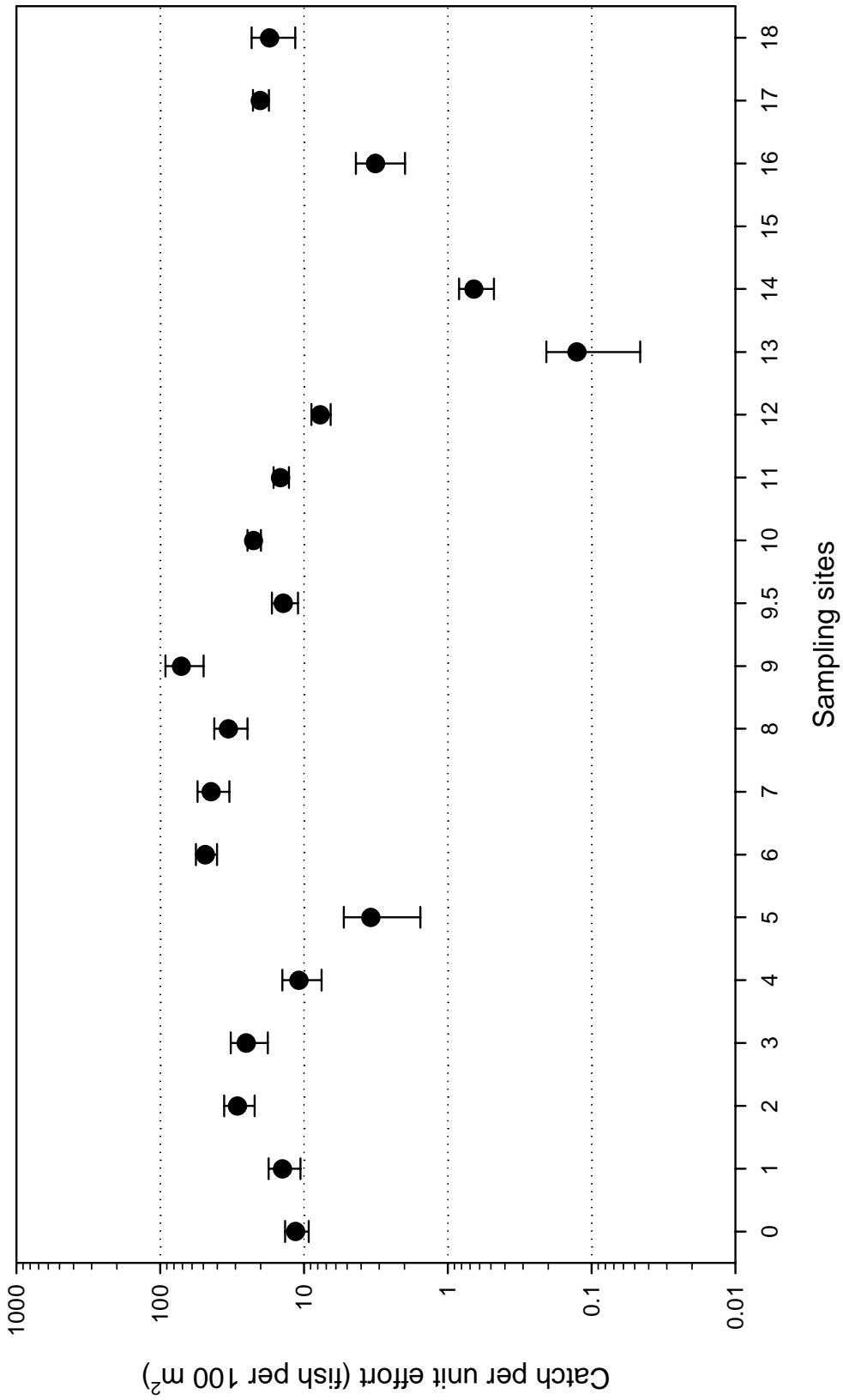


Figure 22. Variation in density values of all fish species combined, for each sampling site, during November 2011. Solid circles indicate means for each sampling site and capped-bars represent the standard error. Dotted horizontal lines represent orders of magnitude.

Sampling variation by reach was also calculated for Rio Grande silvery minnow and all fish species combined (Figure 23). The total variation among reaches for Rio Grande silvery minnow was highest in the Angostura Reach and lowest in the San Acacia Reach. Mean density ranged from 1.30 (Angostura) to 3.57 (San Acacia) individuals per 100 m². The values of CV were 0.37 (Angostura), 0.25 (Isleta), and 0.15 (San Acacia). The mean density for all fish species combined ranged from 9.37 (San Acacia) to 34.27 (Isleta) individuals per 100 m². The values of CV for all fish species combined were 0.19 (Angostura), 0.12 (Isleta), and 0.08 (San Acacia).

A final comparison of sampling variation was made among the 10 focal taxa for the entire sampling area (Figure 24). The mean density of focal fish taxa ranged from 0.06 (common carp: CYPGAR) to 10.17 (red shiner: CYPLUT) individuals per 100 m² and values of CV ranged from 0.09 (red shiner: CYPLUT) to 0.25 (western mosquitofish: GAMAFF). The overall CV value for all fish species combined was 0.06. The overall CV value for Rio Grande silvery minnow was 0.10 but dropped to 0.07 when excluding one outlying value (Site #18 on sampling day one).

DISCUSSION

The population status of Rio Grande silvery minnow and the associated Middle Rio Grande ichthyofaunal community has been systematically monitored since 1993. This effort is unique among ichthyofaunal research studies in the Middle Rio Grande in that it has been providing consistent sampling of fishes over a relatively long duration. Determining changes in fish population trends is best accomplished by analyzing the full suite of available data over the period of record. Long-term population monitoring sampling programs also provide the data necessary to test specific ecological hypotheses. While this study was initially designed to monitor the long-term trends of fish species in the Middle Rio Grande, the scope of this project has expanded to address some of the information needs of natural resource managers. Examples of key components that were added to this project over time include: 1) Evaluating the influence of discharge patterns on population fluctuations, 2) Determining general habitat use patterns, 3) documenting the changes in relative abundance among fish species over time, and 4) Examining seasonal and spatial differences in population structure and abundance of native and nonnative Middle Rio Grande fishes.

The use of catch-per-unit-effort (CPUE) to monitor temporal and spatial changes in fish populations is well established in fisheries science. Some of the first important theoretical contributions were provided in the mid-1900s (Ricker 1940, 1944). The relationship between CPUE and abundance has received considerable attention in the literature (see reviews by Otis et al. 1978, Bannerot and Austin 1983). Experimental and statistical treatment of the issue suggests that CPUE is a valid estimator of abundance and that the relationship is often one of strict proportionality for single species (Richards and Schnute, 1986). Extensive reviews of the various methods for estimating animal abundance identify CPUE as one of the most widely used and well-researched techniques in fisheries science (e.g., Seber 1992, Schwarz and Seber 1999).

Recent analyses have demonstrated a relatively close relationship between the 2008 to 2010 overall population trends for Rio Grande silvery minnow obtained from Population Monitoring Program and Population Estimation Program studies (Dudley et al., 2011). While this suggests that the CPUE metric (i.e., number of fish per unit area) reflects general changes in population abundance over time, additional data collected in future years will be needed to more precisely determine the strength of this correlation. Despite similarities in population trends obtained during the Population Estimation Program and Population Monitoring Program studies, these studies have unique objectives that address different research needs. Systematic Population Monitoring Program activities provide an assessment of recruitment success over short time periods, a basis for comparing the changes in monthly recruitment success among years, insight to seasonal mortality

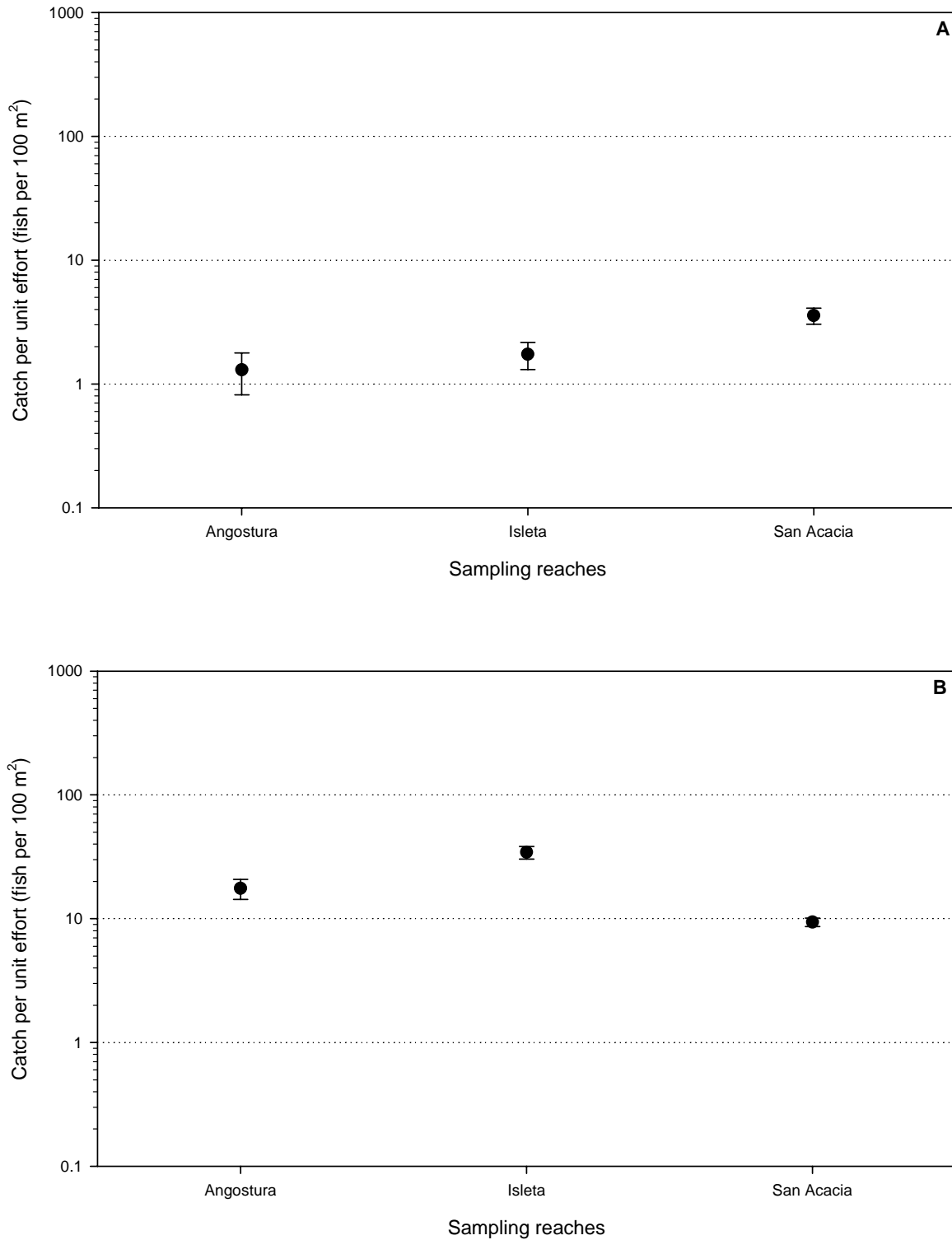


Figure 23. Variation in density values for Rio Grande silvery minnow (A) and for all fish species combined (B), in each sampling reach, during November 2011. Solid circles indicate means for each sampling reach and capped-bars represent the standard error. Dotted horizontal lines represent orders of magnitude.

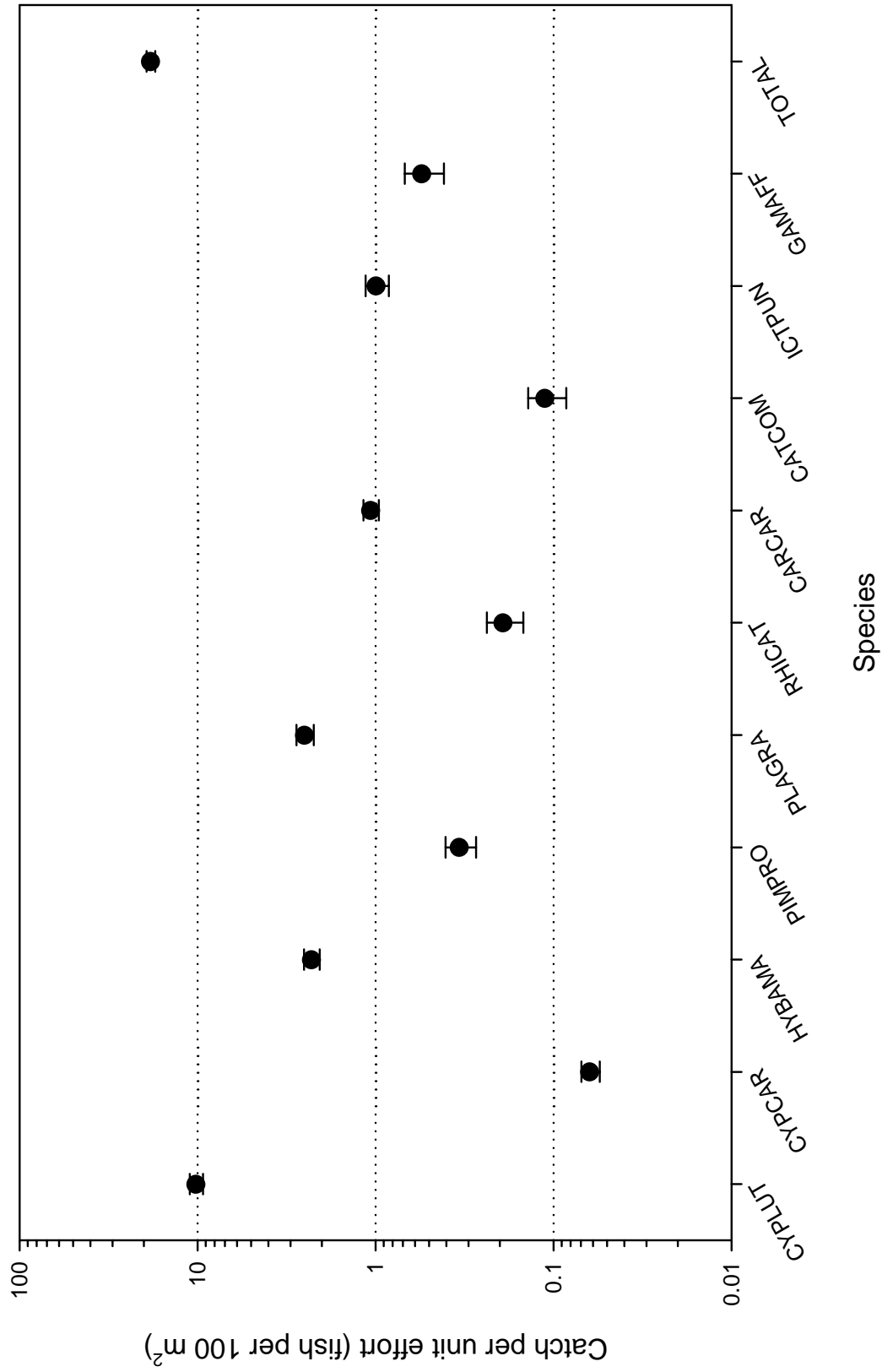


Figure 24. Variation in density values for each focal species (see Table 1 for species codes), at all sampling sites combined, during November 2011. Solid circles indicate means for each species and capped-bars represent the standard error. Dotted horizontal lines represent orders of magnitude.

rates, timely information about the status of the species during periods of reduced abundance, and a valuable tool to assess the real-time effectiveness of adaptive management activities. In contrast to the Population Monitoring Program that provides monthly or bimonthly documentation of general population trends, the Population Estimation Program provides an objective and statistically robust annual estimate of the Rio Grande silvery minnow population during a single time-period (e.g., October) and is important for more precisely evaluating interannual population changes.

The Population Monitoring Program has documented notable changes in densities of Rio Grande silvery minnow among years (i.e., more than several orders of magnitude [$>1,000\%$]) since 1993. Despite large differences in the mean densities of Rio Grande silvery minnow among sampling sites and years, the overall estimates of sampling variation in 2011 (based on repeated monitoring efforts over a four day period) were relatively low and consistent. Pollack et al. (1990) suggested that the coefficient of variation (CV) would ideally be <0.20 for population monitoring studies but that achieving this level of precision would be cost prohibitive for many fish or wildlife species. It appears that the Population Monitoring Program sampling protocols are adequate to achieve a relatively high degree of sampling precision (overall $CV = 0.10$), especially when considering the substantial changes in Rio Grande silvery minnow abundance among years. While the current sampling methodology appears to provide a robust estimate of Rio Grande silvery minnow population trends over time, 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 effort will be required to detect more subtle population changes during periods of greatly reduced abundance.

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. While the physical locations of mesohabitats shift around considerably among years, established sampling protocols for this study ensure 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 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 2011 were again comparable to those occupied in past years (e.g., Dudley and Platania, 1997, 2011a). The distribution of sampled habitats among reaches and the habitats occupied by Rio Grande silvery minnow among reaches were relatively consistent. Shoreline pools and shoreline runs composed the most frequently occupied habitats (relative to those sampled) of Rio Grande silvery minnow. Main channel runs were the least occupied habitat relative to their sampled abundance. However, Rio Grande silvery minnow was found to occupy the full suite of habitats sampled, including main and side channel runs.

There were notable changes in the relative and rank abundance of Middle Rio Grande fish species over the past decade (2002-2011). The species that changed most in rank abundance over time included Rio Grande silvery minnow, flathead chub, and river carpsucker. Despite these occasionally 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 species-specific population size over time. It is possible that changes in the timing, magnitude, and duration of flows (especially during and immediately following spawning season) could be an important factor leading to some of the observed differences in fish species abundance over time and space. For the purpose of this study, an 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. However,

additional study will be required to determine those environmental factors that most influence the spatial and temporal patterns of abundance for other fish species and how those changes might affect ichthyofaunal community dynamics over time.

The annual reproductive effort of Rio Grande silvery minnow normally occurs during spring and is initiated, in part, by large-scale increases in stream discharge associated with high-mountain snowmelt. Rio Grande silvery minnow releases relatively large numbers of eggs (up to several thousand per female) into the water column during spawning and these eggs are passively dispersed downstream with the current. Increased discharge as a result of 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 sometimes resulted in several months of sustained flooded habitats. However, dams and reservoirs now moderate the magnitude and duration of spring discharge. Water that is seasonally diverted from the river for agricultural and municipal purposes substantially reduces the total volume of water that would have normally flowed through the Rio Grande. This issue is further compounded in drought years when a large portion of the available water is diverted from the Rio Grande in early spring, reducing the sustained and elevated flows that appear to facilitate early recruitment success of Rio Grande silvery minnow.

The timing of the 2011 spring runoff was slightly later than usual (as compared to historical flow data) and overall discharge was relatively low. Runoff began in April but didn't peak until early June and elevated flows lasted only a few weeks. The lack of elevated and extended flows during 2011 likely resulted in less favorable conditions for the growth and survivorship of newly hatched Rio Grande silvery minnow larvae. It is possible that recruitment success was increased in years with high spring flows because of the extended inundation of shoreline pools and backwaters where larval fish are most likely to persist (see Dudley and Platania, 2011b). Low-velocity shallow areas provide the warm and productive nursery habitats apparently required by Rio Grande larval fishes to successfully complete their early life history (Pease et al., 2006).

Comparison of Rio Grande silvery minnow mean October densities (1993-1997, 1999-2011) 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, early and 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. Shallow low-velocity habitats (e.g., shoreline pools, backwaters, overbank floodplains etc.) are well known to be essential for the successful recruitment of early life history stages of many freshwater fish species 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 early life stages of Rio Grande silvery minnow (Pease et al., 2006; Turner et al., 2010).

Population Monitoring Program sampling efforts during October indicated that the highest densities of Rio Grande silvery minnow were in the San Acacia Reach and that the lowest densities were in the Angostura or Isleta reaches for the majority of years sampled since 1993 (12 of 18 years = 67%). The exceptions to this pattern generally occurred in years when there was either extensive drying of the river channel in the San Acacia Reach (e.g., 2002 and 2003) and/or notable augmentation efforts in the Angostura and Isleta reaches (e.g., 2005 and 2006). One possible explanation for this apparent upstream to downstream pattern of abundance is the cumulative longitudinal transport of some portion of Rio Grande silvery minnow propagules (drifting eggs and larvae) below instream barriers (i.e., Angostura, Isleta, and San Acacia diversion dams) or into irrigation networks (Dudley and Platania, 2007). Also, the extensive river channelization, habitat

degradation, abandonment of the floodplain, and associated reductions in water turbidity downstream of Cochiti Dam (Lagasse, 1980; Massong et al., 2006) are likely limiting the amount of appropriate habitat available for the successful early recruitment of this species, especially in the Cochiti and Angostura reaches. Rio Grande silvery minnow augmentation efforts in the Angostura Reach apparently reversed this trend from 2002 to 2007 (i.e., October densities were highest in the Angostura Reach during five of six of those years). However, a cessation of augmentation efforts in the Angostura Reach from 2008 to 2011 may have contributed to the reemergence of the San Acacia Reach as supporting the highest densities of Rio Grande silvery minnow since 2008.

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 2003 to 2005 (over two orders of magnitude) is indicative of the ability of this species to rebound quickly following favorable conditions. However, 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. Despite the large fluctuations in the abundance of Rio Grande silvery minnow over the past decade, the overall genetic diversity of this species has apparently been maintained in the wild population, perhaps as a result of the current propagation management plan (Alò and Turner, 2005; Osborne et al., 2012).

The lack of extremely low densities of Rio Grande silvery minnow since 2003 could indicate that current management activities (e.g., stocking, salvage, habitat restoration, LFCC pumping, flow manipulation etc.) are buffering the population against substantial declines similar to those that occurred prior to the implementation of these activities. While recent decreases in the abundance of Rio Grande silvery minnow (e.g., 2007-2009 to 2010-2011) appear to be primarily related to changes in the seasonal flows of the Middle Rio Grande, it is unclear whether these declines would have been even more precipitous if the current suite of management activities were not being implemented. However, the rapid decline of Rio Grande silvery minnow from 2009 to 2010 appears to indicate that differences in the timing, magnitude, and duration of flows during spring and summer are still resulting in apparently dramatic changes in the annual recruitment success of this species. Several drought years in sequence (e.g., similar to what occurred during 2002-2003) could potentially provide the natural experiment necessary to glean insight into just how much current management activities are buffering against potential catastrophic population declines. Regardless of the outcome of such a scenario, having well-established management programs in place should greatly reduce the likelihood of extinction of Rio Grande silvery minnow during a potential crisis. While the suite of ongoing management activities appear to be providing some degree of protection against population losses, it is currently unclear what additional level of effort or types of activities would be required to yield robust self-sustaining populations of Rio Grande silvery minnow in the Middle Rio Grande over time. Future study of the ecological interactions among fish species and their environment in the Middle Rio Grande should further elucidate the factors that control this complex aquatic ecosystem, which will be essential in providing the information required to develop and implement successful management strategies for the long-term recovery of Rio Grande silvery minnow.

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LITERATURE CITED

- 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.
- Bannerot, S. P., and C. B. Austin. 1983. Using frequency distributions of catch per unit effort to measure fish-stock abundance. *Transactions of the American Fisheries Society* 112: 608-617.
- 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. Flow regulation and fragmentation imperil pelagic-spawning riverine fishes. *Ecological Applications* 17: 2074-2086.
- Dudley, R. K., D. A. Helfrich and S. P. Platania. 2009. Effects of river intermittency on populations of Rio Grande silvery minnow. Report to the Middle Rio Grande Endangered Species Collaborative Program and the U.S. Bureau of Reclamation, Albuquerque, New Mexico. 55 pp.
- Dudley, R. K. and S. P. Platania. 2011a. Rio Grande silvery minnow population monitoring program results from September 2009 to October 2010. Report to the Middle Rio Grande Endangered Species Collaborative Program and the U.S. Bureau of Reclamation, Albuquerque, New Mexico. 179 pp.
- Dudley, R. K. and S. P. Platania. 2011b. Spatial spawning periodicity of Rio Grande silvery minnow during 2011. Report to the Middle Rio Grande Endangered Species Collaborative Program and the U.S. Bureau of Reclamation, Albuquerque, New Mexico. 42 pp.

- Dudley, R. K., G. C. White, S. P. Platania, and D. A. Helfrich. 2011. Rio Grande silvery minnow population estimation program results from October 2010. Report to the Middle Rio Grande Endangered Species Collaborative Program and the U.S. Bureau of Reclamation, Albuquerque, New Mexico. 85 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.
- Horwitz, R. J., D. H. Keller, P. F. Overbeck, S. P. Platania, and R. K. Dudley. 2011. Age and growth of Rio Grande silvery minnow. Final report to the Middle Rio Grande Endangered Species Collaborative Program and the U.S. Bureau of Reclamation, Albuquerque, New Mexico. 74 pp.
- 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.
- 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.
- McDonald, J. H. 2009. Handbook of Biological Statistics (2nd ed.). Sparky House Publishing, Baltimore, Maryland. 319 pp.
- 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.
- Osborne, M. J., E. W. Carson, and T. F. Turner. 2012. Genetic monitoring and complex population dynamics: insights from a 12-year study of the Rio Grande silvery minnow. *Evolutionary Applications* doi: 10.1111/j.1752-4571.2011.00235.x
- Otis, D. L., K. P. Burnham, G. C. White, and D. R. Anderson. 1978. Statistical inference from capture data on closed animal populations. *Wildlife Monograph* 62. 135 pp.
- Pease, A. A., J. J. Davis, M. S. Edwards, and T. F. Turner. 2006. Habitat and resource use by larval and juvenile fishes in an arid-land river (Rio Grande, New Mexico). *Freshwater Biology* 51:475-486.
- 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.
- Pollack, K. H., J. D. Nichols, C. Brownie, and J. E. Hines. 1990. Statistical inference for capture-recapture experiments. *Wildlife Monographs* 107: 1-97.
- Richards, L. J., and J. T. Schnute. 1986. An experimental and statistical approach to the question: is CPUE an index of abundance? *Can. J. Fish. Aquat. Sci.* 43:1214-1227.
- Ricker, W. E. 1940. Relation of "catch per unit effort" to abundance and rate of exploitation. *J. Fish. Res. Board Can.* 5:43-70.
- Ricker, W. E. 1944. Further notes on fishing mortality and effort. *Copeia* 1944: 23-44.
- Schwarz, C. J., and G. A. F. Seber. 1999. Estimating animal abundance: review III. *Statistical Science* 14:427-456.
- Seber, G. A. F. 1992. A review of estimating animal abundance II. *International Statistical Review* 60:129-166.
- Turner, T.F., T.J. Krabbenhoft, and A.S. Burdett. 2010. Reproductive phenology and fish community structure in an arid-land river system. Pages 427-446 in K.B. Gido and D.A. Jackson, editors. *Community ecology of stream fishes: concepts, approaches, and techniques*. American Fisheries Society, Symposium Series 73, Bethesda, MD. 664 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.
- Welcomme, R. L. 1979. *The fisheries ecology of floodplain rivers*. Longman, London. 317 pp.
- Zar, J. H. 2010. *Biostatistical Analysis*. Fifth edition. Prentice Hall Inc., Upper Saddle River, New Jersey. 944 pp.

Appendix A.

Middle Rio Grande fish collection localities

Table A-1. Collection localities for December 2010 to October 2011 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 2010 to October 2011 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 2010 to October 2011 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

Table B-1. Water quality* summary statistics [Mean (Standard Deviation)], by sampling unit and reach, during the December 2010 to October 2011 population monitoring of Rio Grande silvery minnow.

REACH Sampling Unit and Name	Sec.	Temp.	Sal.	D.O.	Con. T.	Con.S.	pH
ANGOSTURA REACH							
0 Angostura Dam	44 (35.4)	14.7 (8.2)	0.1 (0)	7.9 (2.8)	245.7 (49.1)	307.2 (19.8)	8.5 (0.2)
1 Bernalillo	30.2 (16.2)	16.1 (8.6)	0.1 (0)	8.5 (2.7)	257.7 (50.2)	311.8 (20.6)	8.7 (0.3)
2 Rio Rancho	26.6 (11.4)	17.1 (8.4)	0.1 (0)	8.5 (1.5)	259.8 (50.2)	314.3 (21.9)	8.7 (0.3)
3 Central Ave.	17.4 (10)	16.4 (7.3)	0.2 (0)	7.5 (2.7)	278.3 (47.1)	334.2 (25.5)	8.5 (0.2)
4 Rio Bravo Blvd.	13.4 (7.8)	14.7 (8.1)	0.2 (0)	8.4 (2.2)	266.7 (50.3)	334.4 (23.6)	8.6 (0.2)
ISLETA REACH							
5 Los Lunas	15 (9.6)	22.5 (10.3)	0.2 (0)	7.8 (1.9)	353.9 (48.9)	420.5 (34)	8.7 (0.2)
6 Belen	15.2 (9.4)	21.1 (9.9)	0.2 (0)	7.4 (2.3)	377.1 (80.9)	441.6 (46.4)	8.7 (0.2)
7 Jarales	19.9 (14.6)	19 (8.7)	0.2 (0)	8.7 (1.9)	357.2 (53.5)	451 (42.8)	8.7 (0.2)
8 Bernardo	19.4 (13.4)	17.2 (8.4)	0.2 (0)	8.2 (1.8)	419.2 (107.6)	488.2 (50.6)	8.6 (0.3)
9 La Joya	23.3 (22.7)	15.1 (7.5)	0.3 (0)	8.6 (2)	455.2 (87)	504.8 (118.5)	8.7 (0.3)
9.5 North of San Acacia	11 (8.3)	19.5 (9.7)	0.3 (0.1)	7.3 (1.2)	571.2 (195.5)	632.6 (137.7)	8.6 (0.1)
SAN ACACIA REACH							
10 San Acacia Dam	11.3 (8.6)	17.7 (9.1)	0.3 (0.1)	7.5 (1.4)	537.2 (179.1)	632.5 (127.4)	8.5 (0.1)
11 South of San Acacia	12.2 (9.2)	17.5 (9.6)	0.3 (0.1)	7.4 (1.3)	493 (88.1)	607.5 (129.7)	8.4 (0.1)
12 Socorro	10.4 (10.1)	16.3 (9)	0.3 (0.1)	8.4 (1.2)	551.5 (167.9)	662.5 (123.2)	8.6 (0.1)
13 North of San Antonio	7.3 (6.5)	14.8 (9.3)	0.3 (0.1)	8.4 (1.2)	542.2 (156)	688.1 (124.5)	8.6 (0.3)
14 San Antonio	6.6 (5.2)	19.5 (10.1)	0.4 (0.2)	8.2 (3.3)	703.7 (528)	824 (458.2)	8.7 (0.4)
15 South of San Antonio	6.1 (4.7)	19.3 (10.2)	0.3 (0.1)	8.9 (3.8)	579 (252.7)	681.1 (188.8)	8.8 (0.4)
16 San Marcial	9.9 (9.1)	18.5 (10.3)	0.4 (0.1)	8.9 (3.6)	690.6 (299.5)	820.4 (191)	8.8 (0.3)
17 South of San Marcial 1	6.9 (6.1)	17.3 (10.2)	0.4 (0.1)	8.9 (4.1)	699.8 (307)	852 (197.7)	8.7 (0.3)
18 South of San Marcial 2	6.9 (6.4)	16.4 (10.3)	0.4 (0.1)	8.9 (4.3)	679.3 (305.8)	837.2 (196.2)	8.7 (0.3)

*Water quality codes:

Sec. = Secchi depth (cm)

Temp. = Water Temperature (°C)

Sal. = Salinity (ppt)

D.O. = Dissolved Oxygen (mg/l)

Con. T. = True Conductivity (µs)

Con. S. = Specific Conductance (µs)

pH = pH (dimensionless measure of the acidity or basicity of a solution)

Appendix C.

Ichthyofaunal composition of the December 2010 to October 2011
Rio Grande silvery minnow population monitoring collections

Monthly trip reports and associated data are available at:
<http://www.asirllc.com/rgsm/rgsm2010/>
and
<http://www.asirllc.com/rgsm/rgsm2011/>

**Rio Grande silvery minnow Population Monitoring
December 2010**

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage
Rio Grande, directly below Angostura Diversion Dam, Algodones.
03 December 2010 **RKD10-285**

Site Number: 0
River Mile: 209.7

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

A.L. Barkalow, R.C. Keller, M.A. Brandenburg

Effort: 624.0 sq. m

FAMILY		N
76	<i>Rhinichthys cataractae</i>	1

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage
Rio Grande, at US HWY 550 (formerly NM State HWY 44) bridge crossing, Bernalillo.
03 December 2010 **RKD10-286**

Site Number: 1
River Mile: 203.8

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

A.L. Barkalow, R.C. Keller, M.A. Brandenburg

Effort: 804.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	2
76	<i>Platygobio gracilis</i>	17

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.
03 December 2010 **RKD10-287**

Site Number: 2
River Mile: 200.0

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

A.L. Barkalow, R.C. Keller, M.A. Brandenburg

Effort: 492.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	21
76	<i>Hybognathus amarus*</i>	2
76	<i>Platygobio gracilis</i>	10
212	<i>Gambusia affinis</i>	9

* *Hybognathus amarus* by age class:

age-0: 2

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
December 2010**

NEW MEXICO: BERNALILLO Co., RIO GRANDE Drainage

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

Site Number: 3

03 December 2010

RKD10-284

River Mile: 183.4

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

A.L. Barkalow, R.C. Keller, M.A. Brandenburg

Effort: 596.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	15
76	<i>Cyprinus carpio</i>	1
76	<i>Platygobio gracilis</i>	8
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	23

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

03 December 2010

RKD10-283

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

A.L. Barkalow, R.C. Keller, M.A. Brandenburg

Effort: 536.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	1
76	<i>Hybognathus amarus*</i>	1
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	3
93	<i>Ictalurus punctatus</i>	1

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

age-0:

age-1: 1

age-2:

**Rio Grande silvery minnow Population Monitoring
December 2010**

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage

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

02 December 2010

RKD10-282

Site Number: 5

River Mile: 161.4

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

A.L. Barkalow, R.C. Keller, K.M. Schaus

Effort: 570.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	33
76	<i>Hybognathus amarus*</i>	14
76	<i>Platygobio gracilis</i>	5
93	<i>Ictalurus punctatus</i>	1

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

age-0: 7

age-1: 6

age-2: 1

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage

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

02 December 2010

RKD10-281

Site Number: 6

River Mile: 151.5

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

A.L. Barkalow, R.C. Keller, K.M. Schaus

Effort: 442.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	130
76	<i>Hybognathus amarus*</i>	4
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	2
76	<i>Rhinichthys cataractae</i>	1
81	<i>Carpoides carpio</i>	4
93	<i>Ictalurus punctatus</i>	14

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

age-0: 3

age-1: 1

age-2:

**Rio Grande silvery minnow Population Monitoring
December 2010**

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage

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

02 December 2010

RKD10-280

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

A.L. Barkalow, R.C. Keller, K.M. Schaus

Site Number: 7

River Mile: 143.2

Effort: 547.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	407
76	<i>Hybognathus amarus*</i>	16
76	<i>Pimephales promelas</i>	7
76	<i>Platygobio gracilis</i>	4
81	<i>Carpoides carpio</i>	2
93	<i>Ictalurus punctatus</i>	3
212	<i>Gambusia affinis</i>	1

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

age-0: 15

age-1: 1

age-2:

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

02 December 2010

RKD10-279

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

A.L. Barkalow, R.C. Keller, K.M. Schaus

Site Number: 8

River Mile: 130.6

Effort: 512.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	148
76	<i>Cyprinus carpio</i>	2
76	<i>Hybognathus amarus*</i>	4
76	<i>Pimephales promelas</i>	5
76	<i>Platygobio gracilis</i>	1
93	<i>Ictalurus punctatus</i>	2
212	<i>Gambusia affinis</i>	16

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

age-0: 2

age-1: 2

age-2:

**Rio Grande silvery minnow Population Monitoring
December 2010**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

02 December 2010

RKD10-278

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

A.L. Barkalow, R.C. Keller, K.M. Schaus

Site Number: 9

River Mile: 127.0

Effort: 502.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	73
76	<i>Hybognathus amarus*</i>	15
76	<i>Pimephales promelas</i>	1
81	<i>Carpiodes carpio</i>	1
212	<i>Gambusia affinis</i>	10
294	<i>Pomoxis annularis</i>	1

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

age-0: 13

age-1: 2

age-2:

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

01 December 2010

RKD10-277

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

M.A. Farrington, A.L. Barkalow, R.C. Keller

Site Number: 9.5

River Mile: 116.8

Effort: 548.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	6
76	<i>Hybognathus amarus*</i>	63
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	143
93	<i>Ictalurus punctatus</i>	3

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

age-0: 61

age-1: 2

age-2:

**Rio Grande silvery minnow Population Monitoring
December 2010**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

01 December 2010

RKD10-276

Site Number: 10

River Mile: 116.2

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

M.A. Farrington, A.L. Barkalow, R.C. Keller

Effort: 623.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	73
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	24
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	107
81	<i>Carpionodes carpio</i>	1

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

age-0: 24

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.

01 December 2010

RKD10-275

Site Number: 11

River Mile: 114.6

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

M.A. Farrington, A.L. Barkalow, R.C. Keller

Effort: 540.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	92
76	<i>Hybognathus amarus*</i>	70
76	<i>Platygobio gracilis</i>	95
93	<i>Ictalurus punctatus</i>	6

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

age-0: 68

age-1: 2

age-2:

**Rio Grande silvery minnow Population Monitoring
December 2010**

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, Socorro. River Mile: 99.5

01 December 2010

RKD10-274

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

M.A. Farrington, A.L. Barkalow, R.C. Keller

Effort: 588.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	12
76	<i>Hybognathus amarus*</i>	101
76	<i>Platygobio gracilis</i>	22
93	<i>Ictalurus punctatus</i>	2

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

age-0: 92

age-1: 7

age-2: 2

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

Site Number: 13

01 December 2010

RKD10-273

River Mile: 91.7

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

M.A. Farrington, A.L. Barkalow, R.C. Keller

Effort: 668.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	2
76	<i>Hybognathus amarus*</i>	65
81	<i>Carpoides carpio</i>	1
93	<i>Ictalurus punctatus</i>	5

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

age-0: 37

age-1: 21

age-2: 7

**Rio Grande silvery minnow Population Monitoring
December 2010**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at US HWY 380 bridge crossing, San Antonio.
01 December 2010

RKD10-272

Site Number: 14
River Mile: 87.1

UTM Easting: 328914 UTM Northing: 3754471 Zone: 13 Quad: San Antonio
R.K. Dudley, M.A. Brandenburg, K.M. Schaus

Effort: 599.0 sq. m

FAMILY		N
76	<i>Hybognathus amarus*</i>	2
76	<i>Rhinichthys cataractae</i>	1
212	<i>Gambusia affinis</i>	4

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

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

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, directly east of Bosque del Apache National Wildlife Refuge Headquarters.
01 December 2010

RKD10-271

Site Number: 15
River Mile: 79.1

UTM Easting: 327055 UTM Northing: 3740839 Zone: 13 Quad: San Antonio SE
R.K. Dudley, M.A. Brandenburg, K.M. Schaus

Effort: 580.3 sq. m

FAMILY		N
76	<i>Hybognathus amarus*</i>	6

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

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

**Rio Grande silvery minnow Population Monitoring
December 2010**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at San Marcial Railroad Bridge, San Marcial.
01 December 2010 **RKD10-270**

Site Number: 16
River Mile: 68.6

UTM Easting: 315284 UTM Northing: 3728347 Zone: 13 Quad: San Marcial
R.K. Dudley, M.A. Brandenburg, K.M. Schaus

Effort: 494.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	3
76	<i>Hybognathus amarus*</i>	68

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

age-0: 66
age-1: 2
age-2:

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, ca. 8 miles downstream of the San Marcial railroad bridge crossing
01 December 2010 **RKD10-269**

Site Number: 17
River Mile: 60.5

UTM Easting: 309487 UTM Northing: 3718178 Zone: 13 Quad: Paraje Well
R.K. Dudley, M.A. Brandenburg, K.M. Schaus

Effort: 587.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	1
76	<i>Hybognathus amarus*</i>	211
76	<i>Platygobio gracilis</i>	2
93	<i>Ictalurus punctatus</i>	1

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

age-0: 209
age-1: 2
age-2:

**Rio Grande silvery minnow Population Monitoring
December 2010**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

01 December 2010

RKD10-268

Site Number: 18

River Mile: 58.8

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

R.K. Dudley, M.A. Brandenburg, K.M. Schaus

Effort: 579.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	1
76	<i>Hybognathus amarus</i> *	38
93	<i>Ictalurus punctatus</i>	9

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

age-0: 38

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
February 2011**

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage
Rio Grande, directly below Angostura Diversion Dam, Algodones.
11 February 2011 **RKD11-018**

Site Number: 0
River Mile: 209.7

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

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

Effort: 554.3 sq. m

FAMILY		N
76	<i>Platygobio gracilis</i>	2
81	<i>Catostomus commersoni</i>	1

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage
Rio Grande, at US HWY 550 (formerly NM State HWY 44) bridge crossing, Bernalillo.
11 February 2011 **RKD11-019**

Site Number: 1
River Mile: 203.8

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

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

Effort: 590.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	1
76	<i>Platygobio gracilis</i>	2

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.
11 February 2011 **RKD11-020**

Site Number: 2
River Mile: 200.0

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

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

Effort: 531.3 sq. m

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

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

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

**Rio Grande silvery minnow Population Monitoring
February 2011**

NEW MEXICO: BERNALILLO Co., RIO GRANDE Drainage

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

Site Number: 3

11 February 2011

RKD11-017

River Mile: 183.4

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

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

Effort: 562.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	7
76	<i>Platygobio gracilis</i>	5

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 February 2011

RKD11-016

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

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

Effort: 478.8 sq. m

FAMILY		N
76	<i>Platygobio gracilis</i>	2

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage

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

Site Number: 5

14 February 2011

RKD11-015

River Mile: 161.4

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

R.K. Dudley, A.L. Barkalow, J.L. Hester

Effort: 612.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	154
76	<i>Hybognathus amarus*</i>	7
76	<i>Platygobio gracilis</i>	1
93	<i>Ictalurus punctatus</i>	1

* *Hybognathus amarus* by age class:

age-0:

age-1: 3

age-2: 4

**Rio Grande silvery minnow Population Monitoring
February 2011**

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage

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

14 February 2011

RKD11-014

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

R.K. Dudley, A.L. Barkalow, J.L. Hester

Site Number: 6

River Mile: 151.5

Effort: 568.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	88
76	<i>Hybognathus amarus*</i>	3
93	<i>Ictalurus punctatus</i>	1

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

age-0:

age-1: 2

age-2: 1

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage

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

14 February 2011

RKD11-013

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

R.K. Dudley, A.L. Barkalow, J.L. Hester

Site Number: 7

River Mile: 143.2

Effort: 557.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	46
76	<i>Hybognathus amarus*</i>	2

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

age-0:

age-1: 2

age-2:

**Rio Grande silvery minnow Population Monitoring
February 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at US HWY 60 bridge crossing, Bernardo.
14 February 2011

RKD11-012

Site Number: 8
River Mile: 130.6

UTM Easting: 334604 UTM Northing: 3809726 Zone: 13 Quad: Abeytas
R.K. Dudley, A.L. Barkalow, J.L. Hester

Effort: 534.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	165
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	8
76	<i>Pimephales promelas</i>	3
76	<i>Platygobio gracilis</i>	1
81	<i>Carpiodes carpio</i>	2
294	<i>Lepomis macrochirus</i>	1

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

age-0:
age-1: 8
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 February 2011

RKD11-011

Site Number: 9
River Mile: 127.0

UTM Easting: 331094 UTM Northing: 3805229 Zone: 13 Quad: Abeytas
R.K. Dudley, A.L. Barkalow, J.L. Hester

Effort: 524.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	109
76	<i>Hybognathus amarus*</i>	12
81	<i>Carpiodes carpio</i>	1

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

age-0:
age-1: 12
age-2:

**Rio Grande silvery minnow Population Monitoring
February 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

11 February 2011

RKD11-010

Site Number: 9.5

River Mile: 116.8

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

M.A. Farrington, A.L. Barkalow, J.L. Hester

Effort: 560.0 sq. m

FAMILY		N
76	<i>Hybognathus amarus</i> *	14
76	<i>Platygobio gracilis</i>	36

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

age-0:

age-1: 14

age-2:

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

11 February 2011

RKD11-009

Site Number: 10

River Mile: 116.2

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

M.A. Farrington, A.L. Barkalow, J.L. Hester

Effort: 519.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	5
76	<i>Hybognathus amarus</i> *	14
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	15
81	<i>Carpoides carpio</i>	1
81	<i>Catostomus commersoni</i>	1

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

age-0:

age-1: 12

age-2: 2

**Rio Grande silvery minnow Population Monitoring
February 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

Site Number: 11

11 February 2011

RKD11-008

River Mile: 114.6

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

M.A. Farrington, A.L. Barkalow, J.L. Hester

Effort: 551.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	23
76	<i>Hybognathus amarus*</i>	23
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	86

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

age-0:

age-1: 23

age-2:

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, Socorro. River Mile: 99.5

11 February 2011

RKD11-007

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

M.A. Farrington, A.L. Barkalow, J.L. Hester

Effort: 491.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	10
76	<i>Hybognathus amarus*</i>	48
76	<i>Platygobio gracilis</i>	21

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

age-0:

age-1: 37

age-2: 11

**Rio Grande silvery minnow Population Monitoring
February 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, ca. 4.0 miles upstream of U.S. 380 bridge crossing.
11 February 2011 **RKD11-006**

Site Number: 13
River Mile: 91.7

UTM Easting: 328140 UTM Northing: 3761283 Zone: 13 Quad: San Antonio
M.A. Farrington, A.L. Barkalow, J.L. Hester

Effort: 506.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	1
76	<i>Hybognathus amarus*</i>	28
93	<i>Ictalurus punctatus</i>	1

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

age-0:
age-1: 23
age-2: 5

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at US HWY 380 bridge crossing, San Antonio.
10 February 2011 **RKD11-005**

Site Number: 14
River Mile: 87.1

UTM Easting: 328914 UTM Northing: 3754471 Zone: 13 Quad: San Antonio
W.H. Brandenburg, A.L. Barkalow, J.L. Hester

Effort: 577.8 sq. m

FAMILY		N
76	<i>Hybognathus amarus*</i>	14
93	<i>Ictalurus punctatus</i>	1

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

age-0:
age-1: 11
age-2: 3

**Rio Grande silvery minnow Population Monitoring
February 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

10 February 2011

RKD11-004

River Mile: 79.1

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

W.H. Brandenburg, A.L. Barkalow, J.L. Hester

Effort: 632.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	1
76	<i>Hybognathus amarus*</i>	46

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

age-0:
age-1: 37
age-2: 9

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

10 February 2011

RKD11-003

Site Number: 16

River Mile: 68.6

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

W.H. Brandenburg, A.L. Barkalow, J.L. Hester

Effort: 634.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	3
76	<i>Hybognathus amarus*</i>	25
76	<i>Platygobio gracilis</i>	4

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

age-0:
age-1: 21
age-2: 4

**Rio Grande silvery minnow Population Monitoring
February 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

Rio Grande, ca. 8 miles downstream of the San Marcial railroad bridge crossing

10 February 2011

RKD11-002

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

W.H. Brandenburg, A.L. Barkalow, J.L. Hester

Site Number: 17

River Mile: 60.5

Effort: 467.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	11
76	<i>Hybognathus amarus*</i>	60
76	<i>Platygobio gracilis</i>	12

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

age-0:

age-1: 56

age-2: 4

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

10 February 2011

RKD11-001

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

W.H. Brandenburg, A.L. Barkalow, J.L. Hester

Site Number: 18

River Mile: 58.8

Effort: 513.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	9
76	<i>Hybognathus amarus*</i>	77
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	3
93	<i>Ictalurus punctatus</i>	4

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

age-0:

age-1: 72

age-2: 5

**Rio Grande silvery minnow Population Monitoring
April 2011**

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage
Rio Grande, directly below Angostura Diversion Dam, Algodones.
06 April 2011 **RKD11-038**

Site Number: 0
River Mile: 209.7

UTM Easting: 363811 UTM Northing: 3916006 Zone: 13 Quad: San Felipe Pueblo
R.K.Dudley, W.H.Brandenburg, W.J.Remshardt, A.T.Dean

Effort: 544.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	6
76	<i>Cyprinus carpio</i>	1
76	<i>Rhinichthys cataractae</i>	1
81	<i>Catostomus commersoni</i>	2

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage
Rio Grande, at US HWY 550 (formerly NM State HWY 44) bridge crossing, Bernalillo.
06 April 2011 **RKD11-039**
UTM Easting: 358543 UTM Northing: 3909722 Zone: 13 Quad: Bernalillo
R.K.Dudley, W.H.Brandenburg, W.J.Remshardt, A.T.Dean

Site Number: 1
River Mile: 203.8

Effort: 497.6 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	4
76	<i>Hybognathus amarus*</i>	3
76	<i>Platygobio gracilis</i>	34
76	<i>Rhinichthys cataractae</i>	2

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

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

**Rio Grande silvery minnow Population Monitoring
April 2011**

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

06 April 2011

RKD11-040

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

R.K.Dudley, W.H.Brandenburg, W.J.Remshardt, A.T.Dean

Effort: 504.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	51
76	<i>Hybognathus amarus*</i>	3
76	<i>Platygobio gracilis</i>	22
76	<i>Rhinichthys cataractae</i>	13

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

age-0:

age-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

06 April 2011

RKD11-037

River Mile: 183.4

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

R.K.Dudley, W.H.Brandenburg, W.J.Remshardt, A.T.Dean

Effort: 519.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	19
76	<i>Hybognathus amarus*</i>	4
76	<i>Platygobio gracilis</i>	47
93	<i>Ictalurus punctatus</i>	1
294	<i>Lepomis macrochirus</i>	1

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

age-0:

age-1:

age-2: 4

**Rio Grande silvery minnow Population Monitoring
April 2011**

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 2011

RKD11-036

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

R.K.Dudley, W.H.Brandenburg, W.J.Remshardt, A.T.Dean

Effort: 637.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	17
76	<i>Hybognathus amarus*</i>	2
76	<i>Platygobio gracilis</i>	3
81	<i>Catostomus commersoni</i>	1

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

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

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 2011

RKD11-035

River Mile: 161.4

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

M.A.Farrington, A.L.Barkalow, and J.L.Hester

Effort: 420.9 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	180
76	<i>Hybognathus amarus*</i>	1
81	<i>Carpoides carpio</i>	2

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

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

**Rio Grande silvery minnow Population Monitoring
April 2011**

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 2011

RKD11-034

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

M.A.Farrington, A.L.Barkalow, and J.L.Hester

Site Number: 6

River Mile: 151.5

Effort: 464.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	89
76	<i>Hybognathus amarus*</i>	1
93	<i>Ictalurus punctatus</i>	1

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

age-0:

age-1:

age-2: 1

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage

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

06 April 2011

RKD11-033

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

M.A.Farrington, A.L.Barkalow, and J.L.Hester

Site Number: 7

River Mile: 143.2

Effort: 437.1 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	378
76	<i>Cyprinus carpio</i>	1
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:

age-2: 1

**Rio Grande silvery minnow Population Monitoring
April 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

Site Number: 8

06 April 2011

RKD11-032

River Mile: 130.6

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

M.A.Farrington, A.L.Barkalow, and J.L.Hester

Effort: 443.7 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	44
93	<i>Ictalurus punctatus</i>	1

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

Site Number: 9

06 April 2011

RKD11-031

River Mile: 127.0

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

M.A.Farrington, A.L.Barkalow, and J.L.Hester

Effort: 499.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	61
76	<i>Cyprinus carpio</i>	1

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

Site Number: 9.5

04 April 2011

RKD11-030

River Mile: 116.8

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

M.A.Farrington, J.L.Hester, and A.T.Dean

Effort: 479.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	2
76	<i>Hybognathus amarus*</i>	1
76	<i>Platygobio gracilis</i>	72

* *Hybognathus amarus* by age class:

age-0:

age-1: 1

age-2:

**Rio Grande silvery minnow Population Monitoring
April 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

04 April 2011

RKD11-029

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

M.A.Farrington, J.L.Hester, and A.T.Dean

Site Number: 10

River Mile: 116.2

Effort: 335.9 sq. m

FAMILY		N
69	<i>Dorosoma cepedianum</i>	1
76	<i>Cyprinella lutrensis</i>	257
76	<i>Hybognathus amarus*</i>	16
76	<i>Platygobio gracilis</i>	23
81	<i>Carpoides carpio</i>	3

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

age-0:

age-1: 6

age-2: 10

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

04 April 2011

RKD11-028

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

M.A.Farrington, J.L.Hester, and A.T.Dean

Site Number: 11

River Mile: 114.6

Effort: 501.9 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	53
76	<i>Hybognathus amarus*</i>	2
76	<i>Platygobio gracilis</i>	27

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

age-0:

age-1: 1

age-2: 1

**Rio Grande silvery minnow Population Monitoring
April 2011**

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, Socorro. River Mile: 99.5

04 April 2011

RKD11-027

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

M.A.Farrington, J.L.Hester, and A.T.Dean

Effort: 492.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	22
76	<i>Hybognathus amarus*</i>	3
76	<i>Platygobio gracilis</i>	1
212	<i>Gambusia affinis</i>	1

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

age-0:

age-1: 2

age-2: 1

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

Site Number: 13

04 April 2011

RKD11-026

River Mile: 91.7

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

M.A.Farrington, J.L.Hester, and A.T.Dean

Effort: 625.4 sq. m

FAMILY	N
<i>No Fish Collected</i>	

**Rio Grande silvery minnow Population Monitoring
April 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at US HWY 380 bridge crossing, San Antonio.
04 April 2011

RKD11-025

Site Number: 14
River Mile: 87.1

UTM Easting: 328914 UTM Northing: 3754471 Zone: 13 Quad: San Antonio
R.K.Dudley, W.H.Brandenburg, and A.L.Barkalow

Effort: 615.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	1
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	11
93	<i>Ictalurus punctatus</i>	4
212	<i>Gambusia affinis</i>	1

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

age-0:
age-1: 4
age-2: 7

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, directly east of Bosque del Apache National Wildlife Refuge Headquarters.
04 April 2011

RKD11-024

Site Number: 15
River Mile: 79.1

UTM Easting: 327055 UTM Northing: 3740839 Zone: 13 Quad: San Antonio SE
R.K.Dudley, W.H.Brandenburg, and A.L.Barkalow

Effort: 580.6 sq. m

FAMILY		N
76	<i>Hybognathus amarus*</i>	7
93	<i>Ictalurus punctatus</i>	1

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

age-0:
age-1: 5
age-2: 2

**Rio Grande silvery minnow Population Monitoring
April 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at San Marcial Railroad Bridge, San Marcial.
04 April 2011 **RKD11-023**

Site Number: 16
River Mile: 68.6

UTM Easting: 315284 UTM Northing: 3728347 Zone: 13 Quad: San Marcial
R.K.Dudley, W.H.Brandenburg, and A.L.Barkalow

Effort: 562.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	13
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	1
93	<i>Ictalurus punctatus</i>	1

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, ca. 8 miles downstream of the San Marcial railroad bridge crossing
04 April 2011 **RKD11-022**

Site Number: 17
River Mile: 60.5

UTM Easting: 309487 UTM Northing: 3718178 Zone: 13 Quad: Paraje Well
R.K.Dudley, W.H.Brandenburg, and A.L.Barkalow

Effort: 589.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	11
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	1
76	<i>Pimephales promelas</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:

**Rio Grande silvery minnow Population Monitoring
April 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

04 April 2011

RKD11-021

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

R.K.Dudley, W.H.Brandenburg, and A.L.Barkalow

Site Number: 18

River Mile: 58.8

Effort: 520.5 sq. m

FAMILY

76

Cyprinella lutrensis

N

3

**Rio Grande silvery minnow Population Monitoring
May 2011**

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage
Rio Grande, directly below Angostura Diversion Dam, Algodones.
12 May 2011 **RKD11-058**

Site Number: 0
River Mile: 209.7

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

M.A.Farrington, T.J.Pilger, J.R. Remshardt, C.W. Hoagstrom

Effort: 443.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	1
76	<i>Rhinichthys cataractae</i>	11
81	<i>Catostomus commersoni</i>	178

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage
Rio Grande, at US HWY 550 (formerly NM State HWY 44) bridge crossing, Bernalillo.
12 May 2011 **RKD11-059**

Site Number: 1
River Mile: 203.8

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

M.A.Farrington, T.J.Pilger, J.R. Remshardt, C.W. Hoagstrom

Effort: 504.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	6
76	<i>Platygobio gracilis</i>	23
76	<i>Rhinichthys cataractae</i>	4
81	<i>Catostomus commersoni</i>	15

**Rio Grande silvery minnow Population Monitoring
May 2011**

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

12 May 2011

RKD11-060

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

M.A.Farrington, T.J.Pilger, J.R. Remshardt, C.W. Hoagstrom

Effort: 385.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	27
76	<i>Hybognathus amarus*</i>	1
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	16
76	<i>Rhinichthys cataractae</i>	1
81	<i>Catostomus commersoni</i>	623

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

age-0:

age-1:

age-2: 1

NEW MEXICO: BERNALILLO Co., RIO GRANDE Drainage

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

Site Number: 3

12 May 2011

RKD11-057

River Mile: 183.4

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

M.A.Farrington, T.J.Pilger, J.R. Remshardt, C.W. Hoagstrom

Effort: 388.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	76
76	<i>Platygobio gracilis</i>	52
76	<i>Rhinichthys cataractae</i>	5
81	<i>Catostomus commersoni</i>	14
93	<i>Ictalurus punctatus</i>	2

**Rio Grande silvery minnow Population Monitoring
May 2011**

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 May 2011

RKD11-056

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

M.A.Farrington, T.J.Pilger, J.R. Remshardt, C.W. Hoagstrom

Effort: 489.1 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	11
76	<i>Platygobio gracilis</i>	2
81	<i>Catostomus commersoni</i>	16

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

11 May 2011

RKD11-055

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

W.H.Brandenburg, J.L.Hester, T.J.Pilger

Effort: 462.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	44
76	<i>Pimephales promelas</i>	1

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage

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

Site Number: 6
River Mile: 151.5

11 May 2011

RKD11-054

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

W.H.Brandenburg, J.L.Hester, T.J.Pilger

Effort: 519.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	180
76	<i>Cyprinus carpio</i>	2
76	<i>Pimephales promelas</i>	18
81	<i>Catostomus commersoni</i>	1
93	<i>Ictalurus punctatus</i>	1

**Rio Grande silvery minnow Population Monitoring
May 2011**

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage

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

11 May 2011

RKD11-053

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

W.H.Brandenburg, J.L.Hester, T.J.Pilger

Site Number: 7

River Mile: 143.2

Effort: 517.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	324
76	<i>Hybognathus amarus*</i>	2
76	<i>Pimephales promelas</i>	1
81	<i>Catostomus commersoni</i>	11

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

age-0:

age-1: 1

age-2: 1

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

11 May 2011

RKD11-052

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

W.H.Brandenburg, J.L.Hester, T.J.Pilger

Site Number: 8

River Mile: 130.6

Effort: 455.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	79
81	<i>Catostomus commersoni</i>	12
212	<i>Gambusia affinis</i>	5

**Rio Grande silvery minnow Population Monitoring
May 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

10 May 2011

RKD11-051

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

W.H.Brandenburg, J.L.Hester, T.J.Pilger

Site Number: 9

River Mile: 127.0

Effort: 532.2 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	57
76	<i>Hybognathus amarus*</i>	1
76	<i>Pimephales promelas</i>	1
81	<i>Carpoides carpio</i>	1
81	<i>Catostomus commersoni</i>	1
93	<i>Ictalurus punctatus</i>	2

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

age-0:

age-1: 1

age-2:

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

10 May 2011

RKD11-050

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

W.H.Brandenburg, J.L.Hester, T.J.Pilger

Site Number: 9.5

River Mile: 116.8

Effort: 467.7 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	9
76	<i>Platygobio gracilis</i>	57
76	<i>Rhinichthys cataractae</i>	2
81	<i>Carpoides carpio</i>	1
81	<i>Catostomus commersoni</i>	140
93	<i>Ictalurus punctatus</i>	1

**Rio Grande silvery minnow Population Monitoring
May 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

10 May 2011

RKD11-049

Site Number: 10

River Mile: 116.2

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

W.H.Brandenburg, J.L.Hester, T.J.Pilger

Effort: 389.2 sq. m

FAMILY		N
69	<i>Dorosoma cepedianum</i>	4
76	<i>Cyprinella lutrensis</i>	300
76	<i>Hybognathus amarus*</i>	9
76	<i>Platygobio gracilis</i>	67
81	<i>Carpoides carpio</i>	7
283	<i>Morone chrysops</i>	1

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

age-0:

age-1: 6

age-2: 3

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

10 May 2011

RKD11-048

Site Number: 11

River Mile: 114.6

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

W.H.Brandenburg, J.L.Hester, T.J.Pilger

Effort: 526.2 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	103
76	<i>Hybognathus amarus*</i>	6
76	<i>Platygobio gracilis</i>	160
76	<i>Rhinichthys cataractae</i>	1
81	<i>Catostomus commersoni</i>	4

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

age-0:

age-1: 5

age-2: 1

**Rio Grande silvery minnow Population Monitoring
May 2011**

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, Socorro. River Mile: 99.5

10 May 2011

RKD11-047

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

W.H.Brandenburg, J.L.Hester, T.J.Pilger

Effort: 564.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	31
76	<i>Hybognathus amarus*</i>	2
76	<i>Platygobio gracilis</i>	1
81	<i>Catostomus commersoni</i>	3
212	<i>Gambusia affinis</i>	5

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

age-0:

age-1: 1

age-2: 1

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

Site Number: 13

10 May 2011

RKD11-046

River Mile: 91.7

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

W.H.Brandenburg, J.L.Hester, T.J.Pilger

Effort: 550.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	7
76	<i>Hybognathus amarus*</i>	4
76	<i>Platygobio gracilis</i>	1

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

age-0:

age-1: 3

age-2: 1

**Rio Grande silvery minnow Population Monitoring
May 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at US HWY 380 bridge crossing, San Antonio.
09 May 2011 **RKD11-045**

Site Number: 14
River Mile: 87.1

UTM Easting: 328914 UTM Northing: 3754471 Zone: 13 Quad: San Antonio
M.A.Farrington, A.L.Barkalow, T.J.Pilger

Effort: 530.0 sq. m

FAMILY		N
69	<i>Dorosoma cepedianum</i>	3
76	<i>Cyprinella lutrensis</i>	13
76	<i>Hybognathus amarus*</i>	27
212	<i>Gambusia affinis</i>	1

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

age-0:
age-1: 19
age-2: 8

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, directly east of Bosque del Apache National Wildlife Refuge Headquarters.
09 May 2011 **RKD11-044**
UTM Easting: 327055 UTM Northing: 3740839 Zone: 13 Quad: San Antonio SE
M.A.Farrington, A.L.Barkalow, T.J.Pilger

Site Number: 15
River Mile: 79.1

Effort: 520.2 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	1
76	<i>Cyprinus carpio</i>	8
76	<i>Hybognathus amarus*</i>	7
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	1

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

age-0: 1
age-1: 4
age-2: 2

**Rio Grande silvery minnow Population Monitoring
May 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at San Marcial Railroad Bridge, San Marcial.
09 May 2011 **RKD11-043**

Site Number: 16
River Mile: 68.6

UTM Easting: 315284 UTM Northing: 3728347 Zone: 13 Quad: San Marcial
M.A.Farrington, A.L.Barkalow, T.J.Pilger

Effort: 501.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	28
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	3
212	<i>Gambusia affinis</i>	3

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

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

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, ca. 8 miles downstream of the San Marcial railroad bridge crossing
09 May 2011 **RKD11-042**

Site Number: 17
River Mile: 60.5

UTM Easting: 309487 UTM Northing: 3718178 Zone: 13 Quad: Paraje Well
M.A.Farrington, A.L.Barkalow, T.J.Pilger

Effort: 507.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	13
76	<i>Platygobio gracilis</i>	4
212	<i>Gambusia affinis</i>	1

**Rio Grande silvery minnow Population Monitoring
May 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

09 May 2011

RKD11-041

Site Number: 18

River Mile: 58.8

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

M.A.Farrington, A.L.Barkalow, T.J.Pilger

Effort: 542.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	12
76	<i>Hybognathus amarus*</i>	2

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

age-0:

age-1: 2

age-2:

**Rio Grande silvery minnow Population Monitoring
June 2011**

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage
Rio Grande, directly below Angostura Diversion Dam, Algodones.
02 June 2011 **RKD11-078**

Site Number: 0
River Mile: 209.7

UTM Easting: 363811 UTM Northing: 3916006 Zone: 13 Quad: San Felipe Pueblo
R.K.Dudley, M.A.Farrington, W.J.Remshardt

Effort: 496.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	35
76	<i>Rhinichthys cataractae</i>	85
81	<i>Catostomus commersoni</i>	112

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage
Rio Grande, at US HWY 550 (formerly NM State HWY 44) bridge crossing, Bernalillo.
02 June 2011 **RKD11-079**

Site Number: 1
River Mile: 203.8

UTM Easting: 358543 UTM Northing: 3909722 Zone: 13 Quad: Bernalillo
R.K.Dudley, M.A.Farrington, W.J.Remshardt

Effort: 589.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	2
76	<i>Platygobio gracilis</i>	63
76	<i>Rhinichthys cataractae</i>	20
81	<i>Catostomus commersoni</i>	212

**Rio Grande silvery minnow Population Monitoring
June 2011**

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

02 June 2011

RKD11-080

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

R.K.Dudley, M.A.Farrington, W.J.Remshardt

Effort: 483.6 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	49
76	<i>Hybognathus amarus*</i>	5
76	<i>Platygobio gracilis</i>	29
76	<i>Rhinichthys cataractae</i>	60
81	<i>Carpoides carpio</i>	1
81	<i>Catostomus commersoni</i>	661
294	<i>Lepomis cyanellus</i>	1

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

age-0:

age-1: 3

age-2: 2

NEW MEXICO: BERNALILLO Co., RIO GRANDE Drainage

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

Site Number: 3

02 June 2011

RKD11-077

River Mile: 183.4

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

R.K.Dudley, M.A.Farrington, W.J.Remshardt

Effort: 505.2 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	27
76	<i>Cyprinus carpio</i>	1
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	53
76	<i>Rhinichthys cataractae</i>	1
81	<i>Carpoides carpio</i>	20
81	<i>Catostomus commersoni</i>	60

**Rio Grande silvery minnow Population Monitoring
June 2011**

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

02 June 2011

RKD11-076

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

R.K.Dudley, M.A.Farrington, W.J.Remshardt

Effort: 517.9 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	5
76	<i>Cyprinus carpio</i>	2
76	<i>Pimephales promelas</i>	9
76	<i>Platygobio gracilis</i>	1
81	<i>Carpoides carpio</i>	1
81	<i>Catostomus commersoni</i>	94
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	1

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

01 June 2011

RKD11-075

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

R.K.Dudley, W.H.Brandenburg, J.L.Hester

Effort: 489.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	72
76	<i>Cyprinus carpio</i>	6
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	1
81	<i>Carpoides carpio</i>	1
81	<i>Catostomus commersoni</i>	17

**Rio Grande silvery minnow Population Monitoring
June 2011**

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage

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

01 June 2011

RKD11-074

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

R.K.Dudley, W.H.Brandenburg, J.L.Hester

Site Number: 6

River Mile: 151.5

Effort: 476.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	128
76	<i>Cyprinus carpio</i>	16
76	<i>Hybognathus amarus*</i>	1
76	<i>Pimephales promelas</i>	108
76	<i>Platygobio gracilis</i>	1
81	<i>Carpiodes carpio</i>	4
81	<i>Catostomus commersoni</i>	19
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	1

*** *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.

01 June 2011

RKD11-073

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

R.K.Dudley, W.H.Brandenburg, J.L.Hester

Site Number: 7

River Mile: 143.2

Effort: 520.9 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	270
76	<i>Pimephales promelas</i>	1
81	<i>Catostomus commersoni</i>	25
93	<i>Ictalurus punctatus</i>	2
212	<i>Gambusia affinis</i>	1

**Rio Grande silvery minnow Population Monitoring
June 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

01 June 2011

RKD11-072

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

R.K.Dudley, W.H.Brandenburg, J.L.Hester

Site Number: 8

River Mile: 130.6

Effort: 513.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	143
76	<i>Pimephales promelas</i>	8
81	<i>Carpoides carpio</i>	1
81	<i>Catostomus commersoni</i>	20
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	2

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

01 June 2011

RKD11-071

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

R.K.Dudley, W.H.Brandenburg, J.L.Hester

Site Number: 9

River Mile: 127.0

Effort: 588.7 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	67
81	<i>Catostomus commersoni</i>	4

**Rio Grande silvery minnow Population Monitoring
June 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

02 June 2011

RKD11-070

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

W.H.Brandenburg, A.L.Barkalow, J.L.Hester

Site Number: 9.5

River Mile: 116.8

Effort: 473.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	1
76	<i>Pimephales promelas</i>	4
76	<i>Platygobio gracilis</i>	89
76	<i>Rhinichthys cataractae</i>	1
81	<i>Carpiodes carpio</i>	28
81	<i>Catostomus commersoni</i>	116
93	<i>Ictalurus punctatus</i>	1

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

02 June 2011

RKD11-069

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

W.H.Brandenburg, A.L.Barkalow, J.L.Hester

Site Number: 10

River Mile: 116.2

Effort: 461.9 sq. m

FAMILY		N
69	<i>Dorosoma cepedianum</i>	1
76	<i>Cyprinella lutrensis</i>	154
76	<i>Cyprinus carpio</i>	1
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	35
76	<i>Rhinichthys cataractae</i>	2
81	<i>Carpiodes carpio</i>	2
81	<i>Catostomus commersoni</i>	20
93	<i>Ictalurus punctatus</i>	2

**Rio Grande silvery minnow Population Monitoring
June 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

02 June 2011

RKD11-068

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

W.H.Brandenburg, A.L.Barkalow, J.L.Hester

Site Number: 11

River Mile: 114.6

Effort: 568.6 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	123
76	<i>Hybognathus amarus*</i>	5
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	95
76	<i>Rhinichthys cataractae</i>	1
81	<i>Carpionodes carpio</i>	1
81	<i>Catostomus commersoni</i>	54
93	<i>Ictalurus punctatus</i>	11

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

age-0:

age-1: 5

age-2:

**Rio Grande silvery minnow Population Monitoring
June 2011**

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, Socorro. River Mile: 99.5

02 June 2011

RKD11-067

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

W.H.Brandenburg, A.L.Barkalow, J.L.Hester

Effort: 566.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	96
76	<i>Cyprinus carpio</i>	9
76	<i>Hybognathus amarus*</i>	3
76	<i>Pimephales promelas</i>	4
76	<i>Platygobio gracilis</i>	13
81	<i>Carpionodes carpio</i>	8
81	<i>Catostomus commersoni</i>	21
93	<i>Ictalurus punctatus</i>	5
212	<i>Gambusia affinis</i>	15

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

age-0: 1

age-1: 1

age-2: 1

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

Site Number: 13

02 June 2011

RKD11-066

River Mile: 91.7

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

W.H.Brandenburg, A.L.Barkalow, J.L.Hester

Effort: 544.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	11
76	<i>Cyprinus carpio</i>	3
76	<i>Hybognathus amarus*</i>	4
76	<i>Pimephales promelas</i>	1
81	<i>Carpionodes carpio</i>	3
81	<i>Catostomus commersoni</i>	1

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

age-0:

age-1: 3

age-2: 1

**Rio Grande silvery minnow Population Monitoring
June 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at US HWY 380 bridge crossing, San Antonio.
01 June 2011

RKD11-065

Site Number: 14
River Mile: 87.1

UTM Easting: 328914 UTM Northing: 3754471 Zone: 13 Quad: San Antonio
M.A.Farrington, A.L.Barkalow, M.A.Brandenburg

Effort: 567.0 sq. m

FAMILY		N
76	<i>Cyprinus carpio</i>	15
76	<i>Hybognathus amarus*</i>	1
76	<i>Pimephales promelas</i>	5
76	<i>Platygobio gracilis</i>	4
81	<i>Carpoides carpio</i>	20
81	<i>Catostomus commersoni</i>	1

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

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

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, directly east of Bosque del Apache National Wildlife Refuge Headquarters.
01 June 2011

RKD11-064

Site Number: 15
River Mile: 79.1

UTM Easting: 327055 UTM Northing: 3740839 Zone: 13 Quad: San Antonio SE
M.A.Farrington, A.L.Barkalow, M.A.Brandenburg

Effort: 472.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	96
76	<i>Cyprinus carpio</i>	102
76	<i>Hybognathus amarus*</i>	11
76	<i>Pimephales promelas</i>	13
81	<i>Carpoides carpio</i>	7
81	<i>Ictiobus bubalus</i>	16
212	<i>Gambusia affinis</i>	2

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

age-0: 1
age-1: 8
age-2: 2

**Rio Grande silvery minnow Population Monitoring
June 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at San Marcial Railroad Bridge, San Marcial.
01 June 2011 **RKD11-063**

Site Number: 16
River Mile: 68.6

UTM Easting: 315284 UTM Northing: 3728347 Zone: 13 Quad: San Marcial
M.A.Farrington, A.L.Barkalow, M.A.Brandenburg

Effort: 491.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	25
76	<i>Cyprinus carpio</i>	27
76	<i>Hybognathus amarus*</i>	6
76	<i>Pimephales promelas</i>	7
76	<i>Platygobio gracilis</i>	5
81	<i>Carpionodes carpio</i>	2
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	1

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

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

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, ca. 8 miles downstream of the San Marcial railroad bridge crossing
01 June 2011 **RKD11-062**

Site Number: 17
River Mile: 60.5

UTM Easting: 309487 UTM Northing: 3718178 Zone: 13 Quad: Paraje Well
M.A.Farrington, A.L.Barkalow, M.A.Brandenburg

Effort: 531.6 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	12
76	<i>Cyprinus carpio</i>	76
76	<i>Pimephales promelas</i>	6
76	<i>Platygobio gracilis</i>	5
81	<i>Carpionodes carpio</i>	5
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	15

**Rio Grande silvery minnow Population Monitoring
June 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

01 June 2011

RKD11-061

Site Number: 18

River Mile: 58.8

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

M.A.Farrington, A.L.Barkalow, M.A.Brandenburg

Effort: 549.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	6
76	<i>Cyprinus carpio</i>	3
76	<i>Hybognathus amarus*</i>	6
76	<i>Pimephales promelas</i>	8
76	<i>Pimephales vigilax</i>	3
93	<i>Ictalurus punctatus</i>	2

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

age-0: 6

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
July 2011**

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage
Rio Grande, directly below Angostura Diversion Dam, Algodones.
14 July 2011

Site Number: 0
River Mile: 209.7

RKD11-098

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

R.K.Dudley, J.L.Hester, M.F.Peralta, M.L.Barnes

Effort: 526.9 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	173
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	17
76	<i>Rhinichthys cataractae</i>	38
81	<i>Carpoides carpio</i>	62
81	<i>Catostomus commersoni</i>	245
212	<i>Gambusia affinis</i>	117
294	<i>Lepomis cyanellus</i>	1
294	<i>Micropterus salmoides</i>	1
294	<i>Pomoxis annularis</i>	2
295	<i>Sander vitreus</i>	1

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage
Rio Grande, at US HWY 550 (formerly NM State HWY 44) bridge crossing, Bernalillo.
14 July 2011

Site Number: 1
River Mile: 203.8

RKD11-099

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

R.K.Dudley, J.L.Hester, M.F.Peralta, M.L.Barnes

Effort: 500.7 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	5
76	<i>Cyprinus carpio</i>	1
76	<i>Platygobio gracilis</i>	40
76	<i>Rhinichthys cataractae</i>	11
81	<i>Catostomus commersoni</i>	104
212	<i>Gambusia affinis</i>	5

**Rio Grande silvery minnow Population Monitoring
July 2011**

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

14 July 2011

RKD11-100

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

R.K.Dudley, J.L.Hester, M.F.Peralta, M.L.Barnes

Effort: 536.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	72
76	<i>Cyprinus carpio</i>	41
76	<i>Hybognathus amarus*</i>	2
76	<i>Platygobio gracilis</i>	5
76	<i>Rhinichthys cataractae</i>	4
81	<i>Carpionodes carpio</i>	21
81	<i>Catostomus commersoni</i>	79
93	<i>Ameiurus natalis</i>	1
212	<i>Gambusia affinis</i>	2
294	<i>Micropterus salmoides</i>	6
295	<i>Perca flavescens</i>	2

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

age-0: 2

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
July 2011**

NEW MEXICO: BERNALILLO Co., RIO GRANDE Drainage

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

Site Number: 3

14 July 2011

RKD11-097

River Mile: 183.4

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

R.K.Dudley, J.L.Hester, M.F.Peralta, M.L.Barnes

Effort: 501.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	57
76	<i>Cyprinus carpio</i>	15
76	<i>Hybognathus amarus*</i>	9
76	<i>Pimephales promelas</i>	8
76	<i>Platygobio gracilis</i>	3
81	<i>Carpiodes carpio</i>	8
81	<i>Catostomus commersoni</i>	29
212	<i>Gambusia affinis</i>	2

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

age-0: 9

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

14 July 2011

RKD11-096

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

R.K.Dudley, J.L.Hester, M.F.Peralta, M.L.Barnes

Effort: 606.5 sq. m

FAMILY		N
69	<i>Dorosoma cepedianum</i>	3
76	<i>Cyprinella lutrensis</i>	65
76	<i>Pimephales promelas</i>	11
76	<i>Platygobio gracilis</i>	4
81	<i>Carpiodes carpio</i>	51
81	<i>Catostomus commersoni</i>	23
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	51
294	<i>Micropterus salmoides</i>	3

**Rio Grande silvery minnow Population Monitoring
July 2011**

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage

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

14 July 2011

RKD11-095

Site Number: 5

River Mile: 161.4

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

W.H.Brandenburg, M.A.Farrington, F.P.Cook

Effort: 524.2 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	496
76	<i>Cyprinus carpio</i>	9
76	<i>Hybognathus amarus*</i>	17
76	<i>Pimephales promelas</i>	47
81	<i>Carpoides carpio</i>	55
81	<i>Catostomus commersoni</i>	10
212	<i>Gambusia affinis</i>	35
294	<i>Micropterus salmoides</i>	2

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

age-0: 17

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
July 2011**

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage

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

14 July 2011

RKD11-094

Site Number: 6

River Mile: 151.5

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

W.H.Brandenburg, M.A.Farrington, F.P.Cook

Effort: 434.6 sq. m

FAMILY		N
69	<i>Dorosoma cepedianum</i>	1
76	<i>Cyprinella lutrensis</i>	651
76	<i>Cyprinus carpio</i>	10
76	<i>Hybognathus amarus*</i>	3
76	<i>Pimephales promelas</i>	18
81	<i>Carpoides carpio</i>	34
81	<i>Catostomus commersoni</i>	1
93	<i>Ictalurus punctatus</i>	2
212	<i>Gambusia affinis</i>	10

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

age-0: 1

age-1: 2

age-2:

**Rio Grande silvery minnow Population Monitoring
July 2011**

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage

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

14 July 2011

RKD11-093

Site Number: 7

River Mile: 143.2

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

W.H.Brandenburg, M.A.Farrington, F.P.Cook

Effort: 495.8 sq. m

FAMILY		N
69	<i>Dorosoma cepedianum</i>	10
76	<i>Cyprinella lutrensis</i>	1533
76	<i>Cyprinus carpio</i>	20
76	<i>Hybognathus amarus*</i>	1
76	<i>Pimephales promelas</i>	105
76	<i>Platygobio gracilis</i>	1
81	<i>Carpoides carpio</i>	20
81	<i>Catostomus commersoni</i>	4
93	<i>Ameiurus natalis</i>	1
212	<i>Gambusia affinis</i>	58
294	<i>Lepomis cyanellus</i>	1
294	<i>Micropterus salmoides</i>	3

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

age-0: 1

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
July 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at US HWY 60 bridge crossing, Bernardo.
14 July 2011

RKD11-092

Site Number: 8
River Mile: 130.6

UTM Easting: 334604 UTM Northing: 3809726 Zone: 13 Quad: Abeytas
W.H.Brandenburg, M.A.Farrington, F.P.Cook

Effort: 509.7 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	919
76	<i>Cyprinus carpio</i>	4
76	<i>Hybognathus amarus*</i>	3
76	<i>Pimephales promelas</i>	5
76	<i>Platygobio gracilis</i>	2
81	<i>Carpiodes carpio</i>	100
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	22

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

age-0: 3

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 July 2011

RKD11-091

Site Number: 9
River Mile: 127.0

UTM Easting: 331094 UTM Northing: 3805229 Zone: 13 Quad: Abeytas
W.H.Brandenburg, M.A.Farrington, F.P.Cook

Effort: 415.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	441
76	<i>Cyprinus carpio</i>	2
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	3
81	<i>Carpiodes carpio</i>	21
81	<i>Catostomus commersoni</i>	1
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	37
294	<i>Micropterus salmoides</i>	2

**Rio Grande silvery minnow Population Monitoring
July 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

Rio Grande, ca. 0.6 miles upstream of San Acacia Diversion Dam, San Acacia
13 July 2011 **RKD11-090**

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, F.P.Cook

Effort: 453.1 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	332
76	<i>Cyprinus carpio</i>	6
76	<i>Hybognathus amarus*</i>	3
76	<i>Pimephales promelas</i>	5
76	<i>Platygobio gracilis</i>	58
81	<i>Carpoides carpio</i>	119
93	<i>Ictalurus punctatus</i>	5
212	<i>Gambusia affinis</i>	31

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

age-0: 3

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
July 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

13 July 2011

RKD11-089

Site Number: 10

River Mile: 116.2

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

W.H.Brandenburg, M.A.Farrington, F.P.Cook

Effort: 445.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	263
76	<i>Cyprinus carpio</i>	7
76	<i>Hybognathus amarus*</i>	104
76	<i>Pimephales promelas</i>	117
76	<i>Platygobio gracilis</i>	470
76	<i>Rhinichthys cataractae</i>	20
81	<i>Carpoides carpio</i>	13
81	<i>Catostomus commersoni</i>	16
93	<i>Ictalurus punctatus</i>	3
212	<i>Gambusia affinis</i>	2

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

age-0: 95

age-1: 9

age-2:

**Rio Grande silvery minnow Population Monitoring
July 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

Rio Grande, ca. 1.5 miles downstream of San Acacia Diversion Dam, San Acacia.
13 July 2011 **RKD11-088**

Site Number: 11
River Mile: 114.6

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

W.H.Brandenburg, M.A.Farrington, F.P.Cook

Effort: 497.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	1528
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	50
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	164
81	<i>Carpiodes carpio</i>	47
81	<i>Catostomus commersoni</i>	15
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	6

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

age-0: 11

age-1: 34

age-2: 5

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, Socorro. River Mile: 99.5
13 July 2011 **RKD11-087**

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, F.P.Cook

Effort: 489.1 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	956
76	<i>Cyprinus carpio</i>	5
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	4
81	<i>Carpiodes carpio</i>	25
81	<i>Catostomus commersoni</i>	27
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	94

**Rio Grande silvery minnow Population Monitoring
July 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, ca. 4.0 miles upstream of U.S. 380 bridge crossing. Site Number: 13
13 July 2011 **RKD11-086** River Mile: 91.7
UTM Easting: 328140 UTM Northing: 3761283 Zone: 13 Quad: San Antonio
W.H.Brandenburg, M.A.Farrington, F.P.Cook Effort: sq. m
FAMILY **N**
Site Not Sampled (Site Dry)

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at US HWY 380 bridge crossing, San Antonio. Site Number: 14
13 July 2011 **RKD11-085** River Mile: 87.1
UTM Easting: 328914 UTM Northing: 3754471 Zone: 13 Quad: San Antonio
R.K.Dudley, J.L.Hester, M.F.Peralta Effort: sq. m
FAMILY **N**
Site Not Sampled (Site Dry)

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, directly east of Bosque del Apache National Wildlife Refuge Headquarters. Site Number: 15
13 July 2011 **RKD11-084** River Mile: 79.1
UTM Easting: 327055 UTM Northing: 3740839 Zone: 13 Quad: San Antonio SE
R.K.Dudley, J.L.Hester, M.F.Peralta Effort: sq. m
FAMILY **N**
Site Not Sampled (Site Dry)

**Rio Grande silvery minnow Population Monitoring
July 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at San Marcial Railroad Bridge, San Marcial.
13 July 2011

RKD11-083

UTM Easting: 315284 UTM Northing: 3728347 Zone: 13 Quad: San Marcial
R.K.Dudley, J.L.Hester, M.F.Peralta

Site Number: 16
River Mile: 68.6

Effort: 477.1 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	206
76	<i>Cyprinus carpio</i>	10
76	<i>Hybognathus amarus*</i>	1
76	<i>Pimephales promelas</i>	1
81	<i>Carpiodes carpio</i>	11
93	<i>Ictalurus furcatus</i>	1
212	<i>Gambusia affinis</i>	7

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

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

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, ca. 8 miles downstream of the San Marcial railroad bridge crossing
13 July 2011

RKD11-082

UTM Easting: 309487 UTM Northing: 3718178 Zone: 13 Quad: Paraje Well
R.K.Dudley, J.L.Hester, M.F.Peralta

Site Number: 17
River Mile: 60.5

Effort: 474.9 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	274
76	<i>Cyprinus carpio</i>	9
76	<i>Hybognathus amarus*</i>	78
76	<i>Pimephales promelas</i>	11
76	<i>Platygobio gracilis</i>	21
81	<i>Carpiodes carpio</i>	12
212	<i>Gambusia affinis</i>	1

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

age-0: 78
age-1:
age-2:

**Rio Grande silvery minnow Population Monitoring
July 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

13 July 2011

RKD11-081

Site Number: 18

River Mile: 58.8

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

R.K.Dudley, J.L.Hester, M.F.Peralta

Effort: 581.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	245
76	<i>Cyprinus carpio</i>	2
76	<i>Hybognathus amarus*</i>	14
76	<i>Pimephales promelas</i>	22
81	<i>Carpoides carpio</i>	7
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	1

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

age-0: 13

age-1: 1

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2011**

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage
Rio Grande, directly below Angostura Diversion Dam, Algodones.
05 August 2011

Site Number: 0
River Mile: 209.7

RKD11-118

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

M.A. Farrington, J.L. Hester, M.F. Peralta, C.J. Wolf

Effort: 392.9 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	56
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	24
76	<i>Rhinichthys cataractae</i>	144
81	<i>Catostomus commersoni</i>	36
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	29
294	<i>Lepomis macrochirus</i>	1
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.
05 August 2011

Site Number: 1
River Mile: 203.8

RKD11-119

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

M.A. Farrington, J.L. Hester, M.F. Peralta, C.J. Wolf

Effort: 545.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	22
76	<i>Hybognathus amarus*</i>	5
76	<i>Platygobio gracilis</i>	26
76	<i>Rhinichthys cataractae</i>	21
81	<i>Carpoides carpio</i>	4
81	<i>Catostomus commersoni</i>	50
93	<i>Ameiurus natalis</i>	3
212	<i>Gambusia affinis</i>	21

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

age-0: 5

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2011**

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 August 2011

RKD11-120

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

M.A. Farrington, J.L. Hester, M.F. Peralta, C.J. Wolf

Effort: 435.9 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	30
76	<i>Hybognathus amarus*</i>	9
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	15
81	<i>Carpoides carpio</i>	3
81	<i>Catostomus commersoni</i>	46
93	<i>Ameiurus natalis</i>	3
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	28
294	<i>Lepomis macrochirus</i>	1

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

age-0: 9

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2011**

NEW MEXICO: BERNALILLO Co., RIO GRANDE Drainage

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

Site Number: 3

05 August 2011

RKD11-117

River Mile: 183.4

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

M.A. Farrington, J.L. Hester, M.F. Peralta, C.J. Wolf

Effort: 462.9 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	135
76	<i>Cyprinus carpio</i>	3
76	<i>Hybognathus amarus*</i>	55
76	<i>Pimephales promelas</i>	8
76	<i>Platygobio gracilis</i>	13
81	<i>Carpoides carpio</i>	25
81	<i>Catostomus commersoni</i>	18
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	138
212	<i>Gambusia affinis</i>	5
294	<i>Micropterus salmoides</i>	1
294	<i>Pomoxis annularis</i>	1

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

age-0: 55

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2011**

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

05 August 2011

RKD11-116

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

M.A. Farrington, J.L. Hester, M.F. Peralta, C.J. Wolf

Effort: 487.2 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	35
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	6
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	8
81	<i>Carpoides carpio</i>	3
81	<i>Catostomus commersoni</i>	5
93	<i>Ameiurus natalis</i>	3
93	<i>Ictalurus punctatus</i>	29
212	<i>Gambusia affinis</i>	58
294	<i>Lepomis macrochirus</i>	1

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

age-0: 6

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2011**

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage

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

05 August 2011

RKD11-115

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

R.K. Dudley, M.A. Brandenburg, F.P. Cook

Site Number: 5

River Mile: 161.4

Effort: 478.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	342
76	<i>Cyprinus carpio</i>	10
76	<i>Hybognathus amarus*</i>	3
76	<i>Pimephales promelas</i>	33
76	<i>Platygobio gracilis</i>	1
81	<i>Carpiodes carpio</i>	61
93	<i>Ameiurus natalis</i>	5
93	<i>Ictalurus punctatus</i>	19
212	<i>Gambusia affinis</i>	30
294	<i>Pomoxis annularis</i>	1

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

age-0: 3

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.

05 August 2011

RKD11-114

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

R.K. Dudley, M.A. Brandenburg, F.P. Cook

Site Number: 6

River Mile: 151.5

Effort: 450.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	215
76	<i>Hybognathus amarus*</i>	42
76	<i>Pimephales promelas</i>	16
81	<i>Carpiodes carpio</i>	2
93	<i>Ictalurus punctatus</i>	4
212	<i>Gambusia affinis</i>	10

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

age-0: 42

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2011**

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage

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

05 August 2011

RKD11-113

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

R.K. Dudley, M.A. Brandenburg, F.P. Cook

Site Number: 7

River Mile: 143.2

Effort: 446.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	372
76	<i>Cyprinus carpio</i>	13
76	<i>Hybognathus amarus*</i>	9
76	<i>Pimephales promelas</i>	31
76	<i>Platygobio gracilis</i>	1
81	<i>Carpiodes carpio</i>	9
81	<i>Catostomus commersoni</i>	1
93	<i>Ictalurus punctatus</i>	4
212	<i>Gambusia affinis</i>	93
294	<i>Micropterus salmoides</i>	1

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

age-0: 9

age-1:

age-2:

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

05 August 2011

RKD11-112

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

R.K. Dudley, M.A. Brandenburg, F.P. Cook

Site Number: 8

River Mile: 130.6

Effort: 505.0 sq. m

FAMILY		N
69	<i>Dorosoma cepedianum</i>	1
76	<i>Cyprinella lutrensis</i>	220
76	<i>Cyprinus carpio</i>	10
76	<i>Pimephales promelas</i>	11
81	<i>Carpiodes carpio</i>	7
81	<i>Catostomus commersoni</i>	1
93	<i>Ictalurus punctatus</i>	2
212	<i>Gambusia affinis</i>	46

**Rio Grande silvery minnow Population Monitoring
August 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

05 August 2011

RKD11-111

Site Number: 9

River Mile: 127.0

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

R.K. Dudley, M.A. Brandenburg, F.P. Cook, Y.M. Paroz

Effort: 508.4 sq. m

FAMILY		N
69	<i>Dorosoma cepedianum</i>	13
76	<i>Cyprinella lutrensis</i>	525
76	<i>Cyprinus carpio</i>	59
76	<i>Hybognathus amarus*</i>	1
76	<i>Pimephales promelas</i>	6
81	<i>Carpionotus carpio</i>	19
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	28
212	<i>Gambusia affinis</i>	40
294	<i>Micropterus salmoides</i>	3

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

age-0:

age-1: 1

age-2:

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

04 August 2011

RKD11-110

Site Number: 9.5

River Mile: 116.8

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

R.K. Dudley, J.L. Hester, M.F. Peralta

Effort: 617.9 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	60
76	<i>Platygobio gracilis</i>	79
93	<i>Ictalurus punctatus</i>	8
212	<i>Gambusia affinis</i>	5

**Rio Grande silvery minnow Population Monitoring
August 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

04 August 2011

RKD11-109

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

R.K. Dudley, J.L. Hester, M.F. Peralta

Site Number: 10

River Mile: 116.2

Effort: 390.7 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	60
76	<i>Platygobio gracilis</i>	138
76	<i>Rhinichthys cataractae</i>	1
81	<i>Catostomus commersoni</i>	1
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	8

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

04 August 2011

RKD11-108

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

R.K. Dudley, J.L. Hester, M.F. Peralta

Site Number: 11

River Mile: 114.6

Effort: 453.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	38
76	<i>Hybognathus amarus*</i>	1
76	<i>Pimephales promelas</i>	4
76	<i>Platygobio gracilis</i>	110
81	<i>Carpoides carpio</i>	1

* *Hybognathus amarus* by age class:

age-0: 1

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2011**

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, Socorro. River Mile: 99.5

04 August 2011

RKD11-107

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

R.K. Dudley, J.L. Hester, M.F. Peralta

Effort: 506.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	300
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	45
76	<i>Pimephales promelas</i>	4
76	<i>Rhinichthys cataractae</i>	1
81	<i>Carpiodes carpio</i>	35
81	<i>Catostomus commersoni</i>	1
212	<i>Gambusia affinis</i>	38

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

age-0: 45

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

04 August 2011

RKD11-106

River Mile: 91.7

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

R.K. Dudley, J.L. Hester, M.F. Peralta

Effort: 619.2 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	2
76	<i>Hybognathus amarus*</i>	5
81	<i>Carpiodes carpio</i>	11
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	2
294	<i>Lepomis cyanellus</i>	1

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

age-0: 5

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at US HWY 380 bridge crossing, San Antonio.
04 August 2011

RKD11-105

Site Number: 14
River Mile: 87.1

UTM Easting: 328914 UTM Northing: 3754471 Zone: 13 Quad: San Antonio
M.A. Farrington, M.A. Brandenburg, F.P. Cook

Effort: 465.2 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	1
81	<i>Carpoides carpio</i>	1
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	1

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, directly east of Bosque del Apache National Wildlife Refuge Headquarters.
04 August 2011

RKD11-104

Site Number: 15
River Mile: 79.1

UTM Easting: 327055 UTM Northing: 3740839 Zone: 13 Quad: San Antonio SE
M.A. Farrington, M.A. Brandenburg, F.P. Cook

Effort: 592.3 sq. m

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

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

age-0: 1

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
August 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at San Marcial Railroad Bridge, San Marcial.
04 August 2011 **RKD11-103**

Site Number: 16
River Mile: 68.6

UTM Easting: 315284 UTM Northing: 3728347 Zone: 13 Quad: San Marcial
M.A. Farrington, M.A. Brandenburg, F.P. Cook

Effort: 500.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	145
76	<i>Cyprinus carpio</i>	3
76	<i>Hybognathus amarus*</i>	119
76	<i>Pimephales promelas</i>	4
76	<i>Platygobio gracilis</i>	3
212	<i>Gambusia affinis</i>	5

*** Hybognathus amarus by age class:**

age-0: 119
age-1:
age-2:

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, ca. 8 miles downstream of the San Marcial railroad bridge crossing
04 August 2011 **RKD11-102**

Site Number: 17
River Mile: 60.5

UTM Easting: 309487 UTM Northing: 3718178 Zone: 13 Quad: Paraje Well
M.A. Farrington, M.A. Brandenburg, F.P. Cook

Effort: 397.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	135
76	<i>Hybognathus amarus*</i>	92
76	<i>Pimephales promelas</i>	14
76	<i>Pimephales vigilax</i>	1
76	<i>Platygobio gracilis</i>	11
81	<i>Carpiodes carpio</i>	4
93	<i>Ictalurus punctatus</i>	34
212	<i>Gambusia affinis</i>	3

*** Hybognathus amarus by age class:**

age-0: 92
age-1:
age-2:

**Rio Grande silvery minnow Population Monitoring
August 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

Site Number: 18

04 August 2011

RKD11-101

River Mile: 58.8

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

M.A. Farrington, M.A. Brandenburg, F.P. Cook

Effort: 483.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	166
76	<i>Cyprinus carpio</i>	13
76	<i>Hybognathus amarus*</i>	63
76	<i>Pimephales promelas</i>	8
76	<i>Pimephales vigilax</i>	1
81	<i>Carpoides carpio</i>	1
81	<i>Ictiobus bubalus</i>	1
93	<i>Ictalurus punctatus</i>	53
212	<i>Gambusia affinis</i>	4

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

age-0: 63

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
September 2011**

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage
Rio Grande, directly below Angostura Diversion Dam, Algodones.
31 August 2011

Site Number: 0
River Mile: 209.7

RKD11-138

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

R.K.Dudley, M.A.Farrington, T.J.Krabbenhoft

Effort: 469.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	212
76	<i>Pimephales promelas</i>	11
76	<i>Platygobio gracilis</i>	45
76	<i>Rhinichthys cataractae</i>	56
81	<i>Catostomus commersoni</i>	13
212	<i>Gambusia affinis</i>	13

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage
Rio Grande, at US HWY 550 (formerly NM State HWY 44) bridge crossing, Bernalillo.
31 August 2011

Site Number: 1
River Mile: 203.8

RKD11-139

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

R.K.Dudley, M.A.Farrington, T.J.Krabbenhoft

Effort: 459.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	17
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	2
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	11
76	<i>Rhinichthys cataractae</i>	4
81	<i>Carpoides carpio</i>	6
81	<i>Catostomus commersoni</i>	31
93	<i>Ameiurus natalis</i>	1
212	<i>Gambusia affinis</i>	80

* *Hybognathus amarus* by age class:

age-0: 2

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
September 2011**

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

31 August 2011

RKD11-140

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

R.K.Dudley, M.A.Farrington, T.J.Krabbenhoft

Effort: 553.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	17
76	<i>Cyprinus carpio</i>	1
76	<i>Hybognathus amarus*</i>	6
76	<i>Pimephales promelas</i>	7
76	<i>Platygobio gracilis</i>	4
81	<i>Carpoides carpio</i>	1
81	<i>Catostomus commersoni</i>	8
212	<i>Gambusia affinis</i>	51

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

age-0: 5

age-1: 1

age-2:

**Rio Grande silvery minnow Population Monitoring
September 2011**

NEW MEXICO: BERNALILLO Co., RIO GRANDE Drainage

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

Site Number: 3

31 August 2011

RKD11-137

River Mile: 183.4

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

R.K.Dudley, M.A.Farrington, T.J.Krabbenhoft

Effort: 502.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	39
76	<i>Hybognathus amarus*</i>	28
76	<i>Pimephales promelas</i>	8
76	<i>Platygobio gracilis</i>	20
81	<i>Carpoides carpio</i>	1
81	<i>Catostomus commersoni</i>	12
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	16
212	<i>Gambusia affinis</i>	29

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

age-0: 27

age-1: 1

age-2:

**Rio Grande silvery minnow Population Monitoring
September 2011**

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

31 August 2011

RKD11-136

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

R.K.Dudley, T.J.Krabbenhoft

Effort: 513.1 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	24
76	<i>Hybognathus amarus*</i>	1
76	<i>Platygobio gracilis</i>	1
93	<i>Ameiurus melas</i>	1
93	<i>Ameiurus natalis</i>	7
93	<i>Ictalurus punctatus</i>	30
212	<i>Gambusia affinis</i>	47

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

age-0: 1

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

River Mile: 161.4

30 August 2011

RKD11-135

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

R.K.Dudley, J.L.Hester, S.A.Zipper

Effort: 462.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	139
76	<i>Hybognathus amarus*</i>	11
76	<i>Pimephales promelas</i>	1
81	<i>Carpoides carpio</i>	37
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	2
212	<i>Gambusia affinis</i>	6
294	<i>Pomoxis annularis</i>	1

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

age-0: 11

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
September 2011**

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage

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

30 August 2011

RKD11-134

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

R.K.Dudley, J.L.Hester, S.A.Zipper

Site Number: 6

River Mile: 151.5

Effort: 371.6 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	545
76	<i>Hybognathus amarus*</i>	31
76	<i>Pimephales promelas</i>	6
81	<i>Carpoides carpio</i>	3
93	<i>Ictalurus punctatus</i>	9
212	<i>Gambusia affinis</i>	29

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

age-0: 28

age-1:

age-2: 3

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage

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

30 August 2011

RKD11-133

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

R.K.Dudley, J.L.Hester, S.A.Zipper

Site Number: 7

River Mile: 143.2

Effort: 415.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	657
76	<i>Hybognathus amarus*</i>	17
76	<i>Pimephales promelas</i>	11
76	<i>Platygobio gracilis</i>	6
81	<i>Carpoides carpio</i>	6
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	63

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

age-0: 16

age-1:

age-2: 1

**Rio Grande silvery minnow Population Monitoring
September 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

30 August 2011

RKD11-132

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

R.K.Dudley, J.L.Hester, S.A.Zipper

Site Number: 8

River Mile: 130.6

Effort: 483.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	387
76	<i>Cyprinus carpio</i>	5
76	<i>Pimephales promelas</i>	4
81	<i>Carpoides carpio</i>	5
212	<i>Gambusia affinis</i>	124

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

30 August 2011

RKD11-131

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

R.K.Dudley, J.L.Hester, S.A.Zipper

Site Number: 9

River Mile: 127.0

Effort: 496.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	330
76	<i>Pimephales promelas</i>	2
81	<i>Carpoides carpio</i>	10
93	<i>Ictalurus punctatus</i>	3
212	<i>Gambusia affinis</i>	344
294	<i>Micropterus salmoides</i>	1

**Rio Grande silvery minnow Population Monitoring
September 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

Rio Grande, ca. 0.6 miles upstream of San Acacia Diversion Dam, San Acacia
29 August 2011 **RKD11-130**

Site Number: 9.5
River Mile: 116.8

UTM Easting: 327902 UTM Northing: 3792603 Zone: 13 Quad: La Joya
R.K.Dudley, T.J.Krabbenhoft, S.A.Zipper

Effort: 593.7 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	52
76	<i>Pimephales promelas</i>	3
76	<i>Platygobio gracilis</i>	83
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	4
212	<i>Gambusia affinis</i>	29

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

Rio Grande, directly below San Acacia Diversion Dam, San Acacia.
29 August 2011 **RKD11-129**

Site Number: 10
River Mile: 116.2

UTM Easting: 326162 UTM Northing: 3791977 Zone: 13 Quad: San Acacia
R.K.Dudley, T.J.Krabbenhoft, S.A.Zipper

Effort: 597.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	35
76	<i>Hybognathus amarus*</i>	1
76	<i>Platygobio gracilis</i>	70
93	<i>Ictalurus punctatus</i>	12

* *Hybognathus amarus* by age class:

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

**Rio Grande silvery minnow Population Monitoring
September 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

Site Number: 11

29 August 2011

RKD11-128

River Mile: 114.6

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

R.K.Dudley, T.J.Krabbenhoft, S.A.Zipper

Effort: 622.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	63
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	95
81	<i>Carpoides carpio</i>	2
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	3

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, Socorro. River Mile: 99.5

29 August 2011

RKD11-127

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

R.K.Dudley, T.J.Krabbenhoft, S.A.Zipper

Effort: 663.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	281
76	<i>Hybognathus amarus*</i>	1
76	<i>Pimephales promelas</i>	3
76	<i>Platygobio gracilis</i>	4
81	<i>Carpoides carpio</i>	1
212	<i>Gambusia affinis</i>	66

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

age-0:

age-1: 1

age-2:

Rio Grande silvery minnow Population Monitoring
September 2011

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, ca. 4.0 miles upstream of U.S. 380 bridge crossing.
29 August 2011

RKD11-126

Site Number: 13
River Mile: 91.7

UTM Easting: 328140 UTM Northing: 3761283 Zone: 13 Quad: San Antonio
R.K.Dudley, T.J.Krabbenhoft, S.A.Zipper

Effort: 611.1 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	15
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	1
81	<i>Carpoides carpio</i>	1
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	39

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at US HWY 380 bridge crossing, San Antonio.
29 August 2011

RKD11-125

Site Number: 14
River Mile: 87.1

UTM Easting: 328914 UTM Northing: 3754471 Zone: 13 Quad: San Antonio
S.P.Platania, M.A.Farrington, M.A.Brandenburg

Effort: 545.4 sq. m

FAMILY		N
81	<i>Carpoides carpio</i>	1
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	4

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, directly east of Bosque del Apache National Wildlife Refuge Headquarters.
29 August 2011

RKD11-124

Site Number: 15
River Mile: 79.1

UTM Easting: 327055 UTM Northing: 3740839 Zone: 13 Quad: San Antonio SE
S.P.Platania, M.A.Farrington, M.A.Brandenburg

Effort: 526.6 sq. m

FAMILY		N
	<i>No Fish Collected</i>	

**Rio Grande silvery minnow Population Monitoring
September 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at San Marcial Railroad Bridge, San Marcial.
29 August 2011

RKD11-123

Site Number: 16
River Mile: 68.6

UTM Easting: 315284 UTM Northing: 3728347 Zone: 13 Quad: San Marcial
S.P.Platania, M.A.Farrington, M.A.Brandenburg

Effort: 486.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	75
76	<i>Cyprinus carpio</i>	2
76	<i>Hybognathus amarus*</i>	58
76	<i>Pimephales promelas</i>	7
76	<i>Platygobio gracilis</i>	1
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	6
212	<i>Gambusia affinis</i>	4

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

age-0: 57

age-1: 1

age-2:

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, ca. 8 miles downstream of the San Marcial railroad bridge crossing
29 August 2011

RKD11-122

Site Number: 17
River Mile: 60.5

UTM Easting: 309487 UTM Northing: 3718178 Zone: 13 Quad: Paraje Well
S.P.Platania, M.A.Farrington, M.A.Brandenburg

Effort: 484.9 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	70
76	<i>Hybognathus amarus*</i>	49
76	<i>Pimephales promelas</i>	7
76	<i>Platygobio gracilis</i>	6
81	<i>Carpoides carpio</i>	2
93	<i>Ictalurus punctatus</i>	79
212	<i>Gambusia affinis</i>	4

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

age-0: 49

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
September 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

Rio Grande, ca. 10 mi downstream of the San Marcial railroad bridge crossing
29 August 2011

RKD11-121

Site Number: 18

River Mile: 58.8

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

S.P.Platania, M.A.Farrington, M.A.Brandenburg

Effort: 527.6 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	200
76	<i>Hybognathus amarus*</i>	1
76	<i>Pimephales promelas</i>	2
76	<i>Pimephales vigilax</i>	2
76	<i>Platygobio gracilis</i>	1
81	<i>Carpoides carpio</i>	1
93	<i>Ictalurus punctatus</i>	66
212	<i>Gambusia affinis</i>	10

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

age-0: 1

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
October 2011**

NEW MEXICO: SANDOVAL Co., RIO GRANDE Drainage
Rio Grande, directly below Angostura Diversion Dam, Algodones.
28 September 2011

Site Number: 0
River Mile: 209.7

RKD11-158

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

R.K.Dudley, J.L.Hester, S.A.Zipper

Effort: 480.7 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	79
76	<i>Cyprinus carpio</i>	3
76	<i>Pimephales promelas</i>	10
76	<i>Platygobio gracilis</i>	7
76	<i>Rhinichthys cataractae</i>	28
81	<i>Catostomus commersoni</i>	10
212	<i>Gambusia affinis</i>	11
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.
28 September 2011

Site Number: 1
River Mile: 203.8

RKD11-159

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

R.K.Dudley, J.L.Hester, S.A.Zipper

Effort: 483.2 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	112
76	<i>Gila pandora</i>	1
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	11
81	<i>Carpoides carpio</i>	2
81	<i>Catostomus commersoni</i>	7
212	<i>Gambusia affinis</i>	37

**Rio Grande silvery minnow Population Monitoring
October 2011**

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

28 September 2011

RKD11-160

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

R.K.Dudley, J.L.Hester, S.A.Zipper

Effort: 488.3 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	105
76	<i>Pimephales promelas</i>	2
76	<i>Platygobio gracilis</i>	3
81	<i>Carpiodes carpio</i>	1
212	<i>Gambusia affinis</i>	13

NEW MEXICO: BERNALILLO Co., RIO GRANDE Drainage

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

Site Number: 3

28 September 2011

RKD11-157

River Mile: 183.4

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

R.K.Dudley, J.L.Hester, S.A.Zipper

Effort: 480.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	27
76	<i>Hybognathus amarus*</i>	3
76	<i>Pimephales promelas</i>	6
76	<i>Platygobio gracilis</i>	6
93	<i>Ameiurus natalis</i>	1
93	<i>Ictalurus punctatus</i>	3
212	<i>Gambusia affinis</i>	1

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

age-0: 3

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
October 2011**

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

28 September 2011

RKD11-156

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

R.K.Dudley, J.L.Hester, S.A.Zipper

Effort: 489.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	10
76	<i>Hybognathus amarus*</i>	3
76	<i>Platygobio gracilis</i>	3
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	37

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

age-0: 3

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

26 September 2011

RKD11-155

River Mile: 161.4

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

R.K.Dudley, M.A.Farrington, S.A.Zipper

Effort: sq. m

FAMILY		N
	<i>Site Not Sampled (Site Dry)</i>	

**Rio Grande silvery minnow Population Monitoring
October 2011**

NEW MEXICO: VALENCIA Co., RIO GRANDE Drainage

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

26 September 2011

RKD11-154

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

R.K.Dudley, M.A.Farrington, S.A.Zipper

Site Number: 6

River Mile: 151.5

Effort: 454.1 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	686
76	<i>Cyprinus carpio</i>	2
76	<i>Hybognathus amarus*</i>	15
76	<i>Pimephales promelas</i>	12
81	<i>Carpoides carpio</i>	64
93	<i>Ictalurus punctatus</i>	18
212	<i>Gambusia affinis</i>	99

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

age-0: 15

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.

26 September 2011

RKD11-153

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

R.K.Dudley, M.A.Farrington, S.A.Zipper

Site Number: 7

River Mile: 143.2

Effort: 462.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	603
76	<i>Cyprinus carpio</i>	2
76	<i>Hybognathus amarus*</i>	7
76	<i>Pimephales promelas</i>	2
81	<i>Carpoides carpio</i>	8
212	<i>Gambusia affinis</i>	27

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

age-0: 7

age-1:

age-2:

**Rio Grande silvery minnow Population Monitoring
October 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

Site Number: 8

26 September 2011

RKD11-152

River Mile: 130.6

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

R.K.Dudley, M.A.Farrington, S.A.Zipper

Effort: 485.2 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	682
76	<i>Cyprinus carpio</i>	3
76	<i>Pimephales promelas</i>	6
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	31

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

Site Number: 9

26 September 2011

RKD11-151

River Mile: 127.0

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

R.K.Dudley, M.A.Farrington, S.A.Zipper

Effort: 491.9 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	495
76	<i>Cyprinus carpio</i>	1
76	<i>Pimephales promelas</i>	3
81	<i>Carpoides carpio</i>	2
212	<i>Gambusia affinis</i>	116

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

Site Number: 9.5

27 September 2011

RKD11-150

River Mile: 116.8

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

R.K.Dudley, J.L.Hester, S.A.Zipper

Effort: 596.6 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	135
76	<i>Platygobio gracilis</i>	14
212	<i>Gambusia affinis</i>	10

**Rio Grande silvery minnow Population Monitoring
October 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

Site Number: 10

27 September 2011

RKD11-149

River Mile: 116.2

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

R.K.Dudley, J.L.Hester, S.A.Zipper

Effort: 385.8 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	7
76	<i>Platygobio gracilis</i>	63
212	<i>Gambusia affinis</i>	1

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

Site Number: 11

27 September 2011

RKD11-148

River Mile: 114.6

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

R.K.Dudley, J.L.Hester, S.A.Zipper

Effort: 495.5 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	17
76	<i>Pimephales promelas</i>	1
76	<i>Platygobio gracilis</i>	11
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	1

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, Socorro. River Mile: 99.5

27 September 2011

RKD11-147

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

R.K.Dudley, J.L.Hester, S.A.Zipper

Effort: 554.9 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	41
93	<i>Ictalurus punctatus</i>	1
212	<i>Gambusia affinis</i>	1

**Rio Grande silvery minnow Population Monitoring
October 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, ca. 4.0 miles upstream of U.S. 380 bridge crossing.
27 September 2011 **RKD11-146**

Site Number: 13
River Mile: 91.7

UTM Easting: 328140 UTM Northing: 3761283 Zone: 13 Quad: San Antonio
R.K.Dudley, J.L.Hester, S.A.Zipper

Effort: 548.4 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	4

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at US HWY 380 bridge crossing, San Antonio.
26 September 2011 **RKD11-145**

Site Number: 14
River Mile: 87.1

UTM Easting: 328914 UTM Northing: 3754471 Zone: 13 Quad: San Antonio
W.H.Brandenburg, J.L.Hester, R.C.Keller

Effort: 489.2 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	24
76	<i>Hybognathus amarus*</i>	1
212	<i>Gambusia affinis</i>	23

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

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

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, directly east of Bosque del Apache National Wildlife Refuge Headquarters.
26 September 2011 **RKD11-144**

Site Number: 15
River Mile: 79.1

UTM Easting: 327055 UTM Northing: 3740839 Zone: 13 Quad: San Antonio SE
W.H.Brandenburg, J.L.Hester, R.C.Keller

Effort: 488.0 sq. m

FAMILY		N
212	<i>Gambusia affinis</i>	4

**Rio Grande silvery minnow Population Monitoring
October 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, at San Marcial Railroad Bridge, San Marcial.
26 September 2011 **RKD11-143**

Site Number: 16
River Mile: 68.6

UTM Easting: 315284 UTM Northing: 3728347 Zone: 13 Quad: San Marcial
W.H.Brandenburg, J.L.Hester, R.C.Keller

Effort: 529.1 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	27
76	<i>Cyprinus carpio</i>	5
76	<i>Hybognathus amarus*</i>	52
81	<i>Carpoides carpio</i>	1
212	<i>Gambusia affinis</i>	9

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

age-0: 52
age-1:
age-2:

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage
Rio Grande, ca. 8 miles downstream of the San Marcial railroad bridge crossing
26 September 2011 **RKD11-142**

Site Number: 17
River Mile: 60.5

UTM Easting: 309487 UTM Northing: 3718178 Zone: 13 Quad: Paraje Well
W.H.Brandenburg, J.L.Hester, R.C.Keller

Effort: 511.0 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	47
76	<i>Hybognathus amarus*</i>	23
76	<i>Pimephales promelas</i>	1
76	<i>Pimephales vigilax</i>	1
76	<i>Platygobio gracilis</i>	4
81	<i>Carpoides carpio</i>	1
93	<i>Ictalurus punctatus</i>	19
212	<i>Gambusia affinis</i>	8

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

age-0: 22
age-1: 1
age-2:

**Rio Grande silvery minnow Population Monitoring
October 2011**

NEW MEXICO: SOCORRO Co., RIO GRANDE Drainage

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

26 September 2011

RKD11-141

Site Number: 18

River Mile: 58.8

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

W.H.Brandenburg, J.L.Hester, R.C.Keller

Effort: 487.6 sq. m

FAMILY		N
76	<i>Cyprinella lutrensis</i>	20
76	<i>Hybognathus amarus*</i>	14
93	<i>Ictalurus punctatus</i>	20
212	<i>Gambusia affinis</i>	1

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

age-0: 14

age-1:

age-2: