RIO GRANDE SILVERY MINNOW AUGMENTATION IN THE MIDDLE RIO GRANDE, NEW MEXICO

Annual Report 2009

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Middle Rio Grande Endangered Species Act Collaborative Program

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Cover Photo: Release of Rio Grande silvery minnow at Bosque del Apache NWR, 2009

Credit: Kelly Kowalski, KUNM, 2009, video capture
(*www.**youtube**.com/watch?v=PVAy4Hfakfw)*

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EXECUTIVE SUMMARY

- In 2009, we continued to implement the revised augmentation plan. This revised augmentation plan provides a detailed stocking strategy only for the Middle Rio Grande, New Mexico between 2008 and 2012 for Isleta and San Acacia Reaches.

- Based on population monitoring catch rates, only 1 site required stocking in 2009, compared with no stocking in 2008.

- In 2009, we continued monitoring on tribal lands in Angostura and Isleta reaches to supplement data collection from other researchers.

- In 2009, no recaptures of hatchery released Rio Grande silvery minnow were documented. This is due in part to reduced numbers of released fish in late 2009 and no released fish in 2008, combined with reduced standard population monitoring conducted by other researchers.

INTRODUCTION

In 2001, the "Rio Grande silvery minnow augmentation plan" was created. Since that time, over 1,000,000 hatchery-raised Rio Grande silvery minnow have been released into the Middle Rio Grande, New Mexico. Initially the goal was to produce 500,000 annually for release based primarily on the expected capacities of propagation facilities, along with knowledge about current population status and suggestions from geneticists. Our stocking and monitoring efforts were initially focused in the Angostura Reach (Albuquerque) where catch rates of wild Rio Grande silvery minnow were extremely low and the expected benefit of augmentation could be maximized (Remshardt and Davenport 2003). Between 2002 and 2004, 100,000 to 200,000 Rio Grande silvery minnow were released annually in the Angostura Reach.

Starting in 2005, augmentation was expanded to include the Isleta and San Acacia Reaches. Between 2005 and 2007, 100,000 to 400,000 Rio Grande silvery minnow were released annually throughout all reaches (Remshardt 2008b). In 2008, favorable conditions and recruitment meant that no augmentation was needed. In addition to augmentation and other conservation measures such as habitat improvement, improved spring runoff and habitat conditions for juvenile survival in 2005 created an opportunity for Rio Grande silvery minnow to increase in abundance.

This annual report summarizes findings between January and December 2009. This effort reflects management needs identified in the Middle Rio Grande Endangered Species Program (Program), Item A.2.2 for Rio Grande silvery minnow as well as the revised Rio Grande Silvery Minnow Recovery Plan (RGSMRP; U.S. Fish and Wildlife Service 2009). These include development and refinement of augmentation protocols for use in the middle Rio Grande and coordinating augmentation needs with propagation activities as identified as a needed task (Task 3.2) by the Program and RGSMRP, respectively.

In the current revised RGSMRP, there are specific criteria listed for catch rates for downlisting from endangered to threatened (U.S. Fish and Wildlife Service 2009). For Recovery Goal 2, Criterion 2-A-1 states that catch rates for October population monitoring must be above 5 fish/100 m^2 for all sites for at least 5 consecutive years. While hatchery released individuals cannot count directly towards recovery goals, their presence and reproduction ultimately result in increased numbers that benefit the species. Augmentation data analysis has shown that stocking is most effective when wild fish densities are below 1 fish/100 m^2. This target was selected based on effectiveness and recommendations from the Rio Grande silvery minnow genetics and propagation working group. Not only does this strategy allow us to be most effective, but it also strives to maintain wild fish genetic structure.

The ultimate goal of augmentation is to re-establish self-sustaining populations of Rio Grande silvery minnow in the MRGNM. Long-term benefits of this study are to: 1) augment populations within the MRGNM; and 2) evaluate stocking efforts and methods.

Specific objectives of augmentation and monitoring activities in 2009 were to:

1) Continue using revised stocking protocol; calculate number of Rio Grande silvery minnow necessary to meet target densities.

2) Continue using revised stocking protocol; closely monitor Angostura Reach Rio Grande silvery minnow densities for effects of augmentation.

3) Determine temporal and spatial upstream and downstream movement of previously stocked Rio Grande silvery minnow within and among reaches.

4) Provide guidance for augmentation activities to maximize survival of Rio Grande silvery minnow.

METHODS

Study Area

This investigation concentrates on areas relative to the known current range within Angostura, Isleta, and San Acacia reaches (Figure 1, Table 1). Angostura Reach (61 km) extends from Angostura Diversion Dam (River Mile (RM) 209.7) to Isleta Diversion Dam (RM 169.3) and includes the cities of Bernalillo, Corrales, and Albuquerque. Isleta Reach (90 km) extends from Isleta Diversion Dam to San Acacia Diversion Dam. This reach includes the southern portion of Isleta Pueblo, cities of Bosque Farms, Valencia, Los Lunas, Belen, and smaller villages such as La Joya, and Bernardo, along with Sevilleta National Wildlife Refuge, all within Bernalillo, Valencia, and Socorro counties. The San Acacia Reach (roughly 76 km) extends from San Acacia Diversion Dam to the headwaters of Elephant Butte Reservoir (the exact location of the lower boundary varies depending upon reservoir water-surface elevation). This reach is relatively remote, including only the city of Socorro and villages of San Acacia, Lemitar, Escondida, and San Antonio along with Bosque del Apache National Wildlife Refuge, within Socorro and Sierra counties.

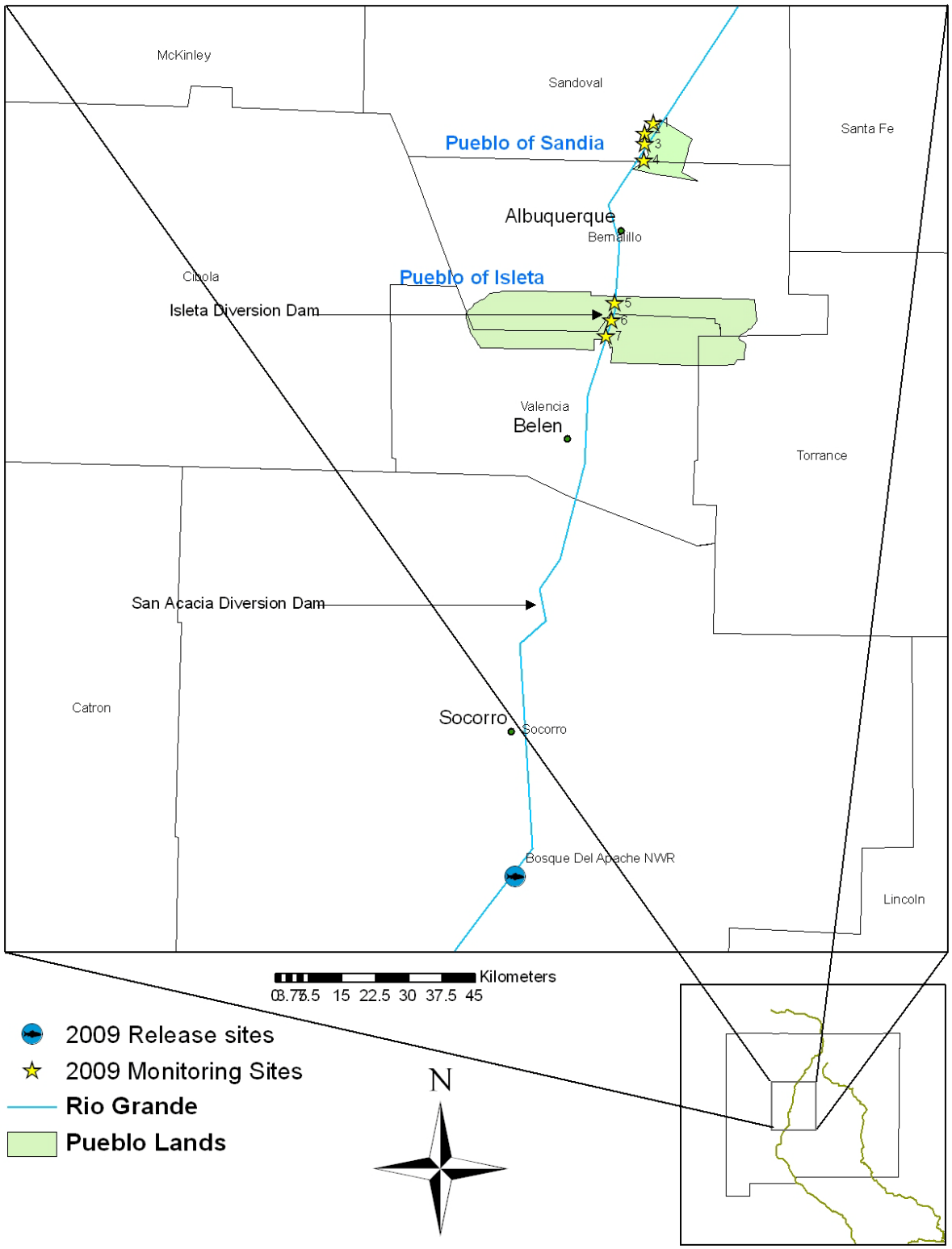

Figure 1. Map of study area for Rio Grande silvery minnow augmentation and monitoring 2009.

Augmentation

As detailed in the revised RGSM augmentation plan 2008-2012 (Appendix D; Remshardt 2008b), augmentation efforts were focused only within the Isleta and San Acacia reaches in 2009 and will continue through 2012. This will allow us to accurately assess the long-term benefits of recent (2002-2007) augmentation in the Angostura Reach. The release number (A) for each site (S_i) is calculated using the following formula:

$$AS_i = (C_t - C_o) \times (\text{total estimated area } m^2 \text{ between } S_i \text{ and } S_{i+1})$$

where; C_t = Target catch rate at each site, or 1 fish / 100 m^2,
C_o = Observed catch rate at each site in September
S_i = Site of release
S_{i+1} = Next downstream site.

Post-Augmentation Monitoring

Monitoring of stocked fish involved specific post-stocking surveys at 1-month intervals to determine survival, growth and movement by NMFWCO. Monitoring sites are currently maintained within Pueblo boundaries to collect additional recapture data not available from standard population monitoring. These efforts were also used to collect secondary information on fish community structure. Fish were collected with a 3 m x 1.8 m, 3 mm mesh seine. Length of individual seine hauls were measured to the nearest 0.1 meter to estimate sampling effort, which was calculated by multiplying the distance of each seine haul by the effective width of the seine (2.5 m). Catch rates for all fish were calculated as number of fish per 100 m^2 sampled. All mesohabitat types were sampled within each site with a minimum of 30 seine hauls at each sampling location, except at high flows when safe wading was difficult or during intermittent conditions when seinable habitat was limited. Water quality parameters were measured (pH, conductivity, water temperature, air temperature, total dissolved solids, and salinity) at each monitoring site. Standard and total lengths were measured from a minimum of 10 Rio Grande silvery minnow per site, age class (young-of-year and age 1+), including marked and unmarked individuals. All other fish captured were identified and enumerated for each individual seine haul in the field and subsequently released. Scientific and common names are arranged in phylogenetic order and follow Nelson et al. (2004), except where subspecies are noted. The use of subspecific epithets reflects the importance of geographical subdivisions in evolution.

Table 1. Rio Grande silvery minnow augmentation monitoring site descriptions, 2009.

Site #	Site Name	Description
Angostura Reach		
1	Sandia Bosque Line 14	New Mexico, Sandoval County, Rio Grande, Pueblo of Sandia, 1.5 miles downstream of U.S. 550 Bridge crossing, RM 202.0.
2	Lomitas Negras	New Mexico, Sandoval County, Rio Grande, below Rio Ranch #3 Wastewater Treatment Plant Outfall, RM 198.3
3	Dixon Road	New Mexico, Sandoval County, Rio Grande, at Sandia Wasteway Outfall, RM 196.0
4	North Amafca	New Mexico, Sandoval County, Rio Grande, Pueblo of Sandia, 1.0 miles upstream of Alameda Bridge crossing, RM 193.2.
5	Atrisco Outfall	New Mexico, Bernalillo County, Rio Grande, Pueblo of Isleta, 1.9 miles upstream of Isleta Diversion Dam, RM 171.2.
Isleta Reach		
6	IDD (Below Isleta Diversion Dam)	New Mexico, Bernalillo County, Rio Grande, Pueblo of Isleta, 0.1 miles downstream of Isleta Diversion Dam, RM 169.3
7	Alejandro Gate	New Mexico, Valencia County, Rio Grande, Pueblo of Isleta, 2.7 miles downstream of Isleta Diversion Dam, RM 166.6

Length-Frequency

Standard lengths of captured Rio Grande silvery minnow were compared by sampling trip to evaluate potential differences in growth rates. The Petersen method of length-frequency analysis was used to estimate age groups (Isaac 1990, Devries and Frie 1996). In this method, the frequency of individuals was plotted as a function of 2 mm standard length increments for each monthly monitoring sample. Age was then assigned to each individually measured fish. Similarly, the known age of recaptured marked and measured Rio Grande silvery minnow was assigned to each individual. Linear regression was used to compare the potential differences between and among marked and unmarked fish by plotting standard length against estimated (or known) ages. The regression coefficient *ß*, or slope was also used as an estimate of instantaneous growth, or in this case monthly growth rate since each sample was spaced approximately one month apart. Student's *t* was used to test the hypothesis about equality of two

population regression coefficients, or in this case, the equality of growth rates between and among marked and unmarked Rio Grande silvery minnow ($\alpha = 0.05$).

Movement

Recapture data can be used to conduct an examination of the overall distance traveled of VIE marked fish. Expected and observed recaptures can then be summarized. Various other projects and researchers conducted monitoring activities throughout the Middle Rio Grande (although standard population monitoring was not conducted between January and August, 2009) and are asked to volunteer recapture information on VIE-marked Rio Grande silvery minnow. These projects have varying objectives and methods, but a summary of recaptures can provide an overall view of movement. Details on these recaptures together with this study are usually provide in this report, but no VIE marked fish were recaptured in 2009, therefore this analysis was not conducted. Based on the fact that adequate population numbers in 2008 resulted in no need to release fish, and limited amount of population monitoring in 2009, it was not unexpected to not recapture any fish this year.

Fish Community

A summary table of fish collections for the current study period (January 2009 to December 2009) was constructed with observations made for each species, including status of the species (native or introduced), total number of individuals, relative percentage of each species, percent occurrence in individual seine hauls, and density (fish / 100 m^2). Observations were also made on total number of species, total effort, and uncommon species. Most fish names in this report are those in the American Fisheries Society's "A List of Common and Scientific Names of Fishes from the United States and Canada" (Nelson et al. 2004). Use of subspecific names includes additional citations.

RESULTS

Augmentation

Based on the September 2009 catch rates from the standard RGSM population monitoring conducted by American Southwest Ichthyological Research Foundation (ASIRF) (Dudley and Platania 2009), a request for release in the Middle Rio Grande in 2009 was made through the RGSM augmentation program for 21,218 fish.

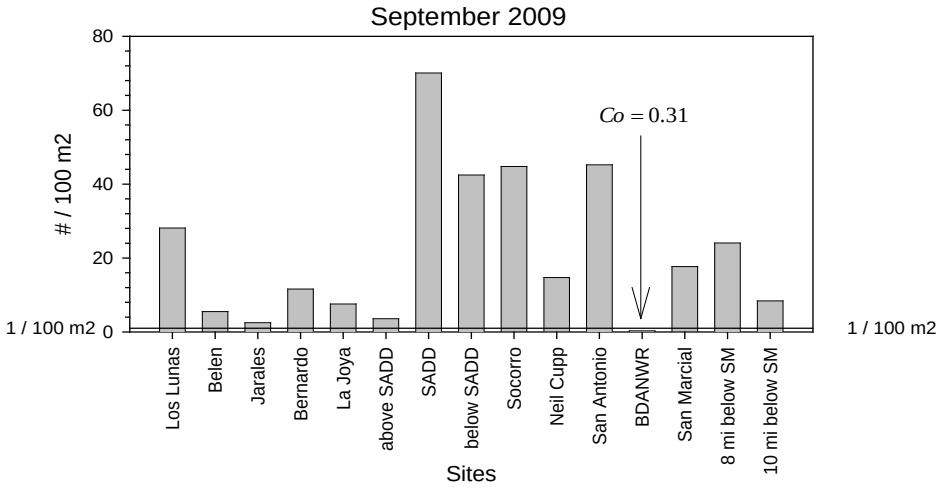

Figure 2. Catch rates for September 2009 Population Monitoring (from Dudley and Platania 2009)

The catch rates from the September monitoring (Dudley and Platania 2009) were compared with the target catch rate of 1 RGSM / 100 m^2 for each site (Figure 2). 14 of the 15 sites in the Isleta and San Acacia reaches had catch rates over this target, including a majority of the sites with significantly higher catch rates. Therefore, only 1 release site for Rio Grande silvery minnow was necessary in the Middle Rio Grande during 2009. The site is Bosque del Apache National Wildlife Refuge (BDANWR) (Site 15 from ASIRF, Figure 1,2), which had a catch rate (C_0=0.31) below the target of 1.00/ 100 m^2.

On 12 November 2009, 21,218 Rio Grande silvery minnow were released at the BDANWR site by NMFWCO personnel. All of these fish had a yellow, left, predorsal VIE tag. Block nets were placed across a backwater at the site prior to release. All fish were released inside the blocked area to prevent immediate dispersal related to the stress of handling and transport and increase short-term survival. The block nets were removed the next day.

Apart from the site within BDANWR, increases in catch rates were observed at the majority of sites compared with 2008. A combination of factors in 2009 led to increased catch rates including optimal spring runoff, recruitment flows throughout the early summer, and no river intermittency in 2008. The low catch rate at the BDANWR site was in direct response to river intermittency throughout this section of the river during the summer of 2009.

In a research project separate from the augmentation program, approximately 6,000 PIT tagged RGSM were released in July 2009 by New Mexico Fish and Wildlife Conservation Office near the fish passage associated with the Albuquerque-Bernalillo County Water Users Authority diversion dam near Alameda Bridge. This fish passage is equipped with antennas that will document PIT-tagged RGSM as they pass through the facility. This project is planned to continue through 2011 but should not appreciably affect the ability to detect the effectiveness of the augmentation program. No other research-related projects (2008-2012) that require RGSM releases in Angostura Reach are known at this point, but will be evaluated against the needs of the augmentation program.

Post-Augmentation Monitoring

Augmentation monitoring within pueblo boundaries continued in 2009. These monitoring efforts are conducted by NMFWCO in conjuction with the associated environment departments of each Pueblo. For these monitoring sites, there were a total of 3,694 Rio Grande silvery minnow collected between January and December 2009 (Table 2). Rio Grande silvery minnow represented 24.1% of all fish captured, were collected in 24.4% of all seine hauls with an overall catch rate of 7.64 individuals/100 m^2 (Table 2). Over the sampling period, catch rates varied for Rio Grande silvery minnow, with the largest collection of 450 individuals occurring in July 2009 at the Alejandro Gate site. During monitoring conducted by NMFWCO in 2009, there were no recaptures of VIE marked Rio Grande silvery minnow.

Table 2. Status, numbers, percent of total, percent occurrence, and density for all species collected during NMFWCO augmentation monitoring at all sites combined in 2009. For status, N=native and I=introduced. Subspecific names include citations below.

Species	Status	n	% of Total	Percent Occurrence	Density (fish/100m^2)
red shiner *Cyprinella lutrensis*	N	7,383	48.1	28.7	15.28
common carp *Cyprinus carpio*	I	77	0.5	1.2	0.16
Rio Grande silvery minnow *Hybognathus amarus*	N	3,694	24.1	24.4	7.64
fathead minnow *Pimephales promelas*	N	228	1.5	5.1	0.47
flathead chub *Platygobio gracilis gulonella*[a]	N	884	5.8	13.9	1.83
longnose dace *Rhinichthys cataractae cataractae*[b]	N	122	0.8	3.4	0.25
river carpsucker *Carpiodes carpio elongatus*[c]	N	251	1.6	3.0	0.52
white sucker *Catostomus commersoni*	I	839	5.5	5.9	1.74
black bullhead *Ameiurus melas*	I	1	< 0.1	< 0.1	<0.01
yellow bullhead *Ameiurus natalis*	I	7	<0.1	0.3	0.01
channel catfish *Ictalurus punctatus*	I	201	1.3	5.0	0.42
western mosquitofish *Gambusia affinis*	I	1,447	9.4	5.9	2.99
white bass *Morone chrysops*	I	13	0.1	0.5	0.03
green sunfish *Lepomis cyanellus*	I	41	0.3	1.0	0.08
bluegill *Lepomis macrochirus speciosus*[d]	N	53	0.3	1.0	0.11
largemouth bass *Micropterus salmoides*	I	84	0.5	1.7	0.17
yellow perch *Percina flavescens*	I	1	<0.1	0.0	<0.01
white crappie *Pomoxis annularis*	I	14	0.1	0.5	0.03
walleye *Sander vitreus*	I	2	<0.1	0.1	<0.01
TOTAL		15,342	100	54.2	31.74

[a] Olund and Cross (1961)
[b] Jenkins and Burkhead (1993)
[c] Trautman (1981)
[d] Hubbs and Lagler (1958), Avise and Smith (1974)

Length-Frequency

Age at month estimates were created by visually determining breaks in the length-frequency distribution of measured Rio Grande silvery minnow by month (Figures 4-5). While not exact, it is an adequate qualitative method for examining general patterns in age-class strength and growth rates. There were 766 unmarked in the length-frequency dataset captured in 2009. There were no marked recaptures in 2009, therefore no analysis of lenth-frequency was completed for hatchery released fish. Linear regression was used to estimate monthly (instantaneous) growth rate. The slope the regression line (*B*) for unmarked Rio Grande silvery minnow was estimated at 1.54 mm/month (Figure 3), with even higher growth rates of 4.2-9.3 mm/month observed during the initial 4 months for juvenile fish.

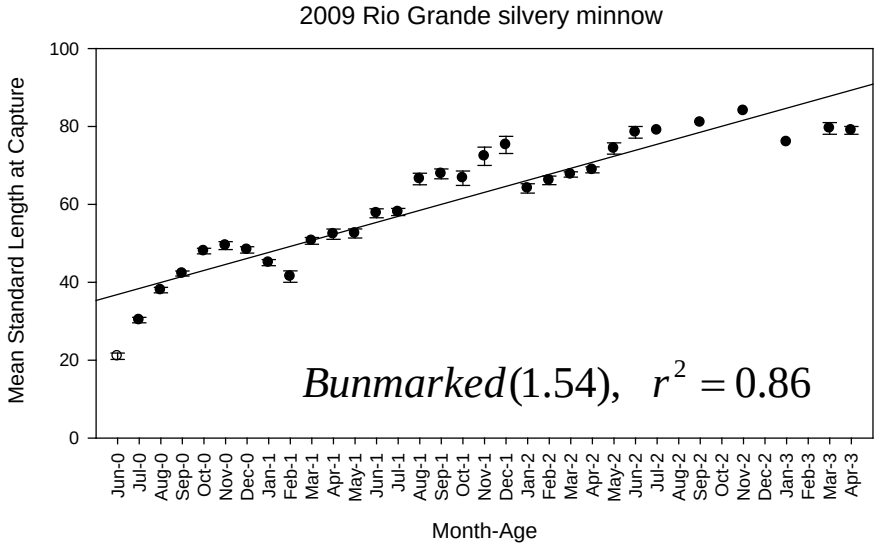

Figure 3. Growth rate for unmarked Rio Grande silvery minnow from slope (*B*) of the regression for mean standard lengths between age at month estimates in 2009.

Upon examination of length-frequency data by month, there appeared to be two or three age classes present in any one month's sample. This is generally represented by ages 1-3 between January and May and ages 0, 1, and 2 individuals between June and December. Based on length-frequency observations, maximum age of Rio Grande silvery minnow was estimated to be approximately 34-35 months old near 80 mm SL. These individuals likely represent the 2006 year class (Figures 4-5). Between January and July, the 2008 year class was well represented, between July and December the 2009 year class became the dominant year class, indicating relatively strong recruitment.

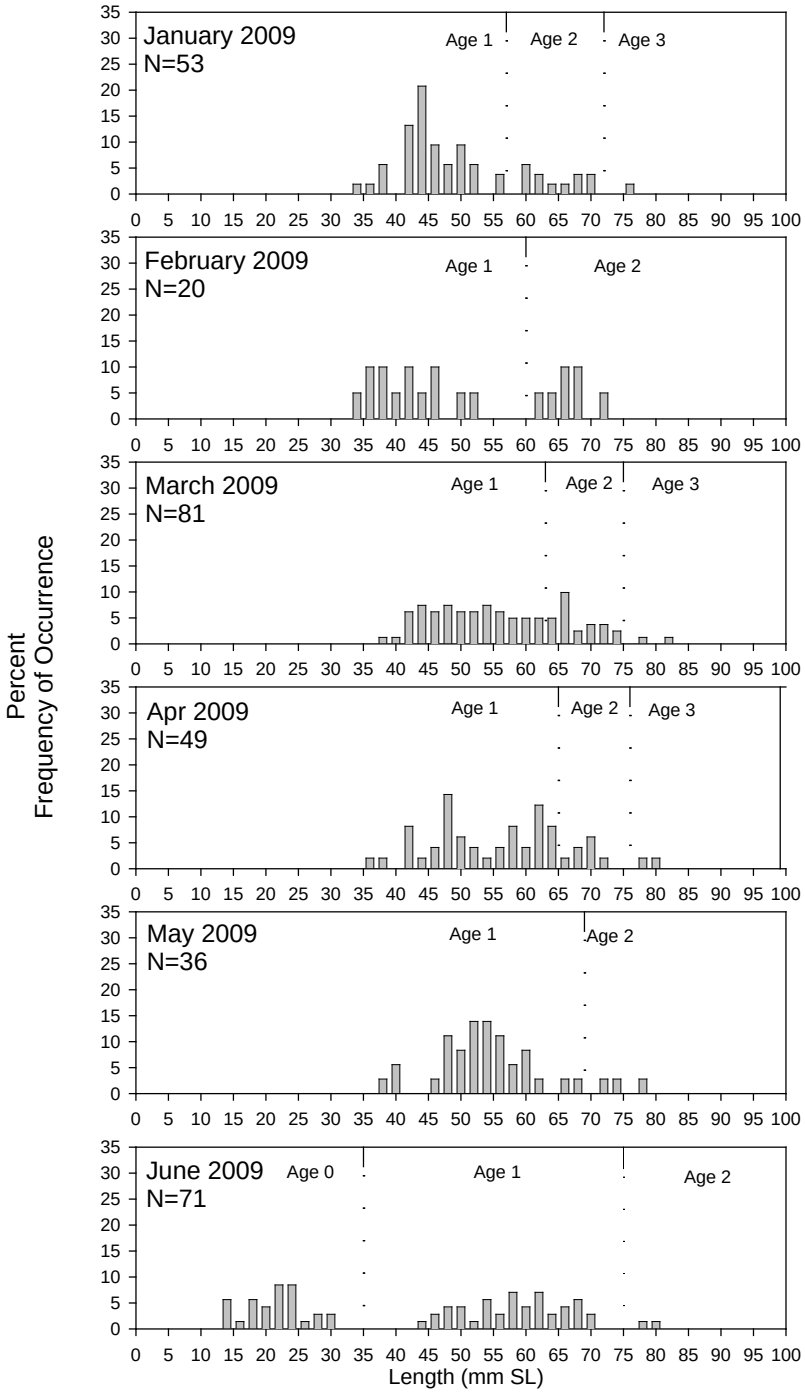

Figure 4. Length-frequency histograms of unmarked Rio Grande silvery minnow captured between January and June 2009. Dashed lines represent estimated breaks between year classes.

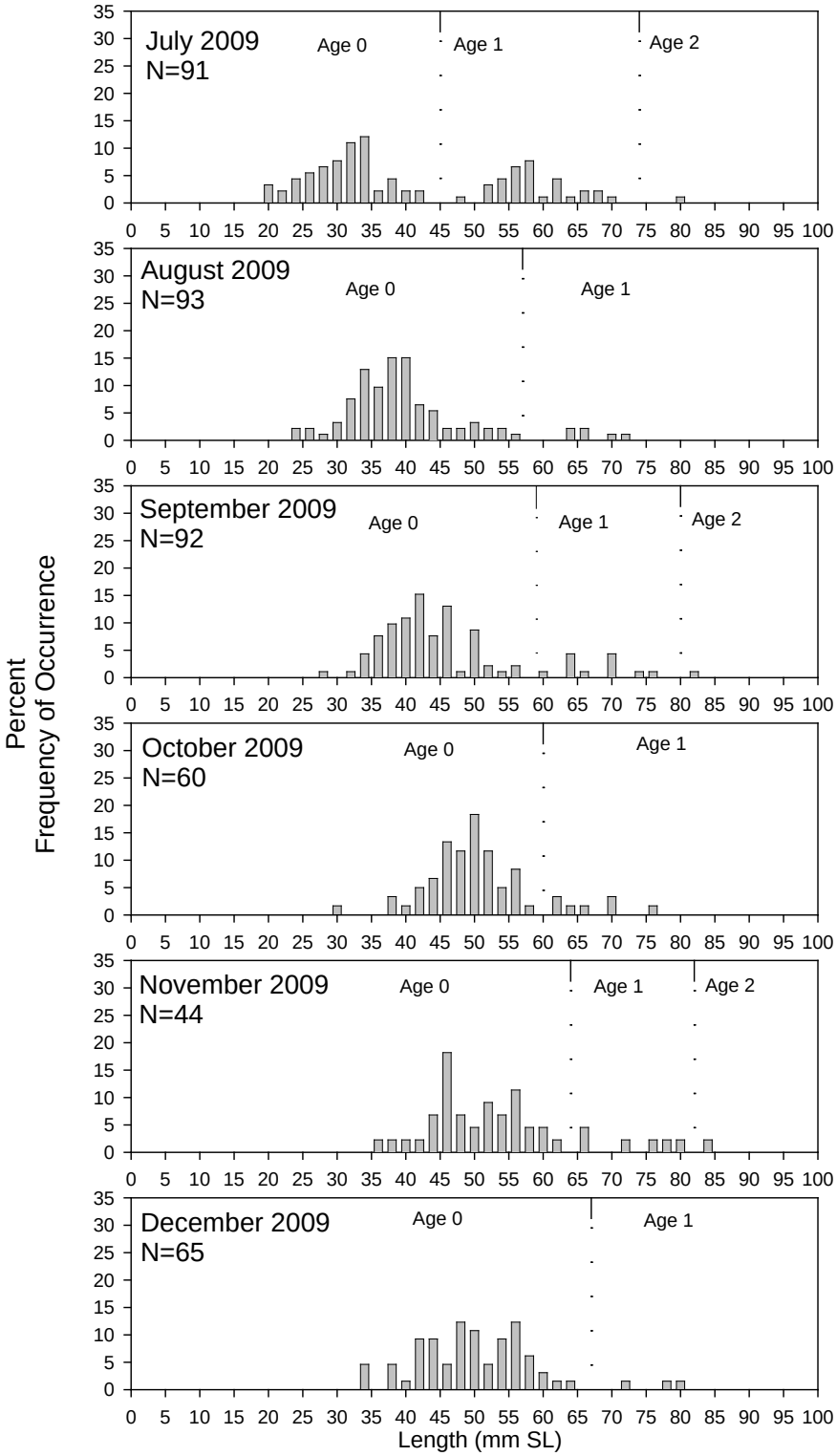

Figure 5. Length-frequency histograms of unmarked Rio Grande silvery minnow captured between July and December 2009. Dashed lines represent estimated breaks between year classes.

Fish Community

From January to December 2009, 2,235 seine hauls totaling 48,329.4 m^2 were conducted. In these samples, 15,342 individuals representing 19 species were collected (Table 2). Native cyprinids including red shiner (*Cyprinella lutrensis*), Rio Grande silvery minnow, fathead minnow (*Pimephales promelas*), flathead chub (*Platygobio gracilis gulonella*), and longnose dace (*Rhinichthys cataractae cataractae*) represented 80% of all individuals collected. Red shiner was the numerically dominant species of the fish community and accounted for 48% of all fish collected.

DISCUSSION

Augmentation efforts in 2009 concluded the eighth year in the Middle Rio Grande, New Mexico. Since 2002, 1,146,964 Rio Grande silvery minnow have been released. 2009 represented the second year of implementation for a revised 5-year augmentation plan (2008-2012) for the Middle Rio Grande. As a result of this revised augmentation strategy and continued favorable conditions for Rio Grande silvery minnow in the wild, only 1 site required stocking in 2009, as compared with no fish being required for augmentation in 2008.

There were no recaptures of VIE tagged Rio Grande silvery minnow in 2009. This was due primarily to the fact that there were no releases in 2008 and only a small release in late 2009. Another factor was the reduced standard population monitoring conducted by ASIRF in 2009 due to contracting issues. Previous results have indicated that recaptures occur primarily within the first 6 months after a release, with catch rates decreasing out to 24 months after a release when catch of released fish nearly disappears. Individuals that are recaptured out to 24 months after a release could be up to 3 years old based on age at release. These individuals would make up a very small percentage of the population, but are present nonetheless.

Under the revised stocking protocol, we determined that augmentation in the Isleta and San Acacia Reaches was only necessary at one site in 2009. A total of 21,218 VIE tagged RGSM were needed for augmentation at the Bosque del Apache National Wildlife Refuge site in the San Acacia Reach. Additional fish that were scheduled for the Middle Rio Grande were made available and released as part of the continued reintroduction in Big Bend, Texas in October October 2009. All other sites had catch rates over this target of 1 fish/100 m^2, including a majority of the sites with significantly higher catch rates. A combination of factors in 2009 led to these increased catch rates including optimal spring runoff, recruitment flows throughout the early summer, and no river intermittency. Expectedly, the one site that required stocking was the only site within the study area that experienced intermittency in 2009.

Monitoring events are spread out over the course of the year and are not designed to maximize capture of fish, they are usually designed to compare across dates and sites. Past results have indicated that estimated survival rates from released fish were comparable if not higher than that for wild fish (Remshardt 2006, 2008a). There are more present in the system than observed and eventually contribute to future spawning events and subsequent generations. For example, standard population monitoring across all 20 sites in September of 2010 resulted in

approximately 10,000 m^2 of habitat sampled, while there are approximately 40,000,000 m^2 of potential habitat between combining all reaches (Dudley and Platania 2009, Dudley et al. 2011). From population estimation work on Rio Grande silvery minnow, detection probabilities have been estimated at 0.4 for all fish (or 40% chance of observing an individual when in fact it is present in a mesohabitat sampled) (Dudley et al. 2011). Using our example above, the effectively sampled area is now 4,000 m^2. This equates to a 1 in 10,000 chance of observing a particular VIE tagged fish. All of this information suggests that the chances of encountering released fish need to be examined based on the relative sampled area. It is quickly evident that even a moderate number of recaptures indicate significantly more impact than just raw numbers of observations.

Even when combining data from a variety of research projects in 2009, there were no recaptures. This precluded any obersvations of movement and survival. Included in the revised augmentation plan is a strategy to reduce downstream movement immediately afer release due to the stress of handling and transport. We now "soft-release" all augmentation-related Rio Grande silvery minnow. This has likely led to decreased initial movement and associated mortality. With batch-marking such as VIE, it is difficult to monitor movement from month to month without knowing the specific actions of each fish. Still, past evidence has shown that the majority of recaptured VIE tagged fish are found within 15 miles of the release location. Specific information on individual movement (including juveniles) is still an important information gap in Rio Grande silvery minnow biology.

Catch rates in the Angostura Reach in 2009 were lower than in 2008. We will continue to monitor the change within this reach in relation to our current augmentation strategy. It is possible that temporarily removing Angostura Reach from augmentation has resulted in decreased catch rates of wild fish. As noted in the augmentation plan, if catch rates in Angostura Reach remain low, we will reinitiate augmentation activities in this reach prior to 2012.
In September 2009, catch rates in the Angostura Reach were higher than the Isleta Reach but lower than the San Acacia Reach. The overall reach catch rate for Angostura Reach was 7.8 RGSM / 100 m^2. We will continue to monitor all of these sites in this reach in 2009, if the overall catch rate for this reach falls below 0.1 RGSM / 100 m^2 during fall surveys, then augmentation will be re-initiated the following year.

With the temporary removal of augmentation from Angostura Reach, it is anticipated that catch rates in this reach will decrease in relation to catch rates in the lower reaches. This observation may be obscured by benefits gained from other restoration activities and detracted by continued threats such as habitat fragmenatation.

Augmentation through 2012 will be focused in the Isleta and San Acacia Reaches while evaluating past efforts in the Angostura Reach. The primary way to determine the effects of augmentation in the Angostura Reach is to remove augmentation and monitor the changes in catch rates (and population estimates). Initial observations throughout the Middle Rio Grande indicate that the majority of the population is located in the Isleta and San Acacia Reaches. If this trend continues and catch rates in the Angostura Reach drop to levels observed prior to augmentation (2002), then it can be expected that augmentation (along with favorable habitat and flow conditions) was a driving force in the temporary increase in catch rates observed between

2003 and 2006. Similarly, the flow and habitat conditions over the last 3 years (2007-2009) must be taken into consideration when evaluating the impacts of augmentation. Regardless of the outcome, the period of augmentation removal (2008-2012) should be sufficient to evaluate the effects.

Continued monitoring of an augmented population is critical for evaluating the success of any project (George et al. 2009). Within the last three years, we have implemented new protocols that have been adapted from information learned in previous years. Evaluation of these populations has not just focused on documenting the presence or absence of released fish, but has included information on growth, movement, survival. Cooperative research includes genetic monitoring and providing information and fish for reintroduction. Augmentation such as this is not intended to be a continuous effort (USFWS 2000), and must not continue for the population to be by definition of a "self-sustaining population". Although various conservation efforts have been undertaken in the past and others are currently being carried out in the middle Rio Grande, and abundance in recent years is increasing, the threat of extinction of the Rio Grande silvery minnow continues because of the high probability of continued drought, the fragmented and isolated nature of currently occupied habitat, and the absence of silvery minnows in other parts of the historic range. Additional work needs to be done to conserve this species and the ecosystems upon which it depends.

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Appendix A.
Ichthyofaunal composition of 2009 Rio Grande silvery minnow augmentation monitoring surveys

2009 Report

SANDIA LINE 14

27 January 2009 DJM09-004 31 seine hauls Effort: 457.5 m ^{2}

Evan B. Anderson, Dustin J. Myers, Angela P. James, Mark Morales

Scientific name	N
Cyprinella lutrensis	16
Hybognathus amarus	68
Platygobio gracilis	2
Catostomus commersoni	1

NORTH AMAFCA

27 January 2009 DJM09-002 31 seine hauls Effort: 514.8 m ^{2}

Evan B. Anderson, Dustin J. Myers, Angela P. James, Mark Morales

Scientific name	N
Cyprinella lutrensis	69
Hybognathus amarus	11
Cyprinus carpio	1
Platygobio gracilis	5
Catostomus commersoni	1
Lepomis macrochirus	1
Micropterus salmoides	1

LOMITAS NEGRAS

27 January 2009 DJM09-003 30 seine hauls Effort: 618.0 m ^{2}

Evan B. Anderson, Dustin J. Myers, Angela P. James, Mark Morales

Scientific name	N
Gambusia affinis	16
Lepomis macrochirus	1
Micropterus salmoides	2

DIXON ROAD

27 January 2009 DJM09-001 30 seine hauls Effort: 594.8 m ^{2}

Evan B. Anderson, Dustin J. Myers, Angela P. James, Mark Morales

Scientific name	N
Cyprinella lutrensis	2
Hybognathus amarus	1
Pimephales promelas	1
Platygobio gracilis	2
Rhinichthys cataractae	1

ATRISCO OUTFALL

30 January 2009 WJR09-835 30 seine hauls Effort: 959.5 m ^{2}

W. Jason Remshardt, Tristan J. Austring, Bobby R. Duran

Scientific name	N
Cyprinella lutrensis	4
Hybognathus amarus	2
Platygobio gracilis	7
Carpiodes carpio	1
Ameiurus natalis	2

ALEJANDRO GATE

30 January 2009 WJR09-837 21 seine hauls Effort: 526.0 m ^{2}

W. Jason Remshardt, Tristan J. Austring, Bobby R. Duran

Scientific name	N
Cyprinella lutrensis	1
Hybognathus amarus	289
Pimephales promelas	1
Platygobio gracilis	1

IDD

30 January 2009 WJR09-836 30 seine hauls Effort: 651.5 m ^{2}

W. Jason Remshardt, Tristan J. Austring, Bobby R. Duran

Scientific name	N
Cyprinella lutrensis	75
Hybognathus amarus	11
Pimephales promelas	3
Platygobio gracilis	1

SANDIA LINE 14

26 February 2009 WJR09-841 30 seine hauls Effort: 639.0 m ^{2}

W. Jason Remshardt, Evan B. Anderson, Thomas P. Archdeacon, Mark Morales, Clint Sandoval

Scientific name	N
Cyprinella lutrensis	25
Hybognathus amarus	77
Pimephales promelas	8
Platygobio gracilis	4
Rhinichthys cataractae	4
Catostomus commersoni	3
Ictalurus punctatus	1

NORTH AMAFCA

26 February 2009 WJR09-839 30 seine hauls Effort: 666.0 m ^{2}

W. Jason Remshardt, Evan B. Anderson, Thomas P. Archdeacon, Mark Morales, Clint Sandoval

Scientific name	N
Platygobio gracilis	3
Gambusia affinis	2

LOMITAS NEGRAS

26 February 2009 WJR09-840 30 seine hauls Effort: 602.8 m ^{2}

W. Jason Remshardt, Evan B. Anderson, Thomas P. Archdeacon, Mark Morales, Clint Sandoval

Scientific name	N
Hybognathus amarus	4
Pimephales promelas	3
Platygobio gracilis	3
Gambusia affinis	1
Lepomis macrochirus	4
Micropterus salmoides	3

DIXON ROAD

26 February 2009 WJR09-838 30 seine hauls Effort: 707.8 m ^{2}

W. Jason Remshardt, Evan B. Anderson, Thomas P. Archdeacon, Mark Morales, Clint Sandoval

Scientific name	N
Cyprinella lutrensis	5
Platygobio gracilis	10
Rhinichthys cataractae	15
Gambusia affinis	3

DIXON ROAD

30 March 2009 WJR09-842 30 seine hauls Effort: 886.3 m ^{2}

W. Jason Remshardt, Dustin J. Myers, Bobby R. Duran, Megan J. Osborne

Scientific name	N
Cyprinella lutrensis	9
Hybognathus amarus	117
Pimephales promelas	1
Platygobio gracilis	13
Catostomus commersoni	4

NORTH AMAFCA

30 March 2009 WJR09-843 30 seine hauls Effort: 594.3 m ^{2}

W. Jason Remshardt, Dustin J. Myers, Bobby R. Duran, Megan J. Osborne

Scientific name	N
Cyprinella lutrensis	27
Hybognathus amarus	21
Platygobio gracilis	2
Catostomus commersoni	1

LOMITAS NEGRAS

30 March 2009 WJR09-844 30 seine hauls Effort: 633.3 m ^{2}

W. Jason Remshardt, Dustin J. Myers, Bobby R. Duran, Megan J. Osborne

Scientific name	N
Cyprinella lutrensis	16
Hybognathus amarus	17
Pimephales promelas	10
Catostomus commersoni	1
Ameiurus natalis	1
Lepomis macrochirus	3
Micropterus salmoides	1

SANDIA LINE 14

30 March 2009 WJR09-845 30 seine hauls Effort: 503.0 m ^{2}

W. Jason Remshardt, Dustin J. Myers, Bobby R. Duran, Megan J. Osborne

Scientific name	N
Cyprinella lutrensis	38
Hybognathus amarus	19
Pimephales promelas	6
Platygobio gracilis	14
Rhinichthys cataractae	2
Catostomus commersoni	6
Ictalurus punctatus	1

LOMITAS NEGRAS

27 April 2009 TPA09-010 24 seine hauls Effort: 373.8 m ^{2}

Dustin J. Myers, Thomas P. Archdeacon, Mark Morales

Scientific name	N
Cyprinella lutrensis	13
Hybognathus amarus	132
Pimephales promelas	1
Cyprinus carpio	4
Platygobio gracilis	5
Ictalurus punctatus	1
Gambusia affinis	1
Lepomis cyanellus	5

SANDIA LINE 14

27 April 2009 TPA09-011 30 seine hauls Effort: 540.0 m ^{2}

Dustin J. Myers, Thomas P. Archdeacon, Mark Morales

Scientific name	N
Cyprinella lutrensis	6
Hybognathus amarus	28
Pimephales promelas	1
Platygobio gracilis	9
Lepomis cyanellus	1

DIXON ROAD

27 April 2009 TPA09-012 30 seine hauls Effort: 729.8 m ^{2}

Dustin J. Myers, Thomas P. Archdeacon, Mark Morales

Scientific name	N
Hybognathus amarus	9
Pimephales promelas	1
Platygobio gracilis	3
Rhinichthys cataractae	4
Carpiodes carpio	2
Gambusia affinis	1

NORTH AMAFCA

27 April 2009 TPA09-013 30 seine hauls Effort: 401.5 m ^{2}

Dustin J. Myers, Thomas P. Archdeacon, Mark Morales

Scientific name	N
Cyprinella lutrensis	46
Hybognathus amarus	5
Pimephales promelas	3
Platygobio gracilis	5
Catostomus commersoni	6
Ictalurus punctatus	1

ATRISCO OUTFALL

28 April 2009 WJR09-846 30 seine hauls Effort: 605.5 m ^{2}

W. Jason Remshardt, Evan B. Anderson, Thomas P. Archdeacon

Scientific name	N
Cyprinella lutrensis	29
Pimephales promelas	1
Platygobio gracilis	50
Rhinichthys cataractae	2
Ictalurus punctatus	12

IDD

28 April 2009 WJR09-847 30 seine hauls Effort: 620.8 m ^{2}

W. Jason Remshardt, Evan B. Anderson, Thomas P. Archdeacon

Scientific name	N
Cyprinella lutrensis	59
Hybognathus amarus	124
Pimephales promelas	1
Platygobio gracilis	3
Catostomus commersoni	1
Morone chrysops	3

ALEJANDRO GATE

28 April 2009 WJR09-848 30 seine hauls Effort: 477.0 m ^{2}

W. Jason Remshardt, Evan B. Anderson, Thomas P. Archdeacon

Scientific name	N
Cyprinella lutrensis	7
Pimephales promelas	3
Gambusia affinis	15

DIXON ROAD

19 May 2009 WJR09-849 30 seine hauls Effort: 674.3 m ^{2}

W. Jason Remshardt, Thomas P. Archdeacon, Stephen R. Davenport, Mark Morales

Scientific name	N
Cyprinella lutrensis	4
Hybognathus amarus	3
Platygobio gracilis	28
Rhinichthys cataractae	8
Catostomus commersoni	1

NORTH AMAFCA

19 May 2009 WJR09-850 30 seine hauls Effort: 505.5 m ^{2}

W. Jason Remshardt, Thomas P. Archdeacon, Mark Morales

Scientific name	N
Cyprinella lutrensis	44
Hybognathus amarus	5
Pimephales promelas	2
Platygobio gracilis	17
Rhinichthys cataractae	1
Catostomus commersoni	4
Pomoxis annularis	2

LOMITAS NEGRAS

19 May 2009 WJR09-851 30 seine hauls Effort: 788.0 m ^{2}

W. Jason Remshardt, Thomas P. Archdeacon, Mark Morales

Scientific name	N
Cyprinella lutrensis	10
Hybognathus amarus	6
Cyprinus carpio	1
Platygobio gracilis	13
Catostomus commersoni	5
Ictalurus punctatus	2
Micropterus salmoides	1

SANDIA LINE 14

19 May 2009 WJR09-852 30 seine hauls Effort: 652.5 m ^{2}

W. Jason Remshardt, Thomas P. Archdeacon, Mark Morales

Scientific name	N
Hybognathus amarus	3
Platygobio gracilis	7
Rhinichthys cataractae	2
Catostomus commersoni	2
Ictalurus punctatus	1

IDD

26 May 2009 WJR09-854 30 seine hauls Effort: 637.0 m ^{2}

W. Jason Remshardt, Evan B. Anderson, Dustin J. Myers

Scientific name	N
Cyprinella lutrensis	85
Hybognathus amarus	18
Pimephales promelas	1
Platygobio gracilis	6
Rhinichthys cataractae	1
Catostomus commersoni	1
Gambusia affinis	5

ALEJANDRO GATE

26 May 2009 WJR09-855 30 seine hauls Effort: 623.3 m ^{2}

W. Jason Remshardt, Evan B. Anderson, Dustin J. Myers

Scientific name	N
Cyprinella lutrensis	128
Hybognathus amarus	8
Pimephales promelas	1

DIXON ROAD

24 June 2009 WJR09-856 30 seine hauls Effort: 717.0 m ^{2}

Angela P. James, James P. Sandoval, Scott J. Bulgrin, Jody Kougioulias, Tim Smith

Scientific name	N
Cyprinella lutrensis	156
Hybognathus amarus	4
Pimephales promelas	4
Cyprinus carpio	1
Platygobio gracilis	9
Rhinichthys cataractae	2
Catostomus commersoni	29
Gambusia affinis	11
Micropterus salmoides	1

NORTH AMAFCA

24 June 2009 WJR09-857 30 seine hauls Effort: 580.8 m ^{2}

Angela P. James, James P. Sandoval, Scott J. Bulgrin, Jody Kougioulias, Tim Smith

Scientific name	N
Cyprinella lutrensis	869
Hybognathus amarus	1
Pimephales promelas	13
Cyprinus carpio	23
Platygobio gracilis	18
Rhinichthys cataractae	7
Catostomus commersoni	174
Gambusia affinis	45
Lepomis cyanellus	21

LOMITAS NEGRAS

24 June 2009 WJR09-858 30 seine hauls Effort: 612.0 m^2

Angela P. James, James P. Sandoval, Scott J. Bulgrin, Jody Kougioulias, Tim Smith

Scientific name	N
Cyprinella lutrensis	332
Hybognathus amarus	7
Pimephales promelas	4
Cyprinus carpio	35
Platygobio gracilis	4
Catostomus commersoni	415
Gambusia affinis	136
Micropterus salmoides	1
Sander vitreus	1

SANDIA LINE 14

24 June 2009 WJR09-859 30 seine hauls Effort: 745.5 m^2

Angela P. James, James P. Sandoval, Scott J. Bulgrin, Jody Kougioulias, Tim Smith

Scientific name	N
Cyprinella lutrensis	51
Hybognathus amarus	12
Pimephales promelas	1
Platygobio gracilis	11
Rhinichthys cataractae	13
Catostomus commersoni	33
Ictalurus punctatus	1

ATRISCO OUTFALL

07 July 2009 WJR09-860 30 seine hauls Effort: 810.8 m ^{2}

W. Jason Remshardt, Evan B. Anderson, Tristan J. Austring, Adam F. Valdez

Scientific name	N
Cyprinella lutrensis	8
Hybognathus amarus	231
Pimephales promelas	11
Cyprinus carpio	1
Platygobio gracilis	38
Rhinichthys cataractae	4
Catostomus commersoni	7
Ictalurus punctatus	4
Lepomis macrochirus	1
Micropterus salmoides	1

IDD

07 July 2009 WJR09-861 30 seine hauls Effort: 729.3 m ^{2}

W. Jason Remshardt, Evan B. Anderson, Tristan J. Austring, Adam F. Valdez

Scientific name	N
Cyprinella lutrensis	135
Hybognathus amarus	80
Platygobio gracilis	5
Catostomus commersoni	1
Ictalurus punctatus	12
Pomoxis annularis	5

ALEJANDRO GATE

07 July 2009 WJR09-862 30 seine hauls Effort: 554.0 m ^{2}

W. Jason Remshardt, Evan B. Anderson, Tristan J. Austring, Adam F. Valdez

Scientific name	N
Cyprinella lutrensis	33
Hybognathus amarus	450
Cyprinus carpio	3
Rhinichthys cataractae	2
Catostomus commersoni	4
Ameiurus natalis	2
Gambusia affinis	61
Micropterus salmoides	4

DIXON ROAD

28 July 2009 WJR09-866 30 seine hauls Effort: 1,137.8 m ^{2}

W. Jason Remshardt, Jody Kougioulias, Andrew A. ElkShoulder, Adam F. Valdez, Mark Morales, Thomas P. Archdeacon

Scientific name	N
Cyprinella lutrensis	36
Hybognathus amarus	292
Pimephales promelas	23
Platygobio gracilis	48
Rhinichthys cataractae	9
Catostomus commersoni	40
Ictalurus punctatus	13
Gambusia affinis	5
Morone chrysops	1
Micropterus salmoides	2

NORTH AMAFCA

28 July 2009 WJR09-867 30 seine hauls Effort: 810.8 m ^{2}

W. Jason Remshardt, Jody Kougioulias, Andrew A. ElkShoulder, Adam F. Valdez, Mark Morales, Thomas P. Archdeacon

Scientific name	N
Cyprinella lutrensis	43
Hybognathus amarus	88
Pimephales promelas	16
Platygobio gracilis	17
Rhinichthys cataractae	2
Catostomus commersoni	19
Ictalurus punctatus	7
Morone chrysops	1

LOMITAS NEGRAS

28 July 2009 WJR09-868 30 seine hauls Effort: 850.8 m ^{2}

W. Jason Remshardt, Jody Kougioulias, Andrew A. ElkShoulder, Adam F. Valdez, Mark Morales, Thomas P. Archdeacon

Scientific name	N
Cyprinella lutrensis	21
Hybognathus amarus	48
Pimephales promelas	9
Platygobio gracilis	14
Rhinichthys cataractae	7
Carpiodes carpio	2
Catostomus commersoni	7
Gambusia affinis	35
Lepomis macrochirus	1
Micropterus salmoides	2

ATRISCO OUTFALL

30 July 2009 TPA09-106 30 seine hauls Effort: 616.3 m ^{2}

Thomas P. Archdeacon, Andrew A. ElkShoulder, Adam F. Valdez

Scientific name	N
Cyprinella lutrensis	6
Hybognathus amarus	75
Pimephales promelas	9
Platygobio gracilis	2
Carpiodes carpio	77
Catostomus commersoni	10
Ictalurus punctatus	16
Gambusia affinis	3
Perca flavescens	1

IDD

30 July 2009 TPA09-107 30 seine hauls Effort: 611.0 m ^{2}

Thomas P. Archdeacon, Andrew A. ElkShoulder, Adam F. Valdez

Scientific name	N
Cyprinella lutrensis	130
Hybognathus amarus	230
Pimephales promelas	5
Platygobio gracilis	3
Carpiodes carpio	28
Catostomus commersoni	2
Ictalurus punctatus	10
Gambusia affinis	2
Micropterus salmoides	2

ALEJANDRO GATE

30 July 2009 TPA09-108 26 seine hauls Effort: 613.8 m ^{2}

Thomas P. Archdeacon, Andrew A. ElkShoulder, Adam F. Valdez

Scientific name	N
Cyprinella lutrensis	98
Hybognathus amarus	201
Pimephales promelas	2
Platygobio gracilis	2
Rhinichthys cataractae	1
Carpiodes carpio	4
Catostomus commersoni	3
Ictalurus punctatus	8
Gambusia affinis	10
Lepomis macrochirus	1
Micropterus salmoides	5
Pomoxis annularis	1

LOMITAS NEGRAS

26 August 2009 TPA09-111 30 seine hauls Effort: 659.8 m ^{2}

Thomas P. Archdeacon, Tristan J. Austring, Jody Kougioulias, Mark Morales

Scientific name	N
Cyprinella lutrensis	30
Hybognathus amarus	62
Pimephales promelas	2
Platygobio gracilis	42
Rhinichthys cataractae	4
Catostomus commersoni	4
Ictalurus punctatus	3
Gambusia affinis	165
Morone chrysops	2
Lepomis cyanellus	1
Lepomis macrochirus	15
Micropterus salmoides	17

DIXON ROAD

26 August 2009 TPA09-112 30 seine hauls Effort: 749.6 m ^{2}

Thomas P. Archdeacon, Tristan J. Austring, Jody Kougioulias, Mark Morales

Scientific name	N
Cyprinella lutrensis	80
Hybognathus amarus	32
Pimephales promelas	3
Platygobio gracilis	56
Rhinichthys cataractae	10
Carpiodes carpio	4
Catostomus commersoni	18
Ameiurus natalis	1
Ictalurus punctatus	8
Gambusia affinis	9
Morone chrysops	2
Lepomis macrochirus	3

NORTH AMAFCA

26 August 2009 TPA09-113 30 seine hauls Effort: 540.3 m ^{2}

Thomas P. Archdeacon, Tristan J. Austring, Jody Kougioulias, Mark Morales

Scientific name	N
Cyprinella lutrensis	82
Hybognathus amarus	7
Cyprinus carpio	2
Platygobio gracilis	32
Rhinichthys cataractae	1
Catostomus commersoni	4
Ictalurus punctatus	3
Gambusia affinis	1
Lepomis macrochirus	6
Micropterus salmoides	1

SANDIA LINE 14

26 August 2009 TPA09-114 30 seine hauls Effort: 491.0 m ^{2}

Thomas P. Archdeacon, Tristan J. Austring, Jody Kougioulias, Mark Morales

Scientific name	N
Cyprinella lutrensis	37
Hybognathus amarus	19
Pimephales promelas	2
Platygobio gracilis	18
Rhinichthys cataractae	3
Carpiodes carpio	1
Catostomus commersoni	7
Ictalurus punctatus	5
Gambusia affinis	22
Lepomis macrochirus	5

ATRISCO OUTFALL

27 August 2009 TPA09-117 30 seine hauls Effort: 594.3 m ^{2}

Evan B. Anderson, Thomas P. Archdeacon, Stephen R. Davenport, Angela P. James

Scientific name	N
Cyprinella lutrensis	196
Hybognathus amarus	17
Pimephales promelas	6
Platygobio gracilis	5
Rhinichthys cataractae	1
Carpiodes carpio	56
Ictalurus punctatus	9
Gambusia affinis	5
Lepomis macrochirus	1

ALEJANDRO GATE

27 August 2009 TPA09-118 30 seine hauls Effort: 612.5 m ^{2}

Evan B. Anderson, Thomas P. Archdeacon, Stephen R. Davenport, Angela P. James

Scientific name	N
Cyprinella lutrensis	491
Hybognathus amarus	58
Pimephales promelas	5
Platygobio gracilis	17
Carpiodes carpio	13
Ictalurus punctatus	5
Gambusia affinis	327
Lepomis macrochirus	1
Micropterus salmoides	1

IDD

27 August 2009 TPA09-119 30 seine hauls Effort: 573.0 m ^{2}

Evan B. Anderson, Thomas P. Archdeacon, Stephen R. Davenport, Angela P. James

Scientific name	N
Cyprinella lutrensis	121
Hybognathus amarus	68
Pimephales promelas	2
Carpiodes carpio	17
Catostomus commersoni	3
Ictalurus punctatus	6
Gambusia affinis	5
Lepomis macrochirus	1
Pomoxis annularis	2

DIXON ROAD

23 September 2009 TPA09-120 30 seine hauls Effort: 685.3 m ^{2}

Dustin J. Myers, Thomas P. Archdeacon, Tristan J. Austring, Mark Morales, Joe Chavez

Scientific name	N
Cyprinella lutrensis	239
Hybognathus amarus	73
Pimephales promelas	15
Platygobio gracilis	31
Carpiodes carpio	1
Catostomus commersoni	5
Ictalurus punctatus	2
Gambusia affinis	57

NORTH AMAFCA

23 September 2009 TPA09-121 30 seine hauls Effort: 590.0 m ^{2}

Dustin J. Myers, Thomas P. Archdeacon, Tristan J. Austring, Mark Morales, Joe Chavez

Scientific name	N
Cyprinella lutrensis	83
Hybognathus amarus	90
Pimephales promelas	11
Platygobio gracilis	61
Rhinichthys cataractae	3
Carpiodes carpio	2
Catostomus commersoni	2
Ameiurus natalis	1
Ictalurus punctatus	1
Gambusia affinis	71
Morone chrysops	1

LOMITAS NEGRAS

23 September 2009 TPA09-122 30 seine hauls Effort: 643.3 m ^{2}

Dustin J. Myers, Thomas P. Archdeacon, Tristan J. Austring, Mark Morales, Joe Chavez

Scientific name	N
Cyprinella lutrensis	30
Hybognathus amarus	79
Pimephales promelas	5
Platygobio gracilis	6
Rhinichthys cataractae	1
Carpiodes carpio	2
Catostomus commersoni	3
Gambusia affinis	19
Lepomis macrochirus	5
Micropterus salmoides	17

SANDIA LINE 14

23 September 2009 TPA09-123 30 seine hauls Effort: 627.5 m ^{2}

Dustin J. Myers, Thomas P. Archdeacon, Tristan J. Austring, Mark Morales, Joe Chavez

Scientific name	N
Cyprinella lutrensis	287
Hybognathus amarus	32
Pimephales promelas	3
Platygobio gracilis	16
Rhinichthys cataractae	3
Catostomus commersoni	1
Ictalurus punctatus	3
Gambusia affinis	128

ATRISCO OUTFALL

24 September 2009 TPA09-124 30 seine hauls Effort: 654.3 m ^{2}

Evan B. Anderson, Thomas P. Archdeacon, Dustin J. Myers

Scientific name	N
Cyprinella lutrensis	157
Hybognathus amarus	3
Pimephales promelas	3
Platygobio gracilis	9
Carpiodes carpio	22
Ictalurus punctatus	5

ALEJANDRO GATE

24 September 2009 TPA09-125 30 seine hauls Effort: 520.5 m ^{2}

Evan B. Anderson, Thomas P. Archdeacon, Dustin J. Myers

Scientific name	N
Cyprinella lutrensis	580
Hybognathus amarus	50
Pimephales promelas	5
Cyprinus carpio	1
Platygobio gracilis	1
Rhinichthys cataractae	3
Ictalurus punctatus	20
Gambusia affinis	54

IDD

24 September 2009 TPA09-126 30 seine hauls Effort: 460.0 m ^{2}

Evan B. Anderson, Thomas P. Archdeacon, Dustin J. Myers

Scientific name	N
Cyprinella lutrensis	84
Hybognathus amarus	1
Platygobio gracilis	2
Carpiodes carpio	1
Catostomus commersoni	1
Ictalurus punctatus	20
Pomoxis annularis	2

ALEJANDRO GATE

27 October 2009 TJA09-057 30 seine hauls Effort: 700.3 m ^{2}

Evan B. Anderson, Tristan J. Austring, Stephen R. Davenport

Scientific name	N
Cyprinella lutrensis	474
Hybognathus amarus	11
Pimephales promelas	1
Platygobio gracilis	4
Catostomus commersoni	1
Ictalurus punctatus	5
Gambusia affinis	8

ATRISCO OUTFALL

27 October 2009 TJA09-058 31 seine hauls Effort: 753.5 m ^{2}

Evan B. Anderson, Tristan J. Austring, Stephen R. Davenport

Scientific name	N
Cyprinella lutrensis	146
Hybognathus amarus	7
Pimephales promelas	5
Platygobio gracilis	4
Rhinichthys cataractae	2
Carpiodes carpio	2
Catostomus commersoni	1
Ictalurus punctatus	4
Gambusia affinis	2

DIXON ROAD

02 November 2009 TJA09-059 30 seine hauls Effort: 798.5 m ^{2}

Tristan J. Austring, Paula J. Stubbs, Mark Morales, Joe Chavez

Scientific name	N
Cyprinella lutrensis	16
Hybognathus amarus	24
Pimephales promelas	1
Platygobio gracilis	5
Rhinichthys cataractae	1
Morone chrysops	2

SANDIA LINE 14

02 November 2009 TJA09-060 30 seine hauls Effort: 849.0 m ^{2}

Tristan J. Austring, Paula J. Stubbs, Mark Morales, Joe Chavez

Scientific name	N
Cyprinella lutrensis	30
Hybognathus amarus	20
Pimephales promelas	1
Platygobio gracilis	9
Catostomus commersoni	1
Ictalurus punctatus	1
Gambusia affinis	23

LOMITAS NEGRAS

02 November 2009 TJA09-061 30 seine hauls Effort: 725.3 m ^{2}

Tristan J. Austring, Paula J. Stubbs, Mark Morales, Joe Chavez

Scientific name	N
Cyprinella lutrensis	19
Hybognathus amarus	23
Pimephales promelas	1
Platygobio gracilis	7
Gambusia affinis	24
Micropterus salmoides	1

NORTH AMAFCA

02 November 2009 TJA09-062 30 seine hauls Effort: 745.5 m ^{2}

Tristan J. Austring, Paula J. Stubbs, Mark Morales, Joe Chavez, Camelio Torres

Scientific name	N
Cyprinella lutrensis	49
Hybognathus amarus	2
Pimephales promelas	1
Platygobio gracilis	2
Rhinichthys cataractae	1
Gambusia affinis	51

ATRISCO OUTFALL

23 November 2009 TPA09-127 30 seine hauls Effort: 503.3 m ^{2}

Thomas P. Archdeacon, Tristan J. Austring,

Scientific name	N
Cyprinella lutrensis	227
Hybognathus amarus	19
Pimephales promelas	5
Platygobio gracilis	5
Carpiodes carpio	3
Catostomus commersoni	4
Ictalurus punctatus	2
Gambusia affinis	10

ALEJANDRO GATE

23 November 2009 TPA09-128 30 seine hauls Effort: 427.0 m ^{2}

Thomas P. Archdeacon, Tristan J. Austring,

Scientific name	N
Cyprinella lutrensis	502
Hybognathus amarus	141
Pimephales promelas	2
Cyprinus carpio	2
Platygobio gracilis	1
Carpiodes carpio	7
Ictalurus punctatus	1
Gambusia affinis	24
Micropterus salmoides	1

IDD

23 November 2009 TPA09-129 25 seine hauls Effort: 371.5 m ^{2}

Thomas P. Archdeacon, Tristan J. Austring,

Scientific name	N
Cyprinella lutrensis	133
Hybognathus amarus	9
Cyprinus carpio	1
Platygobio gracilis	2
Carpiodes carpio	4
Ictalurus punctatus	2

DIXON ROAD

24 November 2009 TPA09-130 30 seine hauls Effort: 855.3 m ^{2}

Evan B. Anderson, Thomas P. Archdeacon, Mark Morales, Camelio Torres

Scientific name	N
Cyprinella lutrensis	10
Platygobio gracilis	9
Catostomus commersoni	1

NORTH AMAFCA

24 November 2009 TPA09-131 30 seine hauls Effort: 814.5 m ^{2}

Evan B. Anderson, Thomas P. Archdeacon, Mark Morales, Camelio Torres

Scientific name	N
Cyprinella lutrensis	6
Hybognathus amarus	3
Pimephales promelas	1
Platygobio gracilis	9
Gambusia affinis	9
Lepomis cyanellus	1

SANDIA LINE 14

24 November 2009 TPA09-132 30 seine hauls Effort: 674.3 m ^{2}

Evan B. Anderson, Thomas P. Archdeacon, Mark Morales, Camelio Torres

Scientific name	N
Cyprinella lutrensis	7
Hybognathus amarus	59
Platygobio gracilis	55
Rhinichthys cataractae	1
Ictalurus punctatus	2
Gambusia affinis	49
Morone chrysops	1
Lepomis cyanellus	9
Lepomis macrochirus	2
Micropterus salmoides	2

LOMITAS NEGRAS

24 November 2009 TPA09-133 25 seine hauls Effort: 645.3 m ^{2}

Evan B. Anderson, Thomas P. Archdeacon, Mark Morales, Camelio Torres

Scientific name	N
Cyprinella lutrensis	120
Hybognathus amarus	3
Pimephales promelas	1
Platygobio gracilis	3
Sander vitreus	1

ATRISCO OUTFALL

16 December 2009 TPA09-137 30 seine hauls Effort: 809.3 m ^{2}

Evan B. Anderson, Thomas P. Archdeacon, Tristan J. Austring, Tyler J. Pilger

Scientific name	N
Cyprinella lutrensis	68
Hybognathus amarus	4
Platygobio gracilis	3
Carpiodes carpio	1
Gambusia affinis	2

ALEJANDRO GATE

16 December 2009 TPA09-138 30 seine hauls Effort: 513.8 m ^{2}

Evan B. Anderson, Thomas P. Archdeacon, Tristan J. Austring, Tyler J. Pilger

Scientific name	N
Cyprinella lutrensis	259
Hybognathus amarus	25
Pimephales promelas	1
Platygobio gracilis	2
Ictalurus punctatus	1
Gambusia affinis	4
Lepomis cyanellus	1
Micropterus salmoides	1

IDD

16 December 2009 EBA09-065 30 seine hauls Effort: 368.0 m ^{2}

Evan B. Anderson, Thomas P. Archdeacon, Tristan J. Austring, Tyler J. Pilger

Scientific name	N
Cyprinella lutrensis	28
Hybognathus amarus	15
Cyprinus carpio	2
Platygobio gracilis	2
Carpiodes carpio	1
Ameiurus melas	1
Ictalurus punctatus	2
Gambusia affinis	1
Micropterus salmoides	1
Pomoxis annularis	2

Appendix B.
Water quality measurements by collection number. For detailed site information, cross-reference with Appendix A.

Collno = collection number; Temp = water temperature (C); DO = dissolved oxygen (mg/l); SpC = specific conductance (ms/cm); TDS = total dissolved solids (mg/l); Sal = salinity (ppt). . = no water quality data available for this collection

Collno	Temp	DO	SpC	Tds	Sal	pH
EBA09-060	8.74	9.97	0.48	0.31	0.23	8.25
EBA09-061	4.96	10.00	0.36	0.23	0.17	9.01
EBA09-062	5.57	10.74	0.37	0.25	0.18	8.92
EBA09-064	4.72	9.88	0.32	0.21	0.15	8.80
EBA09-065	7.46	10.19	0.41	0.27	0.20	8.30
TJA09-057	10.95	9.66	0.45	0.29	0.22	8.76
TJA09-058	10.71	8.30	0.41	0.27	0.20	8.87
TJA09-059	11.57	8.73	0.44	0.29	0.21	7.59
TJA09-060	11.77	9.90	0.32	0.21	0.16	8.64
TJA09-061	14.47	9.44	0.42	0.27	0.20	8.56
TJA09-062	14.41	9.48	0.36	0.24	0.17	8.59
TPA09-010	11.55	10.55	0.27	0.17	0.13	7.73
TPA09-011	12.90	59.19	0.24	0.15	0.12	7.69
TPA09-012	13.86	12.62	0.25	0.16	0.12	7.92
TPA09-013	14.56	14.08	0.25	0.16	0.12	7.90
TPA09-106	22.44	4.65	0.38	0.25	0.18	.
TPA09-107	21.82	3.75	0.37	0.24	0.18	.
TPA09-108	28.77	4.62	0.49	0.32	0.24	.
TPA09-111	23.58	7.89	0.38	0.24	0.18	8.43
TPA09-112	19.31	7.58	0.29	0.19	0.14	8.69
TPA09-113	20.83	7.70	0.30	0.19	0.14	8.65
TPA09-114	23.37	8.24	0.30	0.19	0.14	8.80
TPA09-117	21.44	7.07	0.37	0.24	0.18	8.72
TPA09-118	21.70	7.70	0.42	0.27	0.20	.
TPA09-119	23.46	8.69	0.39	0.26	0.19	.
TPA09-120	13.51	8.40	0.32	0.21	0.15	8.26
TPA09-121	14.68	8.71	0.32	0.21	0.15	8.40
TPA09-122	19.23	8.02	0.47	0.31	0.23	8.35
TPA09-123	18.21	8.36	0.31	0.20	0.15	8.60
TPA09-124	15.47	8.44	0.50	0.33	0.25	8.05
TPA09-125	15.42	8.07	0.45	0.29	0.22	8.15
TPA09-126	17.09	7.86	0.47	0.31	0.23	8.31
TPA09-127	6.66	10.82	0.40	0.26	0.20	7.84
TPA09-128	8.94	10.23	0.42	0.28	0.21	8.18
TPA09-129	9.93	11.07	0.41	0.27	0.20	8.59
TPA09-130	9.18	7.61	0.51	0.33	0.25	8.12
TPA09-131	6.08	9.30	0.39	0.25	0.19	8.45
TPA09-132	8.31	9.00	0.37	0.26	0.19	8.53

Collno	Temp	DO	SpC	Tds	Sal	pH
TPA09-133	8.09	10.04	0.28	0.22	0.16	8.79
TPA09-137	5.50	11.25	0.39	0.26	0.19	8.20
TPA09-138	9.73	11.80	0.59	0.38	0.29	8.55
WJR09-835	4.05	12.40	0.38	0.24	0.18	7.98
WJR09-836	6.04	12.07	0.41	0.26	0.20	8.48
WJR09-837	6.73	11.95	0.40	0.26	0.19	8.47
WJR09-838	7.79	11.55	0.28	0.19	0.15	.
WJR09-839	8.91	10.02	0.35	0.23	0.17	.
WJR09-840	9.50	10.20	0.42	0.27	0.21	.
WJR09-841	8.62	10.48	0.70	0.46	0.35	.
WJR09-842	8.12	11.99	0.26	0.17	0.12	7.90
WJR09-843	7.06	13.48	0.26	0.17	0.12	7.62
WJR09-844	2.88	13.86	0.28	0.18	0.13	.
WJR09-845	.	.	.	.	.	.
WJR09-846	14.02	8.57	0.26	0.17	0.12	7.78
WJR09-847	15.02	9.38	0.28	0.18	0.13	7.77
WJR09-848	15.27	9.20	0.39	0.25	0.19	7.61
WJR09-849	15.70	9.64	5.40	.	0.10	.
WJR09-850	22.55	8.16	2.63	.	0.10	.
WJR09-851	17.65	10.37	0.25	.	0.10	.
WJR09-852	25.45	5.38	0.23	.	0.10	.
WJR09-853	14.30	0.45	.	.	.	.
WJR09-854	17.35	13.06	.	.	.	.
WJR09-855	17.50	12.60	.	.	.	.
WJR09-856	19.78	6.27	0.30	0.19	0.14	8.28
WJR09-857	20.61	6.67	0.30	0.20	0.14	8.44
WJR09-858	21.55	7.02	0.37	0.24	0.18	8.02
WJR09-859	21.69	7.41	0.31	0.20	0.15	8.14
WJR09-860	22.63	6.05	0.35	0.23	0.17	7.85
WJR09-861	23.84	5.38	0.34	0.22	0.17	7.29
WJR09-862	23.65	5.80	0.41	0.27	0.20	7.16
WJR09-866	24.56	5.95	0.30	0.19	0.14	8.57
WJR09-867	26.19	5.80	0.29	0.19	0.14	8.77
WJR09-868	26.52	5.54	0.40	0.26	0.19	8.03