BUREAU OF RECLAMATION

Technical Memorandum – ENV-2021-109

February Raft Mounted Electrofishing Surveys, Middle Rio Grande: 2020 Annual Report

U.S. Department of the Interior

July 2020

Mission Statements

The U.S. Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated Island Communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Cover Photo: Rio Grande Silvery Minnow, Bosque del Apache National Wildlife Refuge (Reclamation).

February Raft Mounted Electrofishing Surveys, Middle Rio Grande: 2020 Annual Report

Prepared for:
Albuquerque Area Office
555 Broadway NE, Suite 100
Albuquerque, NM 87102

Prepared by:
Technical Service Center
Fisheries and Wildlife Resources Group
Eric Best; Fisheries Biologist
Matthew Bullard; Fisheries Biologist

Bureau of Reclamation
Technical Service Center

Acronyms

ASIR	American Southwest Ichthyological Researchers
CPUE	catch per unit effort
DO	dissolved oxygen
km	kilometers
LFCC	Low Flow Conveyance Channel
m	meters
m^2	square meter
mm	millimeter
NWR	National Wildlife Refuge
SL	standard length
µS/cm	microSiemens per centimeter
Reclamation	Bureau of Reclamation
TL	total length
VIE	visible implant elastomer
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service
UTM	Universal Transverse Mercator

Contents

Figures

Tables

1. Executive Summary

The Bureau of Reclamation (Reclamation) performs annual surveys proximate to Reclamation facilities and operation areas to evaluate the fish community at various river maintenance projects along the Rio Grande. Electrofishing and seining surveys are used to evaluate fish captures at different sites and habitats. These survey efforts supplement other monitoring projects within the Middle Rio Grande between Cochiti Dam and Elephant Butte Dam, New Mexico, particularly in winter. In February 2020, Reclamation monitored the fish community at nine locations on the Middle Rio Grande to track the presence and density changes of endangered Rio Grande Silvery Minnow (silvery minnow) (*Hybognathus amaru*s) and associated fish community.

A total of 574 fish were captured during the February 2020 survey, comprising nine native and seven introduced species (Table 1 in Section 4.1). Total fish captures were highest at the Escondida site (n=130; electrofishing), followed by the Los Lunas site (n=101; seining). A total of 191 silvery minnows were captured during the February 2020 sampling effort. Numerically, silvery minnows were the most common fish species overall and observed at seven of the nine survey locations. Silvery minnows were encountered at all but the Los Lunas and Low Flow Conveyance Channel (LFCC) sites. Total silvery minnow captures were highest at Escondida (n=81), as well as the electrofishing catch per unit effort (0.93 fish per minute). Five of the recaptured silvery minnows carried visible implant elastomer (VIE) markers—suggesting the majority of captured fish were of wild origin.

2. Introduction

Reclamation, in coordination with partner organizations, oversees projects designed to convey water for communities, agricultural lands, refuges, riverine habitats, recreation, fish, and wildlife within the Middle Rio Grande. Reclamation uses best available practices to collect biological data for sensitive fish and wildlife species that may be impacted by Reclamation activities and attempts to mitigate those impacts while providing for the multiple, conflicting needs of water users. These biological monitoring efforts supplement the gaps in timing or location of other sensitive species monitoring projects conducted by the U.S. Fish and Wildlife Service (USFWS) (Archdeacon 2020) or American Southwest Ichthyological Researchers, LLC (ASIR; Dudley et al. 2020), which also survey the fish community, including the Rio Grande Silvery Minnow.

The Rio Grande Silvery Minnow was listed as endangered by the State of New Mexico in 1979 (NMAC 19.33.1) and by USFWS in 1994 (Federal Register 59: 36988-36995). The historic range of the silvery minnow covered almost the entire length of the Rio Grande and Pecos Rivers (Figure 1; Bestgen and Platania 1991 and Propst 1999). The current range of the silvery minnow is now restricted to short stretches of river fragmented by dams and reservoirs on the Middle Rio Grande. The species entire current range was designated as critical habitat in 2003 (USFWS 2003) (Figure 1 and Figure 2). However, this critically designated habitat only represents about five percent of the fish's historic range (USFWS 2007).

Silvery minnows in the Middle Rio Grande have been detected in four reaches:

1) the Cochiti Reach (detected during surveys conducted in the 1990s) from Cochiti Dam extending downriver to the Angostura Diversion Dam,
2) the Angostura Reach from Angostura Diversion Dam down through Albuquerque to the Isleta Diversion Dam,
3) in the Isleta Reach at Isleta Diversion Dam and south to San Acacia Diversion Dam, and
4) in the San Acacia Reach which continues downstream to Elephant Butte Reservoir (Figure 2).

Reclamation biannually performs surveys intended to monitor the fish community proximate to Reclamation facilities and operation areas to determine the effects of various river maintenance projects on the fish community. Reclamation monitors in the winter, using electrofishing and seining techniques and also monitors sites below San Marcial, New Mexico. The U.S. Fish and Wildlife Service (USFWS) in the 2016 Biological Opinion identified reasonable and prudent measures necessary and appropriate to minimize impacts of incidental take of silvery minnows. The Biological Opinion established Reasonable and Prudent Measure Number 7. *"Reclamation will monitor, and report on the populations of the silvery minnow, flycatcher, cuckoo and their habitats in the Action Areas" (p. 109; USFWS 2016). With the expectation of compliance with the following Terms and Conditions:*

> *"7.1 Reclamation shall fund and implement the Silvery Minnow Population Monitoring Program using the current protocols, procedures, analytic methods and reporting without any gaps, especially in the fall, of its implementation along the Middle Rio Grande. The Silvery Minnow Population Monitoring Program may be modified and adjusted through the adaptive management process, provided there is appropriate overlap in monitoring prior to the implementation of any newly modified Silvery Minnow Population Monitoring Program. Results shall be used to inform the adaptive management process in the River Integrated Operations (RIO)."*
>
> *"7.2. Reclamation shall monitor the habitat use and movement of silvery minnows in association with Proposed Action projects, including fish passage projects. Results shall be used to inform the adaptive management process in the RIO."*

This study can be described as a "presence-only" rather than a "presence/absence" survey since locations are not randomly selected and not all habitat is surveyed equally. Survey locations have varied from year to year to encompass recent river maintenance and habitat improvement projects (see Reclamation 2010). This annual report presents catch per unit effort (CPUE), community composition, and length-weight data for all fish captured by raft-based electrofishing and seining during February 2020.

Figure 1. Current and historic ranges of the Rio Grande Silvery Minnow after Bestgen and Platania 1991 and Propst 1999.

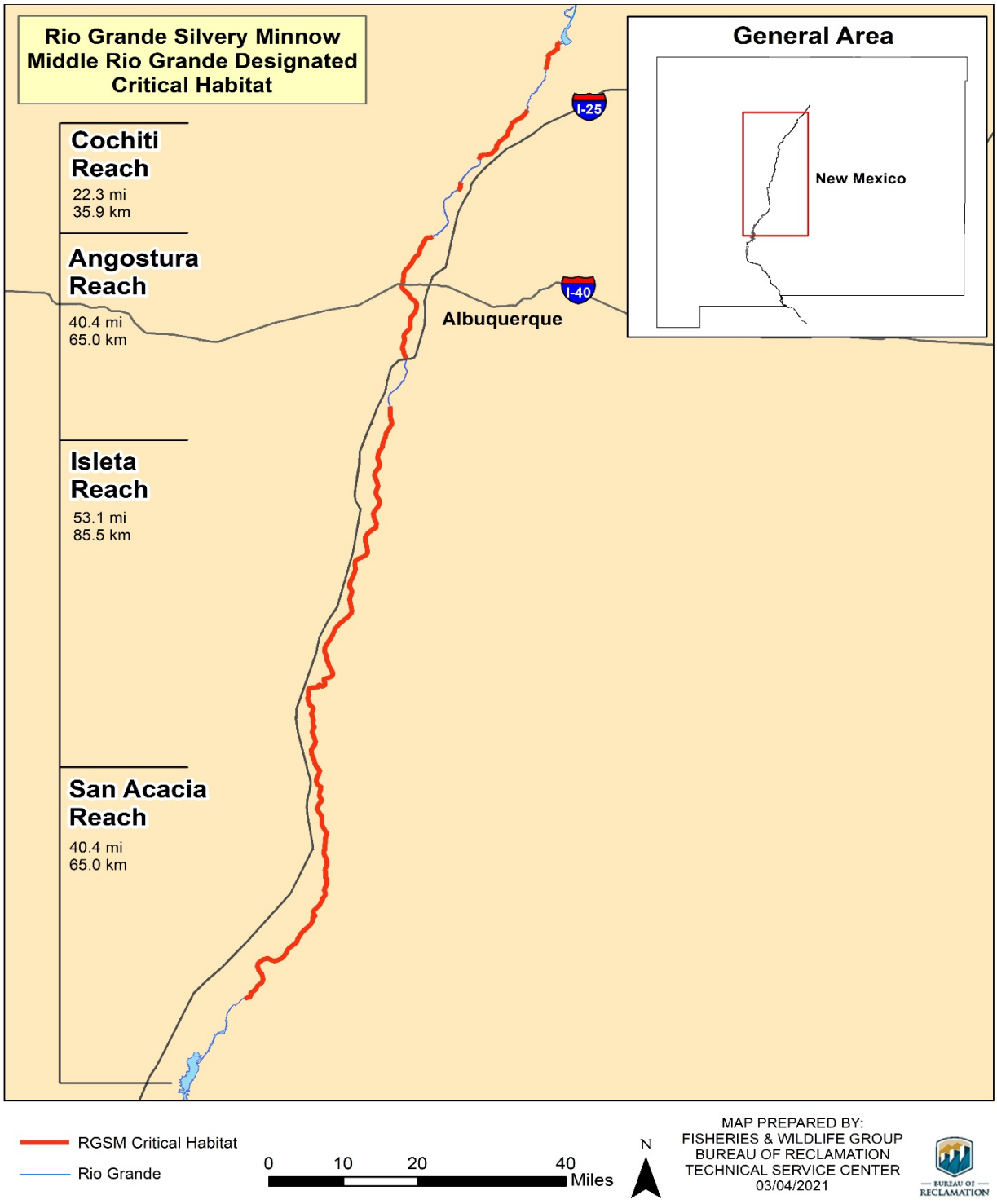


Figure 2. Designated Critical Habitat for Rio Grande Silvery Minnow (USFWS 2003).

3. Methods

Sampling has been standardized to begin the last two weeks of February (prior to irrigation diversion on or about March 1) since 2004. Surveys were generally conducted between the hours of 8:00 and 18:00. In 2020, surveys were conducted at the following nine locations: Sandia, Montano, Los Lunas, Sevilleta National Wildlife Refuge (NWR), San Acacia Diversion Dam (San Acacia), Escondida, Bosque del Apache NWR, the Low Flow Conveyance Channel (LFCC) at San Marcial, and the river downstream of the LFCC at its confluence with the Rio Grande. The larger area covered by raft-mounted electrofishing can provide information on the local silvery minnow distribution at survey sites as well as throughout the Middle Rio Grande.

We used a raft-mounted, 1.5 kilovolt-pulsed direct current electrofishing system (Smith-Root, Inc.) with a target operating power of 2.0 to 4.0 amps at 30 pulses per second to survey for the fish community within the survey locations. One crew member guided the boat downriver and near the shoreline. Two additional crewmembers netted fish and placed them in a live well within the boat. For every 10 minutes of shocking time ("a transect"), the boat was pulled to shore to process captured fish. Endangered species were processed first to reduce stress from capture and handling. Fish species, standard length (SL) (snout to caudal peduncle), total length (TL) (snout to the longest lobe of the caudal fin), and weight of large fish (over 180 millimeters) were recorded. Coordinates (in Universal Transverse Mercator [UTM]) were recorded on a global positioning system at each location where a silvery minnow was captured. If multiple silvery minnows were captured at a single location only one waypoint was recorded, and number of silvery minnows noted.

The number of transects in a location varied between 5 and 10 and depended on the velocity of the current and the length of the location surveyed. Survey locations varied in length from 4.2 kilometers (km) at the LFCC to 12.4 km at Escondida. Typically, shorelines were surveyed based on habitat suitability, e.g. shallow or slow velocity habitats, such as muddy shorelines with emergent vegetation were preferentially chosen over areas where the bank was formed by a bedrock cliff with deep water at the shoreline.

In addition to electrofishing, seine surveys were conducted where water levels were too low to use the electrofishing raft. In 2020, two sites (Bosque del Apache, Los Lunas) were surveyed using seine nets. Two crew members used a seine net measuring 3 meters (m) wide by 1 m high with 4.8 millimeter (mm) knotless mesh. Nets had floats on top and a weighted lead line on the bottom. Each crew member held one end of the net and then hauled it perpendicularly downstream for a distance of 3.1 to 15.6 m, usually running the haul to the shoreline. Specific mesohabitats sampled were not recorded for these two sites.

All captured fish were placed into a bucket and processed after each seine haul. Endangered fish were processed first in order to reduce stress from capture and handling. Fish were identified to species and measured for standard length and total length. When large numbers of a specific species were captured, a representative subsample of the catch was measured and the rest of the catch were tallied.

Silvery minnows were observed for a colored visible implant elastomer (VIE) marker next to their dorsal fin. These VIE markers indicate which hatchery the fish came from, when and where they were stocked in the river. A blue VIE marker indicated that a fish also carried a passive

integrated transponder tag and would require to be scanned. All unmarked fish were assumed to be of wild origin.

Mean catch per unit effort for the electrofishing surveys were determined by calculating the number of fish captured per generator minute along each transect in each location. Then the average CPUE was taken of all transects within a location, giving mean CPUE for the location. For seining surveys, the mean CPUE was calculated for each site by dividing the number of silvery minnows captured by the area seined and multiplying by 100 to provide fish per 100 square meters (m^2). Area was calculated by multiplying the length of the seine haul by the width of the seine (3 meters). Mean CPUE was plotted as "bycatch" for all non-target species and independently plotted for silvery minnow by survey location. To present length-frequency histograms, standard length data was rounded to the nearest ten-millimeter bin category.

Water quality measurements were also taken at each survey location. These measurements include dissolved oxygen (DO), water temperature, oxygen saturation, and specific conductivity. Streamflow at the time when surveys were conducted was inferred from mean daily discharge rates provided by U.S. Geological Survey (USGS) at the nearest upstream gage (see http://waterdata.usgs.gov/nm/nwis/rt for gauges in Albuquerque (ID - 08330000), San Acacia (ID - 08354900) and near San Marcial (ID – 08358400), in New Mexico). All raw data can be viewed in the Appendix.

4. Results

4.1. 2020 Seining and Raft Based Electrofishing Species composition, CPUE and Recaptures

A total of 574 fishes were captured in 2020; comprising 9 native and 7 introduced species (Table 1). The silvery minnow was the most numerous fish species captured and was observed at seven of the nine survey locations (Figure 3). A total of 191 silvery minnows were captured throughout the survey sites. Five silvery minnows were captured with VIE markers. Four of those five silvery minnows were captured seining and one was captured electrofishing.

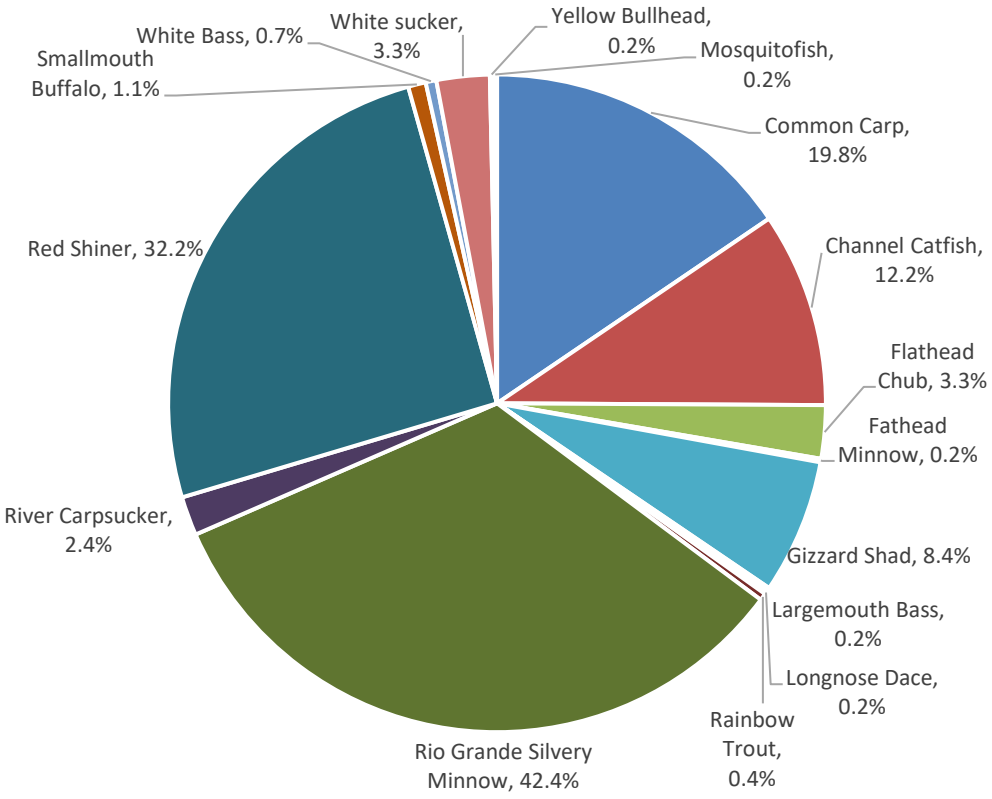


Figure 3. Composition of fish species captured across sites, during sampling efforts, February 2020.

4.2. Raft Based Electrofishing

Total fish captured during electrofishing for all species was highest at Escondida (n=130), followed by San Acacia (n=76) (Table 1 and Figure 4). Shocking CPUE for all species, excluding silvery minnow was highest at Montano (0.96 fish per minute) (Figure 5). Total silvery minnow capture was highest at the Escondida (n=81), as was CPUE (0.93 fish per minute). A single silvery minnow was captured with a VIE marker at Escondida.

Table 1. Total fish captured at nine survey locations on the Middle Rio Grande, New Mexico, February 2020. Native status from Sallenave et al. 2010.

Species	Common Name	Family/ Native?	Sandia	Montano	*Los Lunas	Sevilleta NWR	San Acacia	Escondida	*BDA NWR	LFCC	LFCC Confluence	Totals
Hybognathus amarus	Rio Grande Silvery Minnow	Cyprinidae/ Yes	3	4	-	32	49	81	18	-	4	**191**
Cyprinus carpio	Carp	Cyprinidae/ No	10	15	-	3	15	8	1	20	17	**89**
Ictalurus punctatus	Channel Catfish	Ictaluridae/ No	18	16	-	6	3	9	-	2	1	**55**
Carpiodes carpio	River Carpsucker	Catostomidae/ Yes	2	6	-	-	2	1	-	-	-	**11**
Platygobio gracilis	Flathead Chub	Cyprinidae/ Yes	2	5	-	2	2	1	3	-	-	**15**
Dorosoma cepedianum	Gizzard Shad	Clupeidea/ Yes	-	-	-	-	2	13	-	-	23	**38**
Catostomus commersonii	White Sucker	Catostomidae/ No	14	1	-	-	-	-	-	-	-	**15**
Ictiobus bubalus	Smallmouth Buffalo	Cyprinidae/ Yes	-	-	-	-	-	-	-	5	-	**5**
Cyprinella lutresnsis	Red Shiner	Cyprinidae/ Yes	3	1	100	11	3	16	-	1	10	**145**
Morone chrysops	White Bass	Moronidae/ No	-	1	-	-	-	1	-	-	1	**3**
Pimephales promelas	Fathead Minnow	Cyprinidae/ Yes	-	-	-	-	-	-	1	-	-	**1**
Gambusia affinis	Mosquitofish	Poeciliidae/Yes	-	-	1	-	-	-	-	-	-	**1**
Micropterus salmoides	Largemouth Bass	Centrarchidae/ No	-	1	-	-	-	-	-	-	-	**1**
Ameiurus natalis	Yellow Bullhead	Ictaluridae/ No	-	1	-	-	-	-	-	-	-	**1**
Onchorychus Mykiss	Rainbow Trout	Salmonidae/No	-	2	-	-	-	-	-	-	-	**2**
Rhinichthys cataractae	Longnose Dace	Cyprinidae/Yes	1	-	-	-	-	-	-	-	-	**1**
Totals			**53**	**53**	**101**	**54**	**76**	**130**	**23**	**28**	**56**	**574**

*Locations were sampled using seine nets.

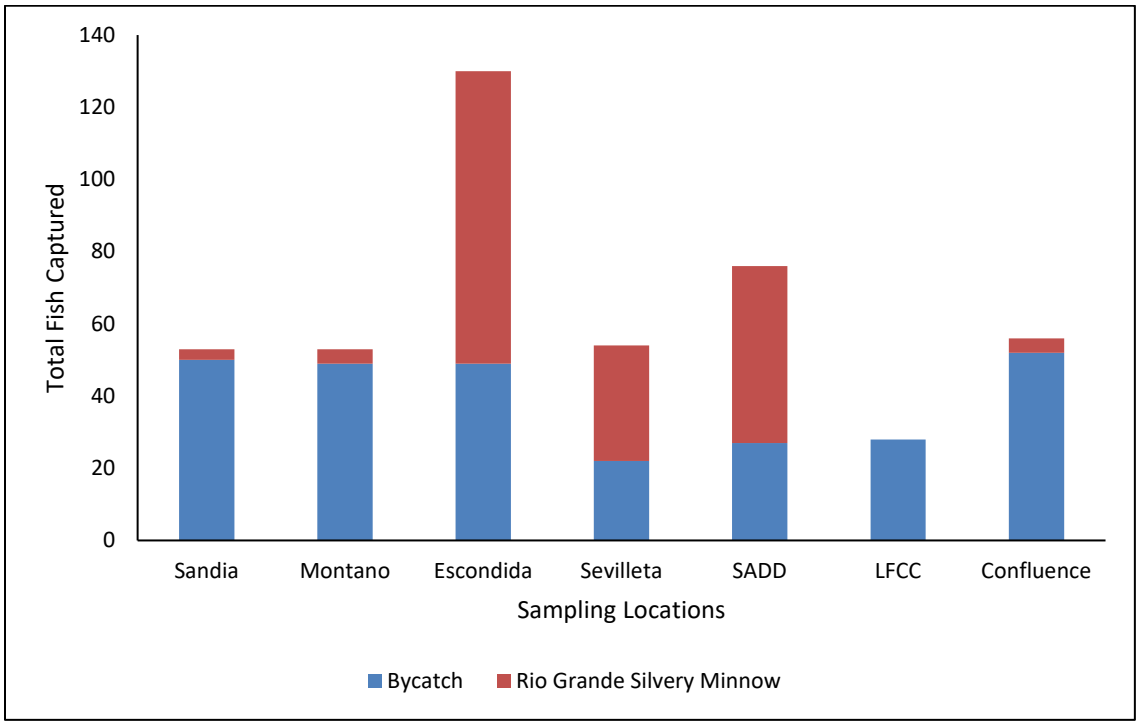


Figure 4. Total fish captured (electrofishing; all species; silvery minnow) by sample location, February 2020.

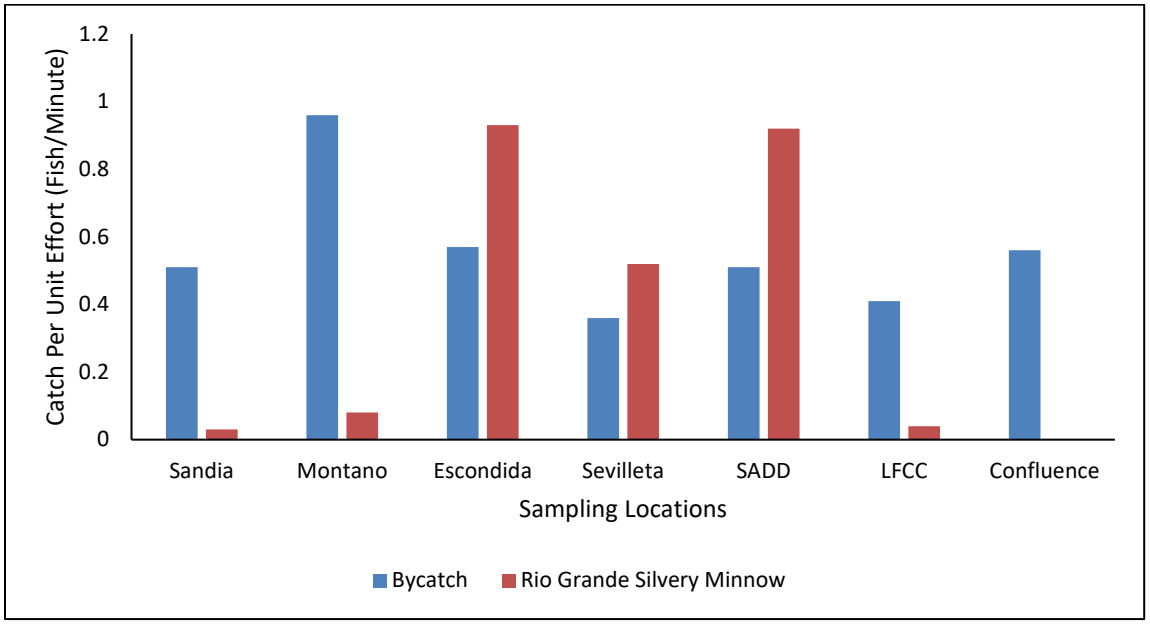


Figure 5. Catch per unit effort for all fish and silvery minnow, by sample location, for raft-based electrofishing on the Middle Rio Grande, New Mexico, February 2020.

4.3. Composition Metrics and Length Frequency By Survey Location

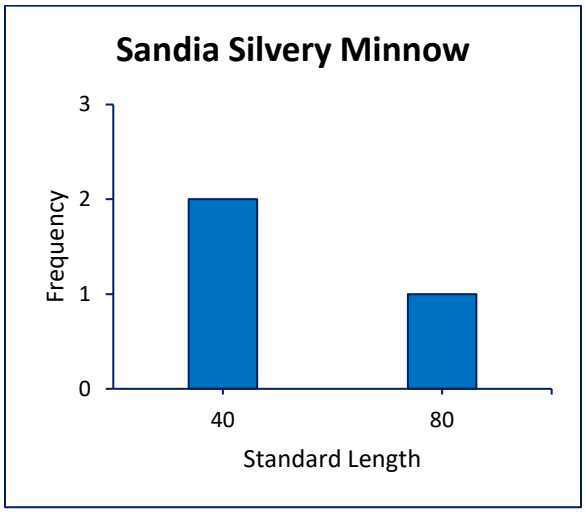
Species measurement metrics are presented by survey location for February 2020 (Table 2 - Table 10). Standard length-frequency histograms are presented by survey location for each species in the figures and summaries below.

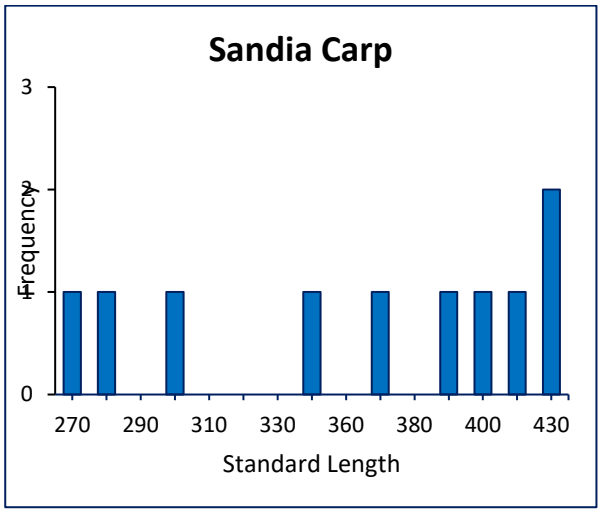
4.3.1. Sandia

There were 53 fish captured within the Sandia site, across ten shocking transects, comprising eight fish species (Table 2). Channel catfish were the most numerous species captured, followed by white suckers. Three unmarked silvery minnows were caught on the Sandia survey. Binned length-frequency histograms for all fish captured at this location are presented in Figure 6. The Sandia site and silvery minnow capture locations are illustrated in Figure 7.

Table 2. Species morphometrics Sandia raft electrofishing, February 2020.

Species	Count	SL (mm; mean ± SD)	TL (mm; mean ± SD)	Wt. (g; mean ± SD)
Rio Grande Silvery Minnow	3	53.7 ± 23.9	62.3 ± 24.1	NA
Carp	10	363.0 ± 60.6	493.5 ± 66.5	1815.0 ± 626.7
Channel Catfish	18	298.3 ± 64.5	412.0 ± 72.1	683.9 ± 335.9
River Carpsucker	2	280.0 ± 390.0	390.0 ± 56.6	700.0 ± 282.8
Flathead Chub	2	87.0 ± 2.8	105.5 ± 3.5	NA
White Sucker	14	241.3 ± 71.5	309.4 ± 87.5	512.5 ± 256.0
Longnose Dace	1	37.0 ± NA	45.0 ± NA	NA
Red Shiner	3	21.7 ± 15.2	25.3 ± 17.6	NA





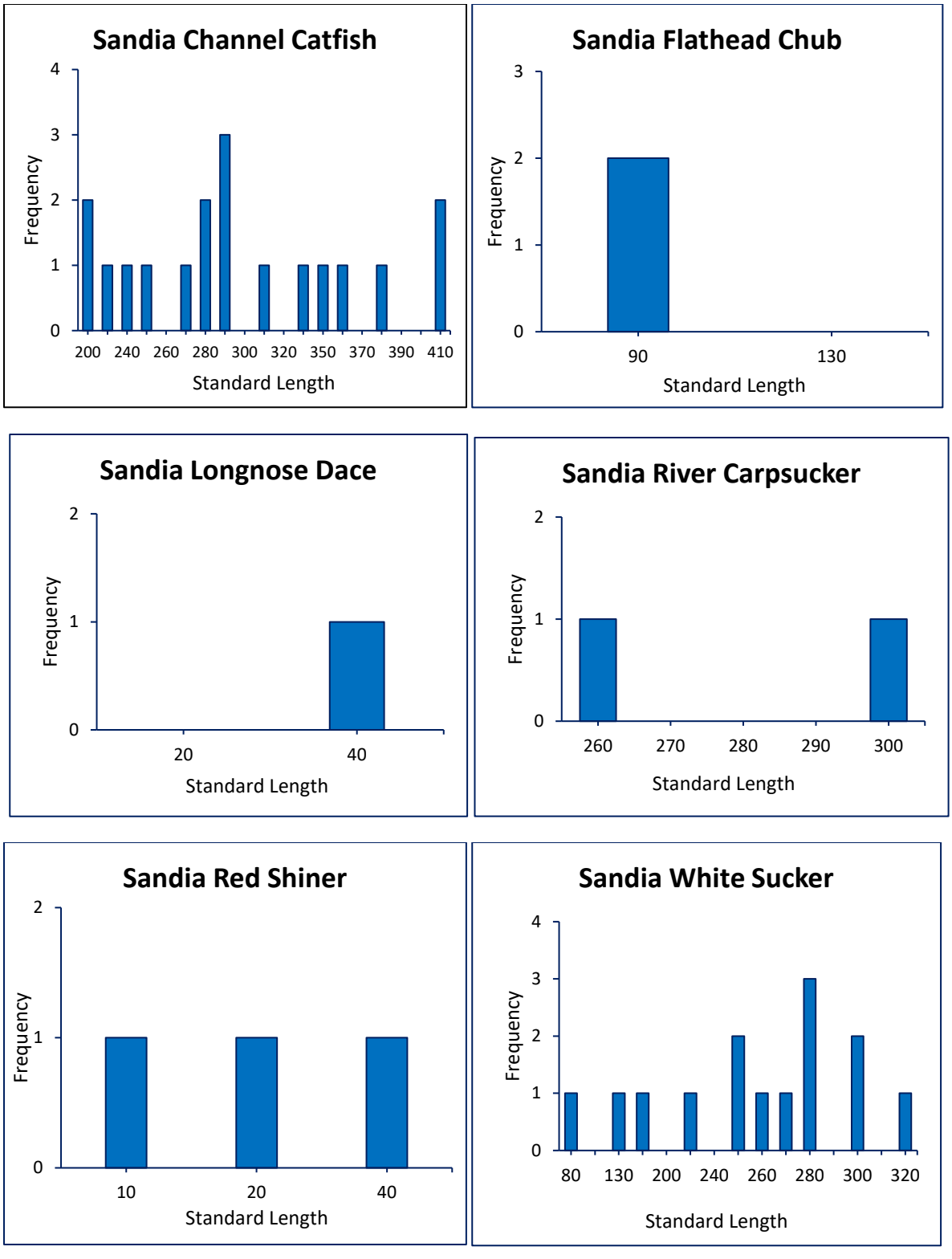


Figure 6. All species binned length-frequency histograms for Sandia, February 2020.

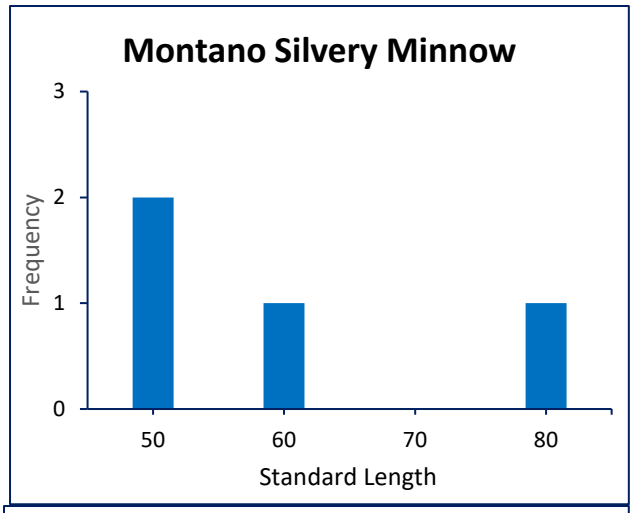
Figure 7. Sandia Site silvery minnow capture locations, February 2020.

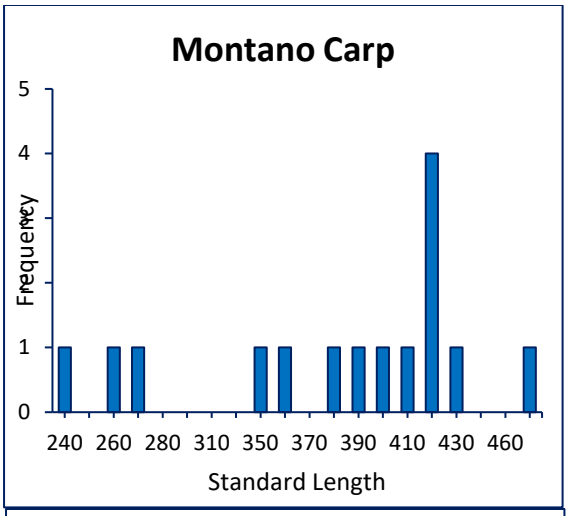
4.3.2. Montano

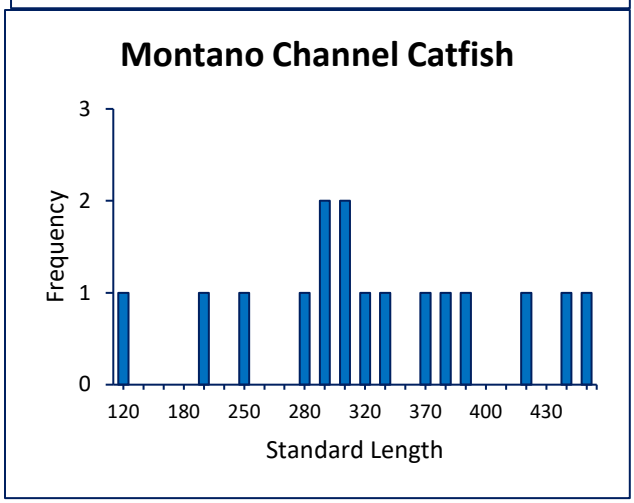
There were 53 fish captured at the Montano site, across 5 transects, comprising 11 fish species. Channel catfish were the most numerous species captured (Table 3). Four silvery minnows were caught on the Montano survey; none had VIE markers. Binned length-frequency histograms for all fish captured at this location are presented in Figure 8. The Montano site and silvery minnow capture locations are illustrated in Figure 9.

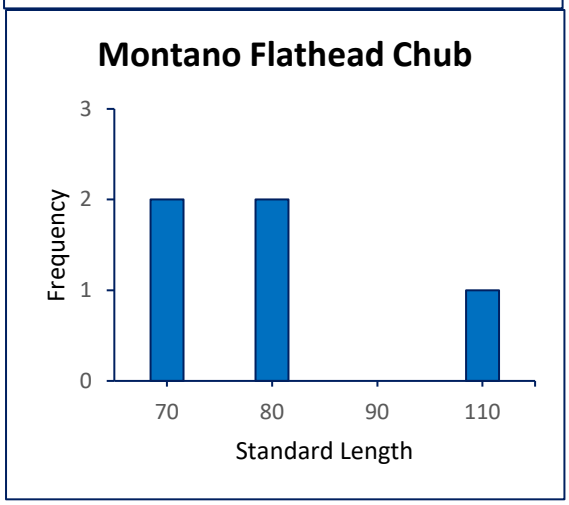
Table 3. Species morphometrics for Montano raft electrofishing, February 2020.

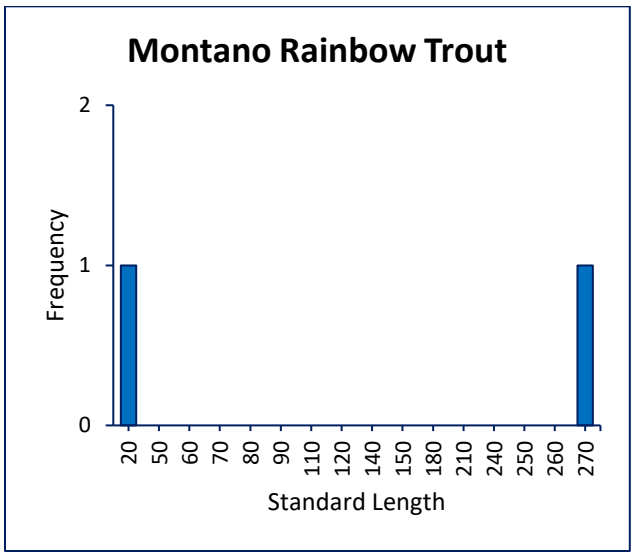
Species	Count	SL (mm; mean ± SD)	TL (mm; mean ± SD)	Wt. (g; mean ± SD)
Rio Grande Silvery Minnow	4	58.5 ± 13.8	70.8 ± 15.4	NA
Carp	15	378.1 ± 73.1	439.1 ± 86.2	1520.0 ± 736.3
Channel Catfish	16	324.1 ± 88.0	407.3 ± 110.3	675.0 ± 407.2
River Carpsucker	6	267.8 ± 66.7	326.7 ± 80.5	460.0 ± 138.7
Flathead Chub	5	80.2 ± 17.3	98.2 ± 18.4	NA
White Sucker	1	94.0 ± NA	114.0 ± NA	NA
Red Shiner	1	56.0 ± NA	69.0 ± NA	NA
Rainbow Trout	2	147.3 ± 173.6	163.8 ± 192.7	200.0 ± 141.4
White Bass	1	250.0 ± NA	300.0 ± NA	450.0 ± NA
Largemouth Bass	1	154.0 ± NA	NA	NA
Yellow Bullhead	1	183.0 ± NA	209.0 ± NA	200.0 ± NA

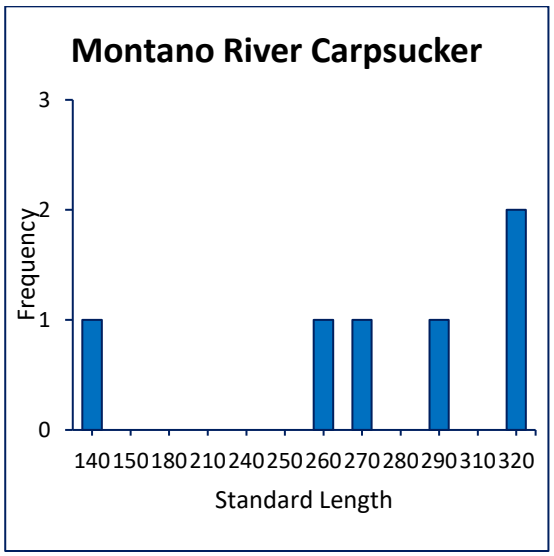

Montano Silvery Minnow
Frequency
0
1
2
3
50
60
70
80
Standard Length


Montano Carp
Frequency
0
1
2
3
4
5
240 260 280 310 350 370 390 410 430 460
Standard Length


Montano Channel Catfish
Frequency
0
1
2
3
120 180 250 280 320 370 400 430
Standard Length


Montano Flathead Chub
Frequency
0
1
2
3
70
80
90
110
Standard Length


Montano Rainbow Trout
Frequency
0
1
2
20 50 60 70 80 90 110 120 140 150 180 210 240 250 260 270
Standard Length


Montano River Carpsucker
Frequency
0
1
2
3
140 150 180 210 240 250 260 270 280 290 310 320
Standard Length

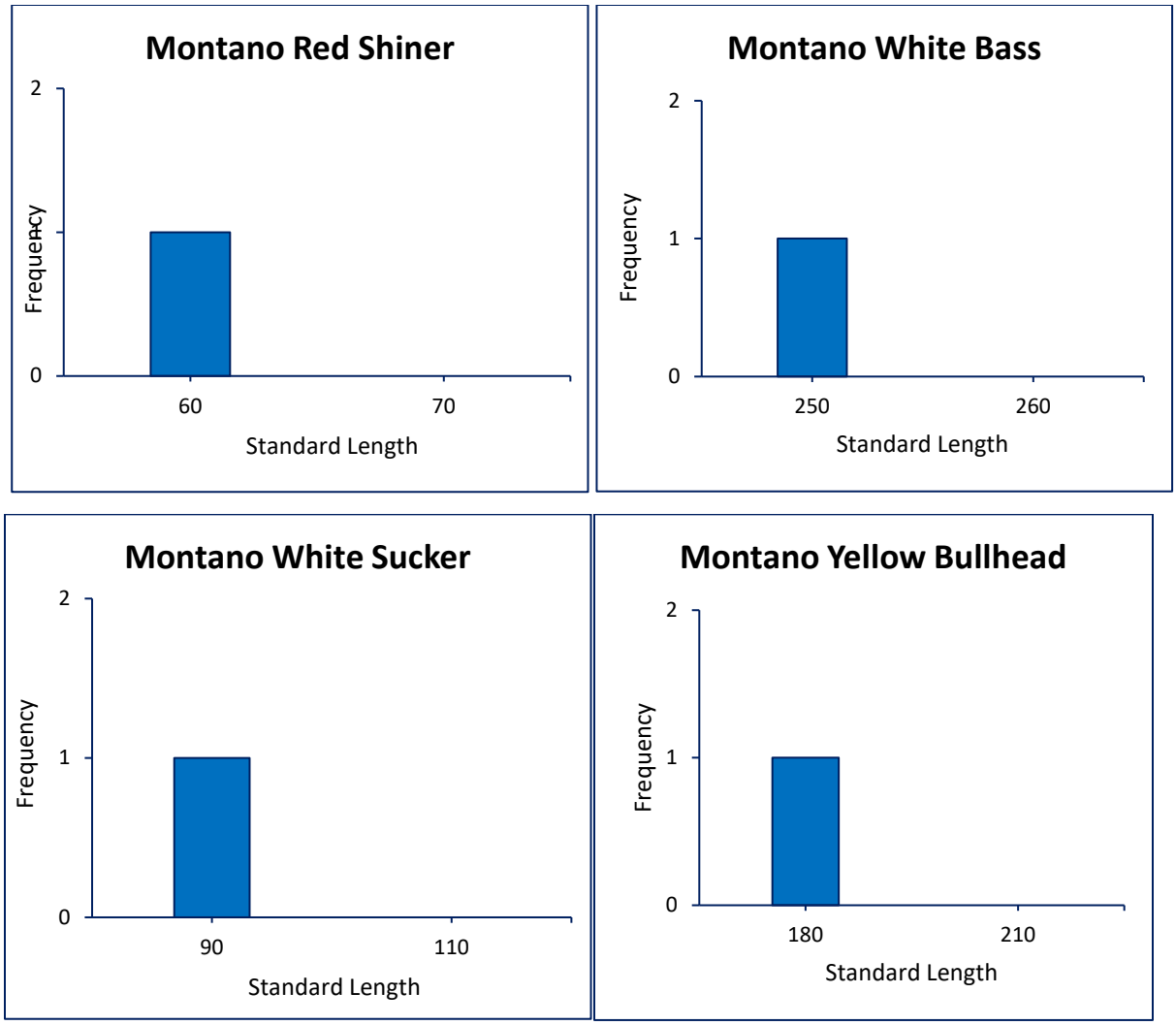


Figure 8. All species binned length-frequency histograms for Montano, February 2020.

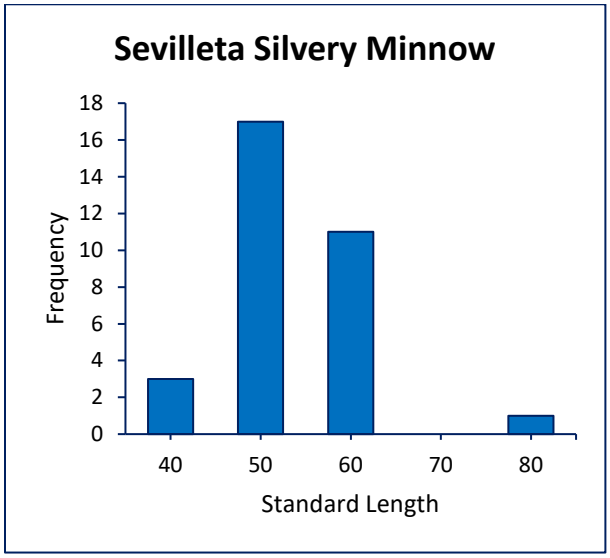
Figure 9. Montano Site silvery minnow capture locations, February 2020.

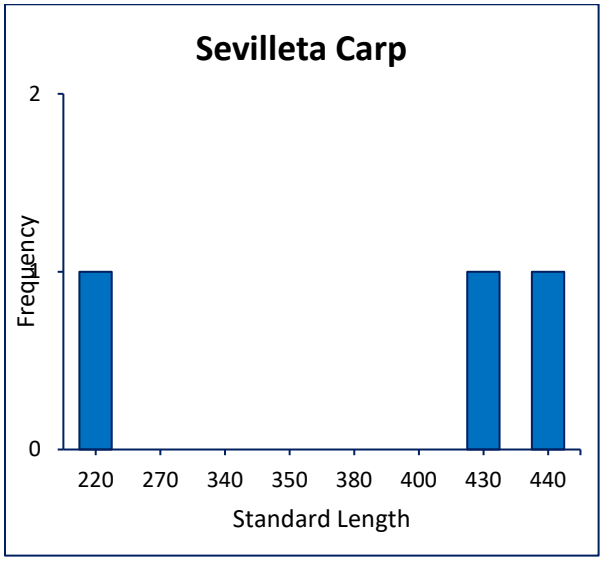
4.3.3. Sevilleta NWR

There were 54 fish captured at the Sevilleta site, across 6 transects, comprising five fish species. Silvery minnows were the most numerous species captured, followed by the red shiner (Table 4). No silvery minnows captured had a VIE marker. Binned length-frequency histograms for all fish captured at this location are presented in Figure 10. The Sevilleta NWR site and silvery minnow capture locations are illustrated in Figure 11.

Table 4. Species morphometrics for Sevilleta raft electrofishing, February 2020.

Species	Count	SL (mm; mean ± SD)	TL (mm; mean ± SD)	Wt. (g; mean ± SD)
Rio Grande Silvery Minnow	32	53.4 ± 7.4	64.3 ± 8.7	NA
Carp	3	364.0 ± 124.8	441.3 ± 150.3	1263.3 ± 907.2
Channel Catfish	6	297.0 ± 129.7	371.8 ± 157.7	735.0 ± 254.9
Flathead Chub	2	52.0 ± 25.5	63.0 ± 32.5	NA
Red Shiner	11	27.5 ± 3.2	33.5 ± 3.6	NA





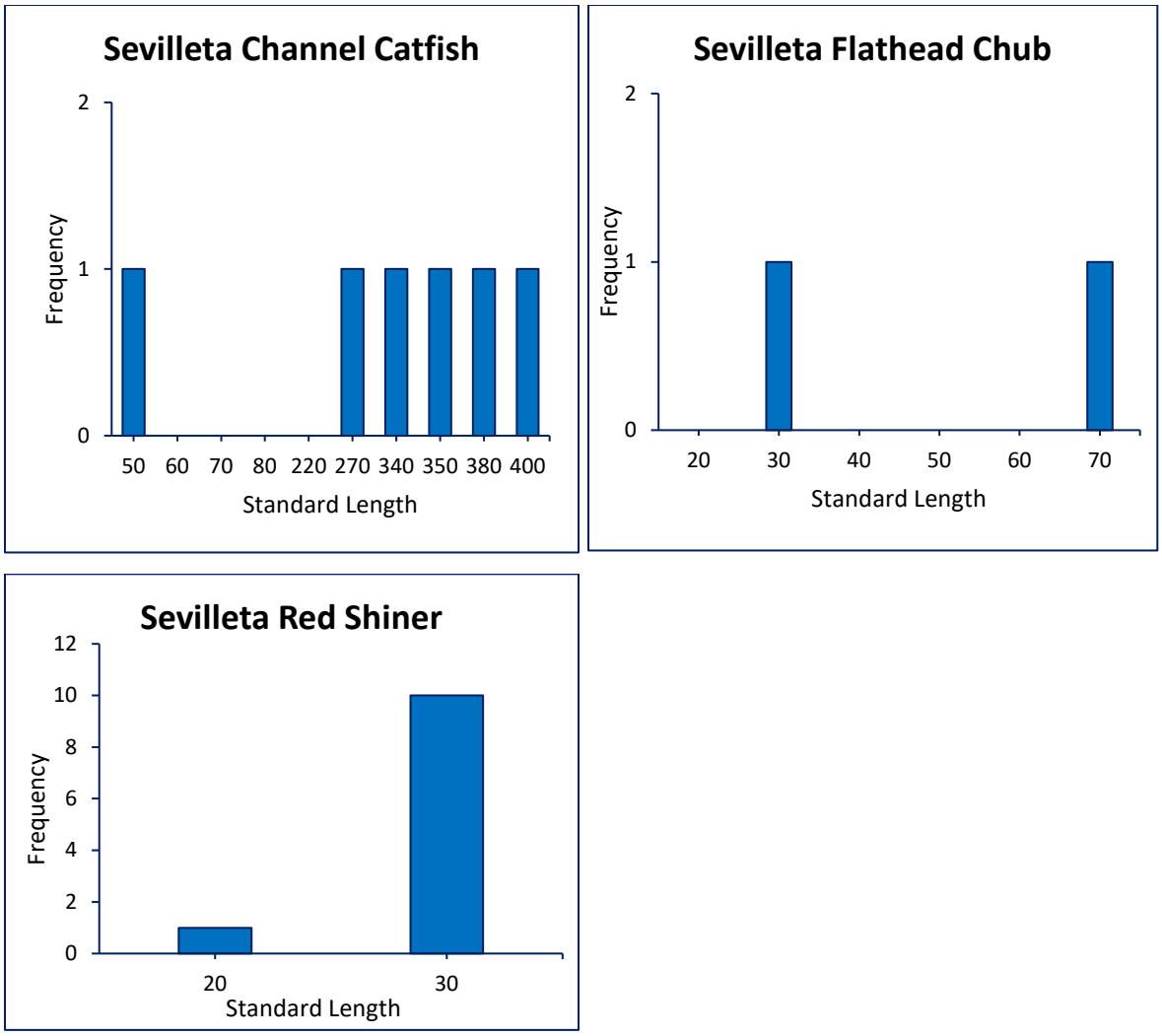


Figure 10. All species binned length-frequency histograms for Sevilleta, February 2020.

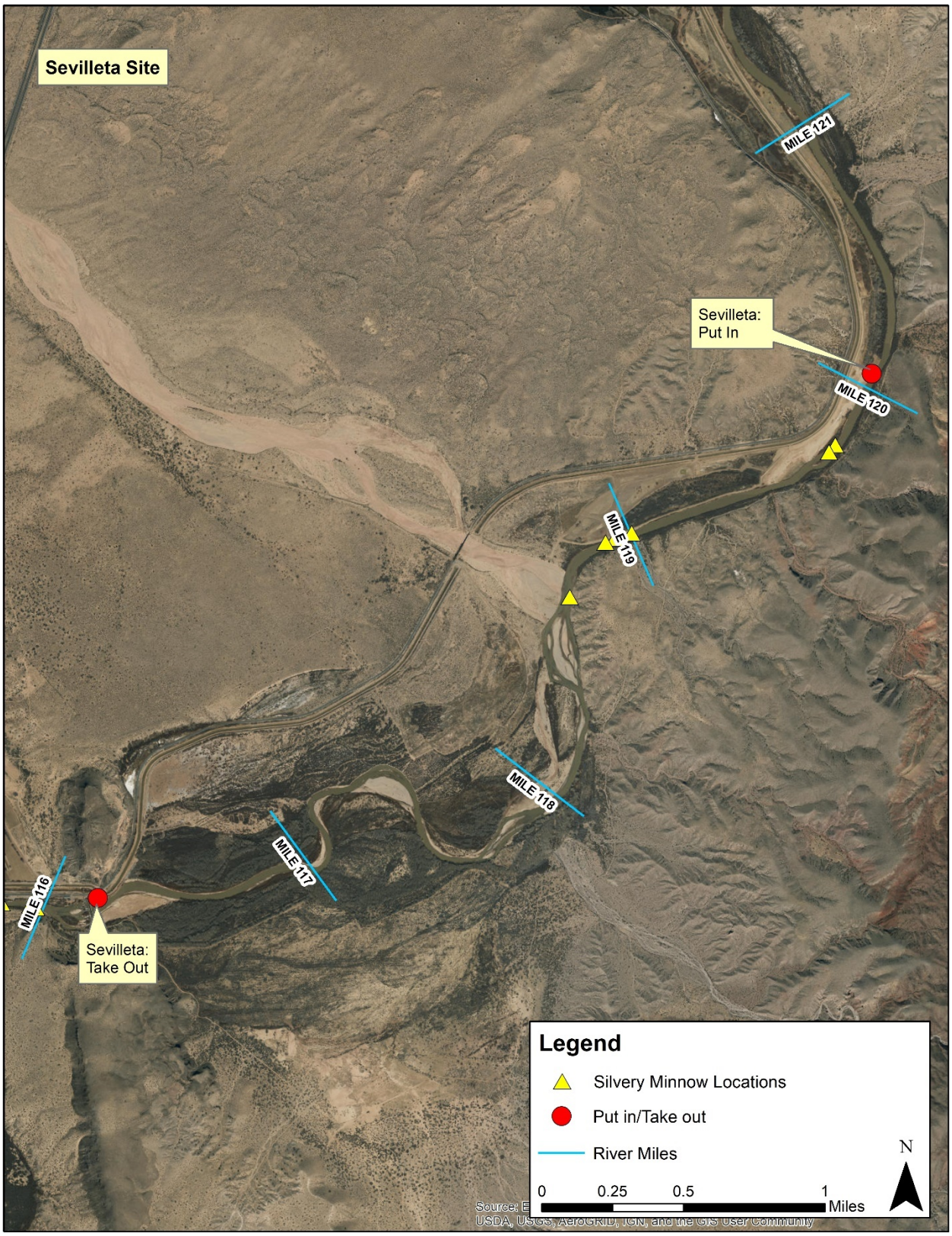


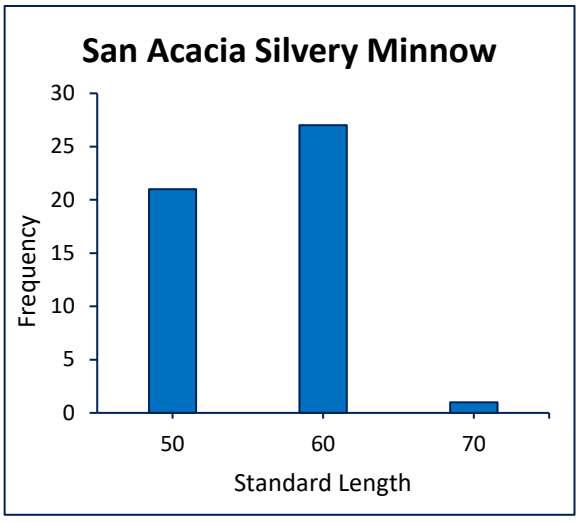
Figure 11. Sevilleta Site silvery minnow survey locations, February 2020.

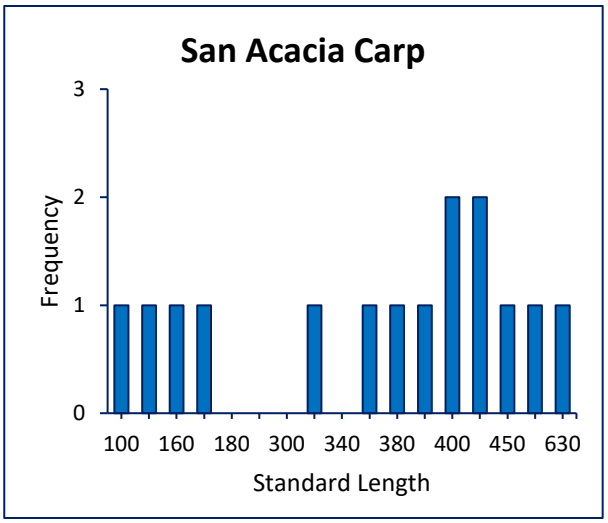
4.3.4. San Acacia Diversion Dam

There were 76 fish captured at the San Acacia site, across 5 transects, comprising 7 fish species. Silvery minnows were the most numerous species captured, followed by carp (Table 5). The second highest number of silvery minnows were captured on the San Acacia survey (n=49). No silvery minnow had VIE markers. Binned length-frequency histograms for all fish captured at this location are presented in Figure 12. The San Acacia site and silvery minnow capture locations are illustrated in Figure 13.

Table 5. Species morphometrics for San Acacia raft electrofishing, February 2020.

Species	Count	SL (mm; mean ± SD)	TL (mm; mean ± SD)	Wt. (g; mean ± SD)
Rio Grande Silvery Minnow	49	55.3 ± 4.4	66.9 ± 5.2	NA
Carp	15	341.6 ± 145.9	416.7 ± 174.9	1754.2 ± 1307.7
Channel Catfish	3	148.3 ± 166.9	179.7 ± 199.5	600.0 ± NA
River Carpsucker	2	171.0 ± 5.7	209.5 ± 9.2	NA
Flathead Chub	2	26.0 ± 1.4	33.0 ± 1.4	NA
Red Shiner	3	37.7 ± 4.0	43.7 ± 2.3	NA
Gizzard Shad	2	287.0 ± 22.6	356.0 ± 32.5	450.0 ± 70.7





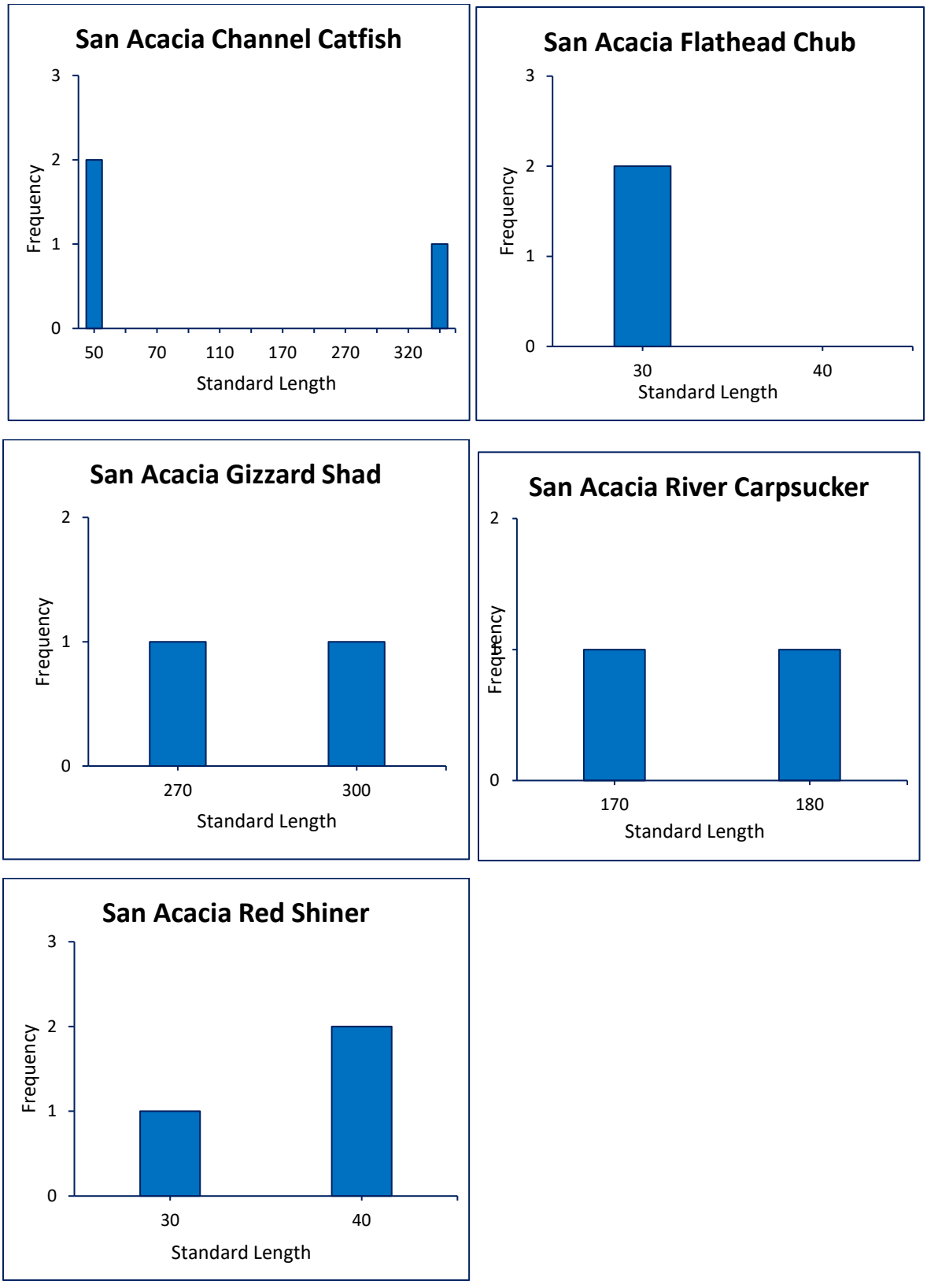


Figure 12. All species binned length-frequency histograms for San Acacia, February 2020.

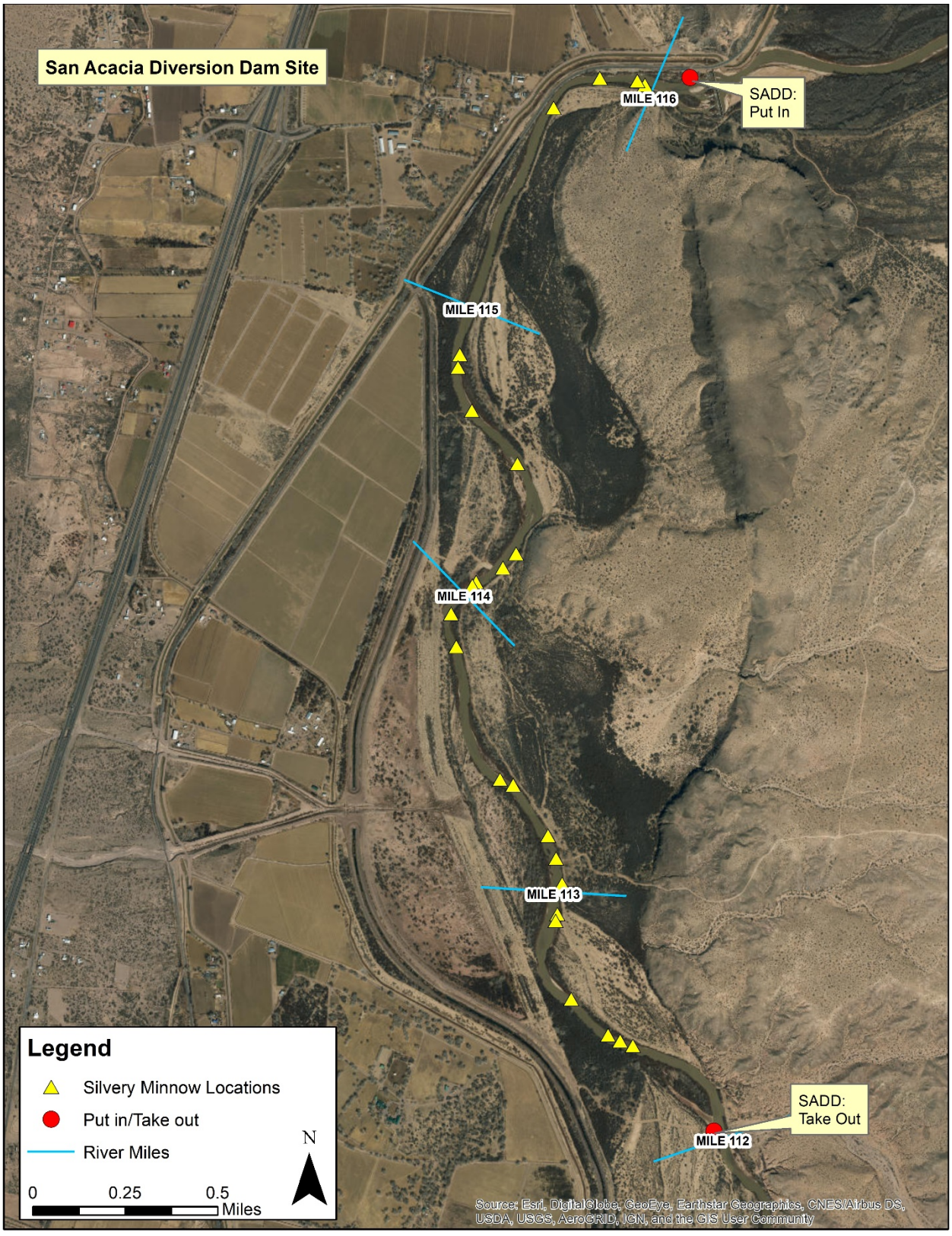


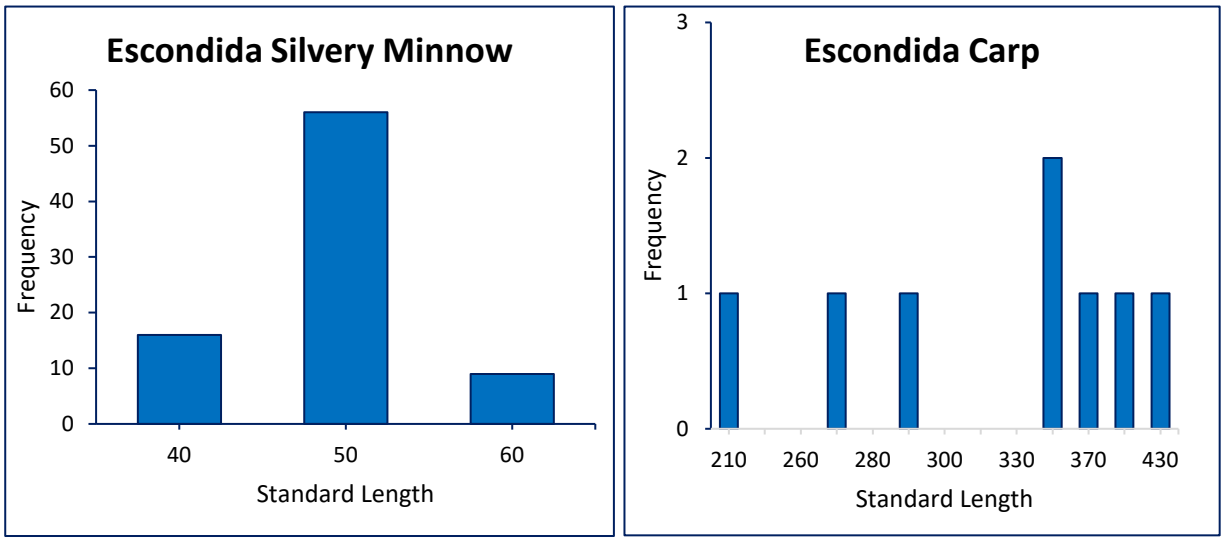
Figure 13. San Acacia Diversion Dam Site silvery minnow capture locations, February 2020.

4.3.5. Escondida

There were 130 fish captured at the Escondida Site, across 9 transects, comprising 8 fish species. Silvery minnows were the most numerous species captured (Table 6). Eighty-one silvery minnows were caught on the Escondida survey, the highest total of all nine survey areas. One silvery minnow had a red VIE marker on its right side. Binned length-frequency histograms for all fish captured at this location are presented in Figure 14. The Escondida site and silvery minnow capture locations are illustrated in Figure 15.

Table 6. Species morphometrics for Escondida raft electrofishing, February 2020.

Species	Count	SL (mm; mean ± SD)	TL (mm; mean ± SD)	Wt. (g; mean ± SD)
Rio Grande Silvery Minnow	81	48.7 ± 5.0	59.2 ± 5.9	NA
Carp	8	333.0 ± 73.6	405.9 ± 90.1	1056.3 ± 592.5
Channel Catfish	9	208.8 ± 139.2	255.8 ± 169.1	550.0 ± 209.8
River Carpsucker	1	154.0 ± NA	185 ± NA	100.0 ± NA
Flathead Chub	1	24.0 ± NA	29 ± NA	NA
Red Shiner	16	27.6 ± 4.2	35.1 ± 6.3	NA
Gizzard Shad	13	282.3 ± 14.4	341.6 ± 20.7	415.4 ± 42.7
White Bass	1	188.0 ± NA	235 ± NA	200.0 ± NA



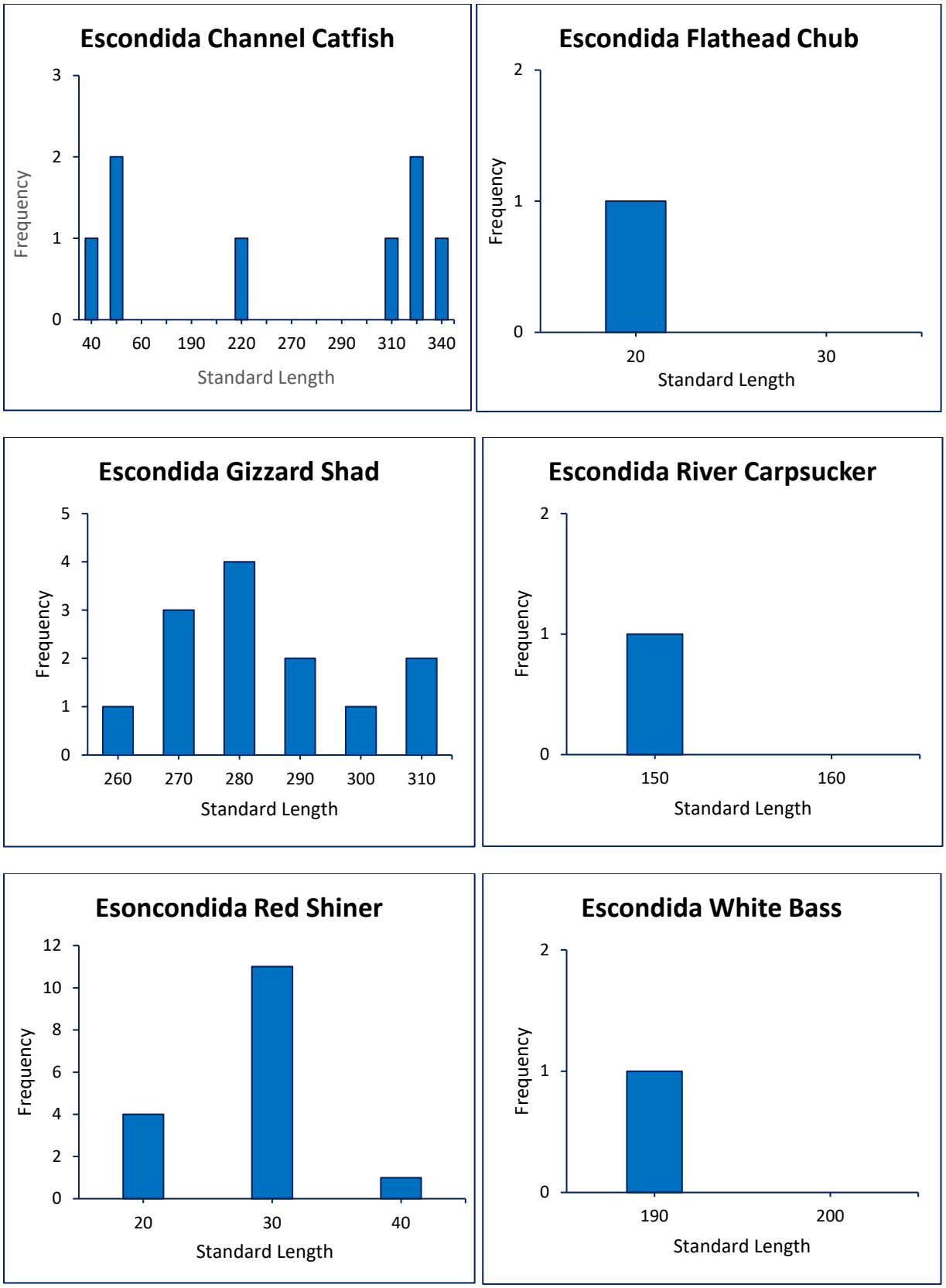


Figure 14. All species binned length-frequency histograms for Escondida, February 2020.

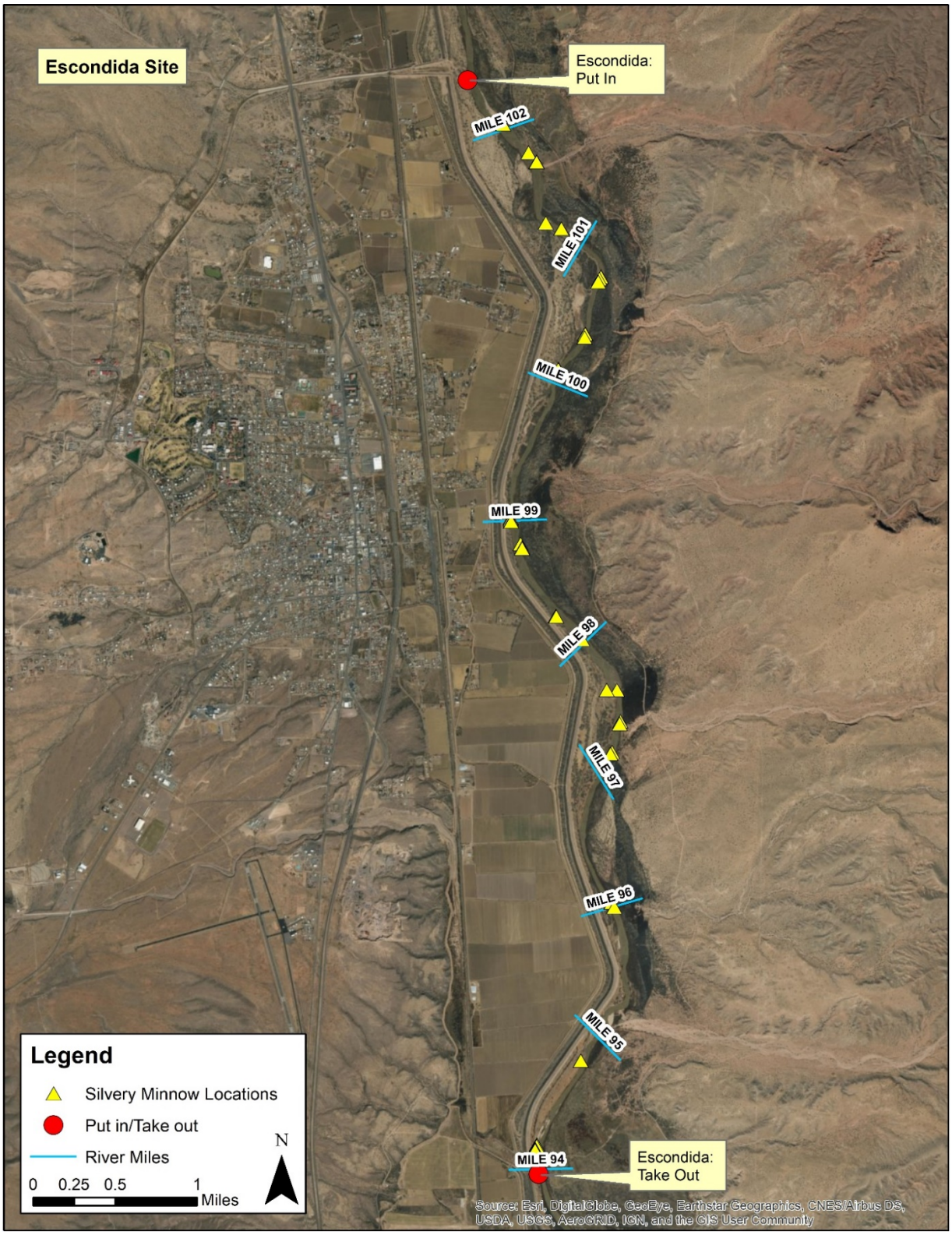


Figure 15. Escondida Site silvery minnow survey locations, February 2020.

4.3.6. Low Flow Conveyance Channel

There were 28 fish captured at the LFCC site, across 6 transects, comprising 4 fish species. Common carp was the most numerous species captured, followed by the native smallmouth buffalo (Table 7). No silvery minnows were captured in this location. Binned length-frequency histograms for all fish captured at this location are presented in Figure 16. The LFCC site is illustrated in Figure 17.

Table 7. Species morphometrics for Low Flow Conveyance Channel raft electrofishing, February 2020.

Species	Count	SL (mm; mean ± SD)	TL (mm; mean ± SD)	Wt. (g; mean ± SD)
Carp	20	341.7 ± 69.5	409.8 ± 82.0	1274.2 ± 438.5
Channel Catfish	2	144.0 ± 1.4	183.0 ± 2.8	NA
Red Shiner	1	41.0 ± NA	46.0 ± NA	NA
Smallmouth Buffalo	5	353.0 ± 60.3	426.4 ± 73.5	1262.0 ± 540.9

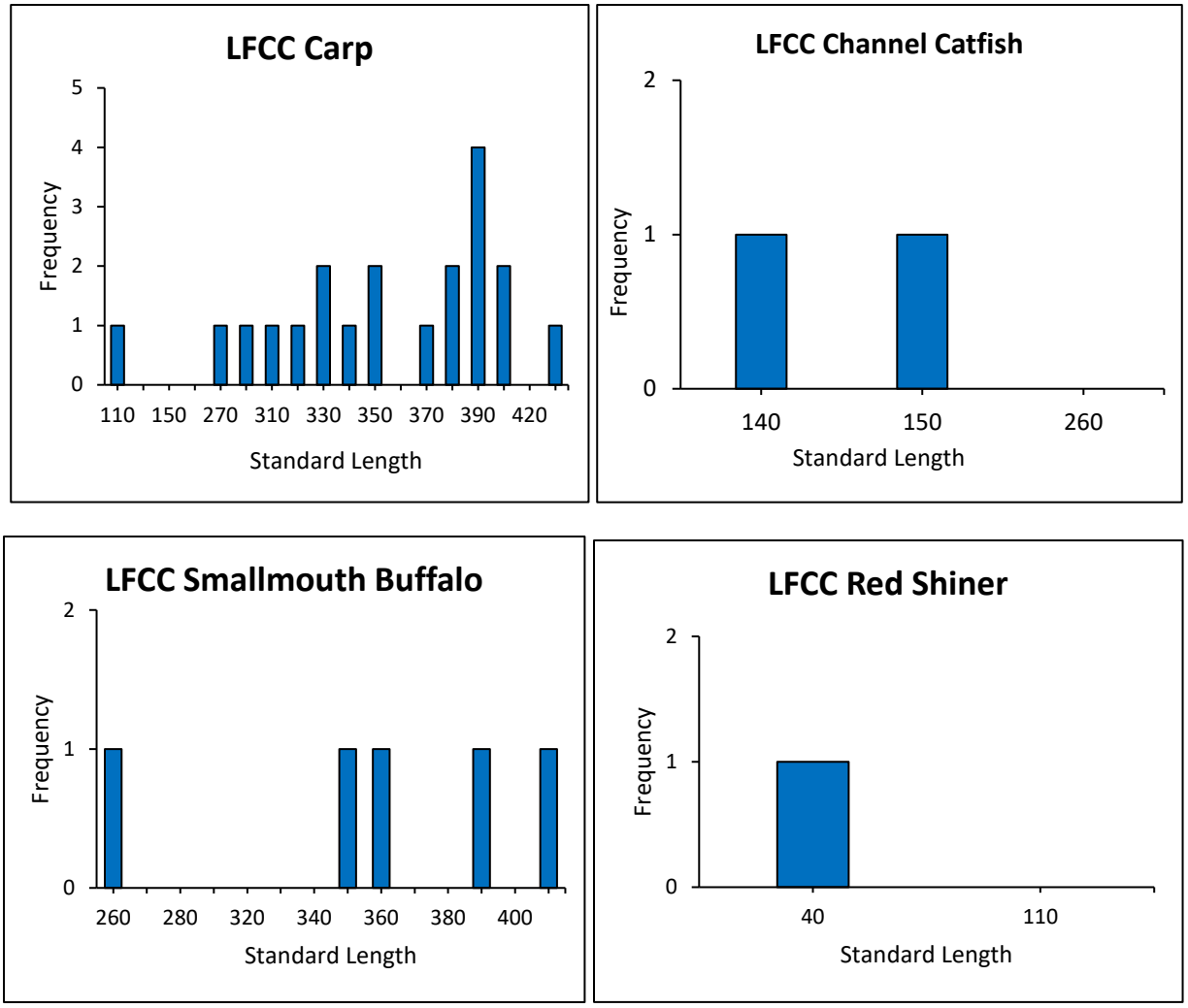


Figure 16. All Species binned length-frequency histograms for Low Flow Conveyance Channel, February 2020.

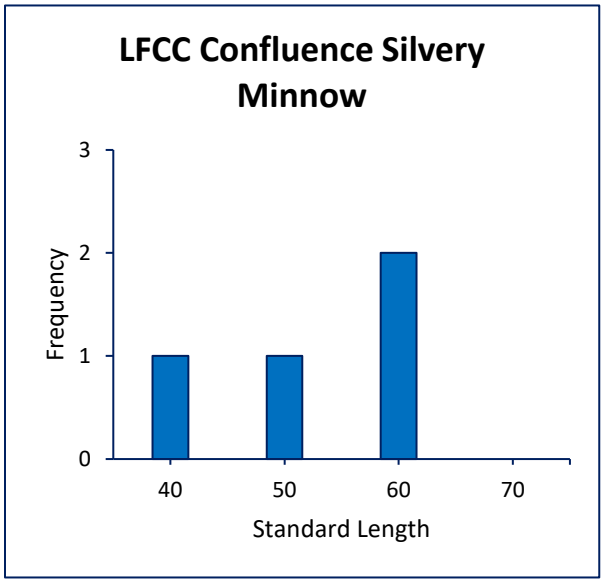
Figure 17. LFCC Site silvery minnow survey locations, February 2020.

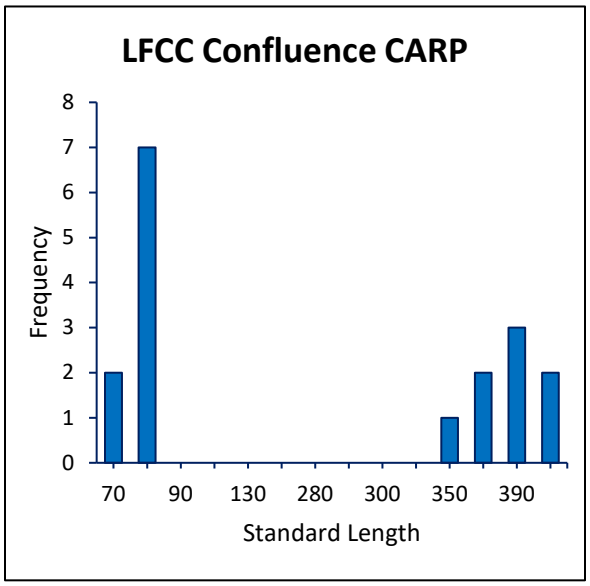
4.3.7. Low Flow Conveyance Channel Confluence

There were 56 fish captured at the Low Flow Conveyance Channel Confluence site, across 9 transects, comprising 6 fish species. Gizzard shad were the most numerous species captured, followed by common carp (Table 8). Four unmarked silvery minnows were caught on the LFCC Confluence survey. Binned length-frequency histograms for all fish captured at this location are presented in Figure 18. The LFCC Confluence site and silvery minnow capture locations are illustrated in Figure 19.

Table 8. Species morphometrics for Low Flow Conveyance Channel Confluence raft electrofishing, February 2020.

Species	Count	SL (mm; mean ± SD)	TL (mm; mean ± SD)	Wt. (g; mean ± SD)
Rio Grande Silvery Minnow	4	50.5 ± 9.6	61.5 ± 10.3	NA
Carp	17	220.5 ± 157.3	270.8 ± 190.1	1095.0 ± 270.4
Channel Catfish	1	312.0 ± NA	342.0 ± NA	325.0 ± NA
Red Shiner	10	26.6 ± 5.0	32.8 ± 6.3	NA
Gizzard Shad	23	254.7 ± 67.4	306.8 ± 80.9	368.4 ± 68.3
White Bass	1	122.0 ± NA	150.0 ± NA	NA





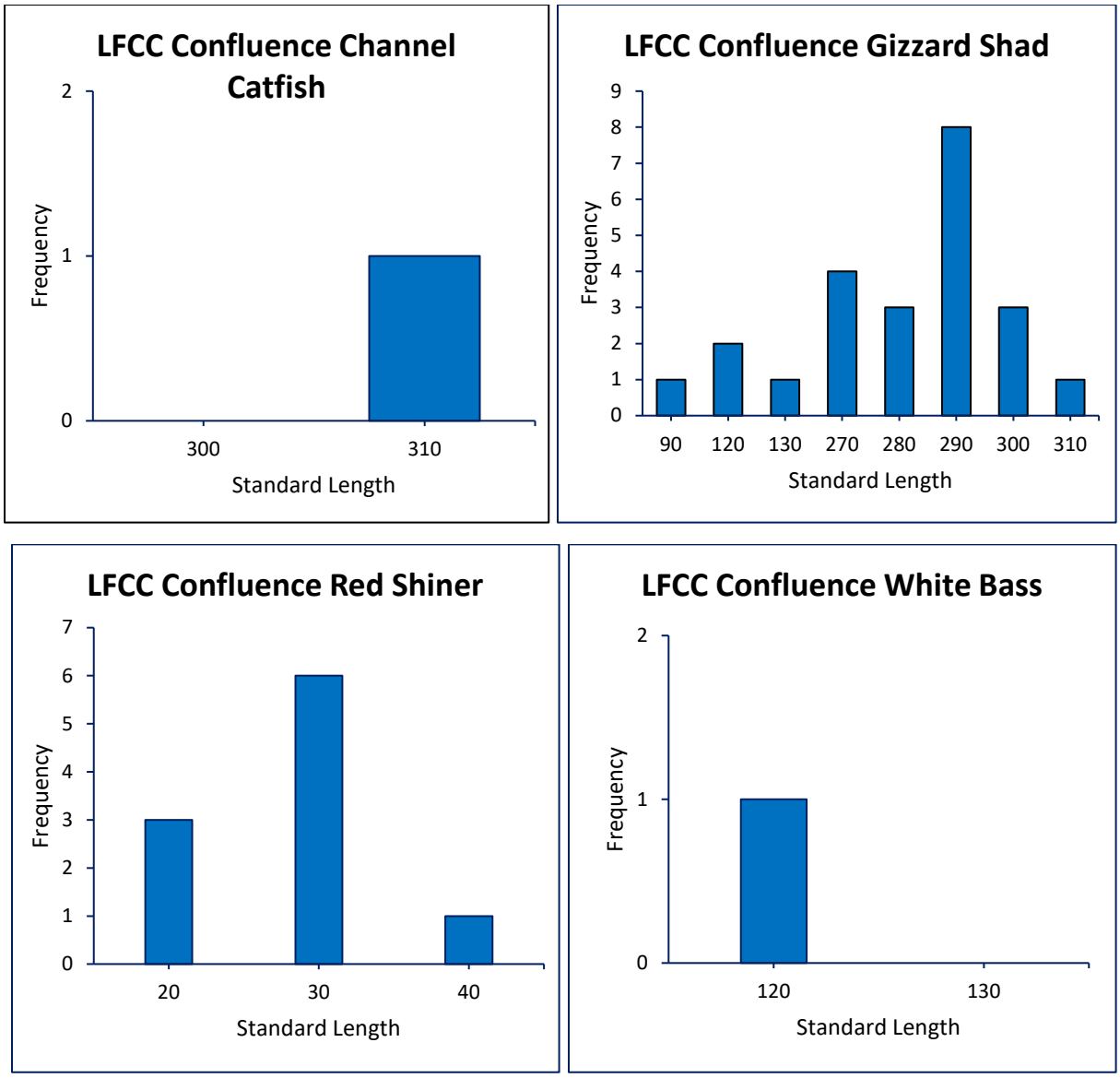


Figure 18. All species binned length-frequency histograms for LFCC Confluence, February 2020.

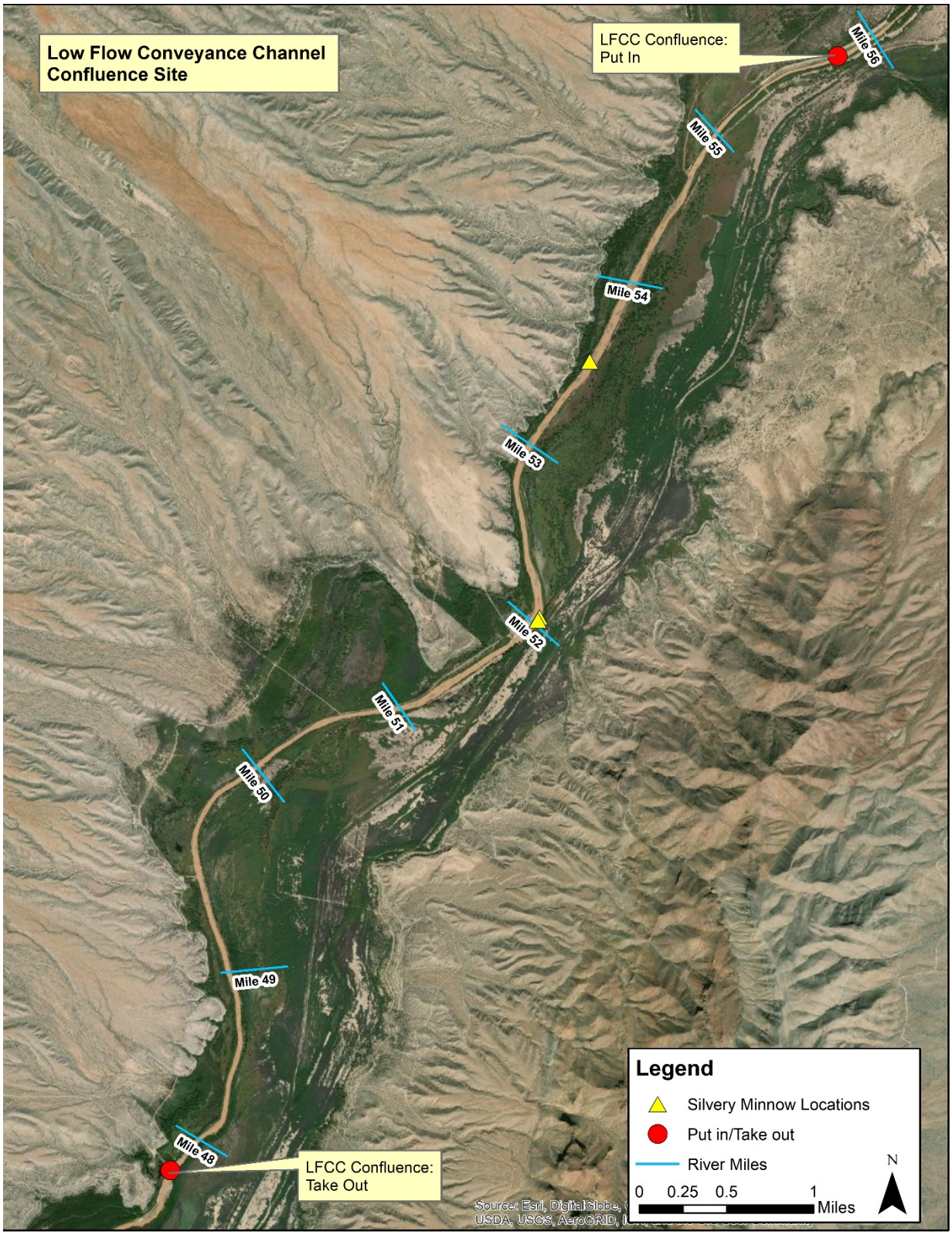


Figure 19. LFCC Confluence Site silvery minnow capture locations, February 2020.

4.4. Seine Netting:

Total fish captured during the seining efforts yielded a total of 124 fish. The Los Lunas site produced the highest number of fish captured (n=101), and the Bosque Del Apache site produced 23 fish (Table 1). The CPUE for bycatch was highest at the Los Lunas site (13.3 fish/ 100 m^2) (Figure 20). The bycatch CPUE for the Bosque Del Apache NWR was 1.6 fish/100 m^2. Eighteen silvery minnows were caught while seining and all were captured at the Bosque Del Apache NWR. The CPUE for silvery minnows at the Bosque Del Apache NWR was 1.2 fish/100 m^2. Four silvery minnows had a VIE marker, three of the fish had a red dorsal tag on the right side and the fourth fish had a red dorsal tag on the left side.

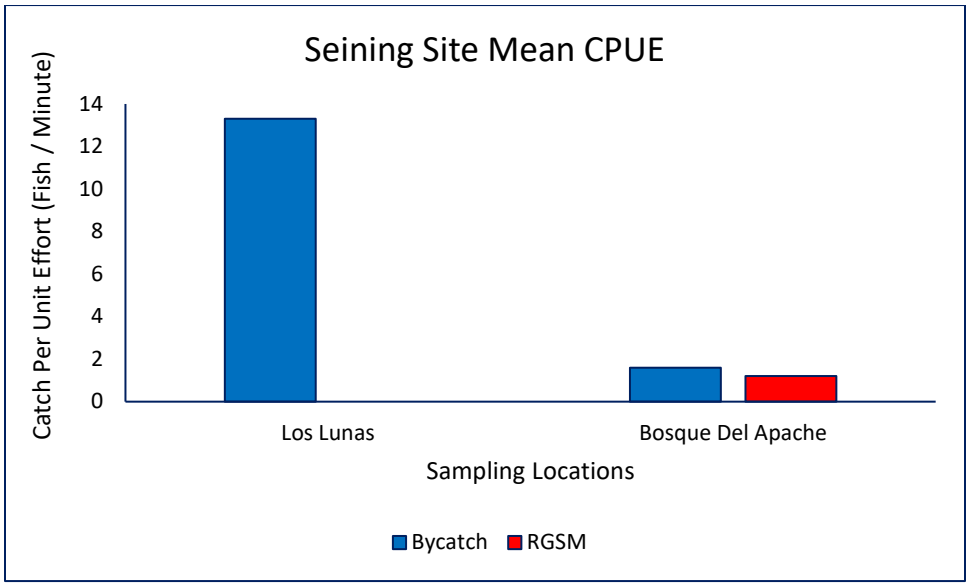


Figure 20. Mean CPUE for all fish (bycatch) and RGSM at each seining site.

4.4.1. Los Lunas

There were 101 fish captured at the Los Lunas location, across 39 seine hauls, comprised of 2 fish species. Seine hauls ranged from 3.1 to 15.6 meters. Red shiners made up the vast majority of fish captured at Los Lunas (n=100). A single mosquitofish was captured at the Los Lunas site (Table 9). No silvery minnows were captured throughout this sampling site. The species binned length-frequency histograms for all fish captured at this site are presented in Figure 21. The Los Lunas site is illustrated in Figure 22.

Table 9. Species morphometrics for Los Lunas seining effort, February 2020.

Species	Count	SL (mm; ± SD)	TL (mm; ± SD)
Red Shiner	100	25.1 ± 2.6	31.1 ± 3.4
Mosquitofish	1	29.0 ± NA	34 ± NA

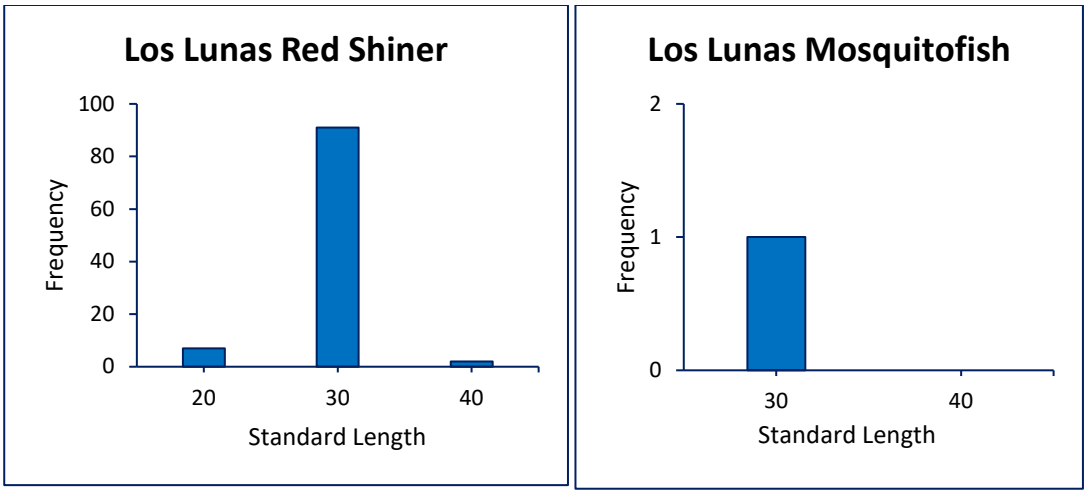


Figure 21. All species binned length-frequency histograms for Los Lunas, February 2020.

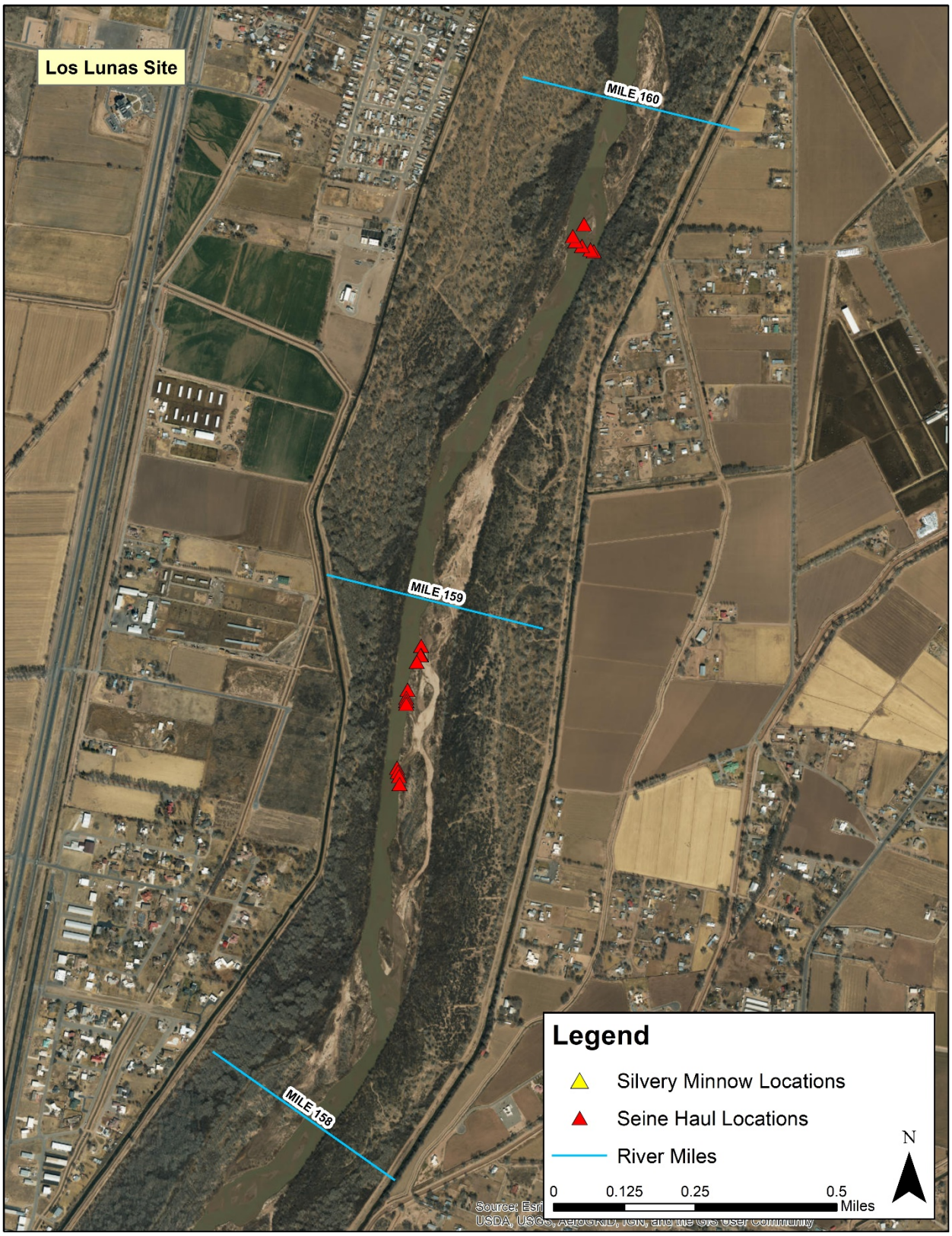


Figure 22. Los Lunas Site silvery minnow seining locations, February 2020.

4.4.2. Bosque Del Apache

There were 23 fish captured at this site, across 29 seine hauls, yielding 4 fish species. The seine hauls ranged from 3 to 20 meters. The most numerous species captured were silvery minnow, followed by flathead chub (Table 10). Eighteen silvery minnows were captured at this location, four had a VIE marker (three were right dorsal red and a single fish was marked left dorsal red). Binned length-frequency histograms for each species are shown in Figure 23. The Bosque Del Apache site and silvery minnow capture locations are illustrated in Figure 24.

Table 10. Species morphometrics for Bosque Del Apache seining effort, February 2020.

Species	Count	SL (mm; ± SD)	TL (mm; ± SD)
Rio Grande Silvery Minnow	18	42.6 ± 9.6	52.6 ± 11.7
Carp	1	61.0 ± NA	72.0 ± NA
Flathead Chub	3	26.7 ± 1.5	32.7 ± 1.5
Fathead Minnow	1	43.0 ± NA	54.0 ± NA

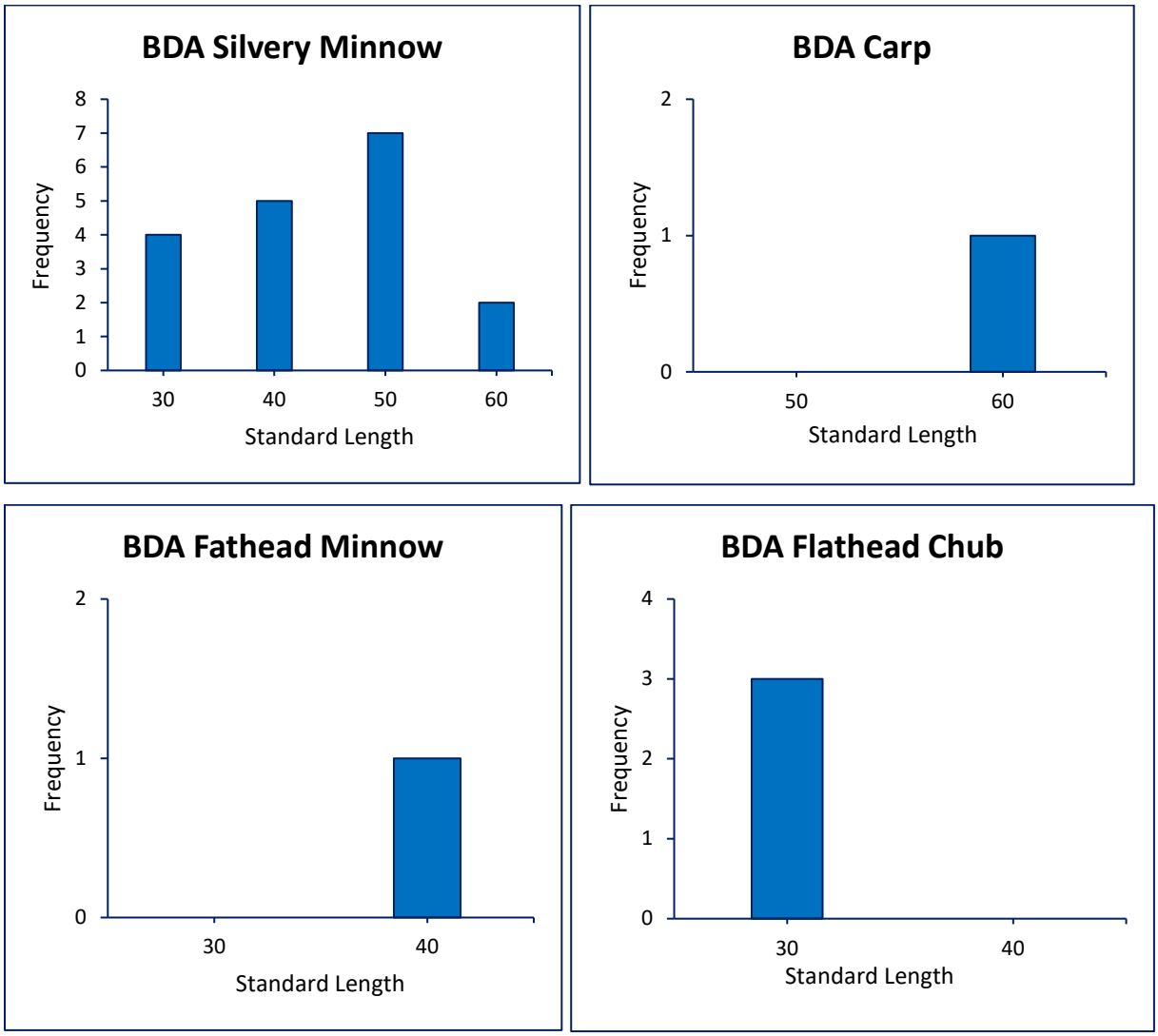


Figure 23. All species binned length-frequency histograms for the Bosque Del Apache, February 2020.

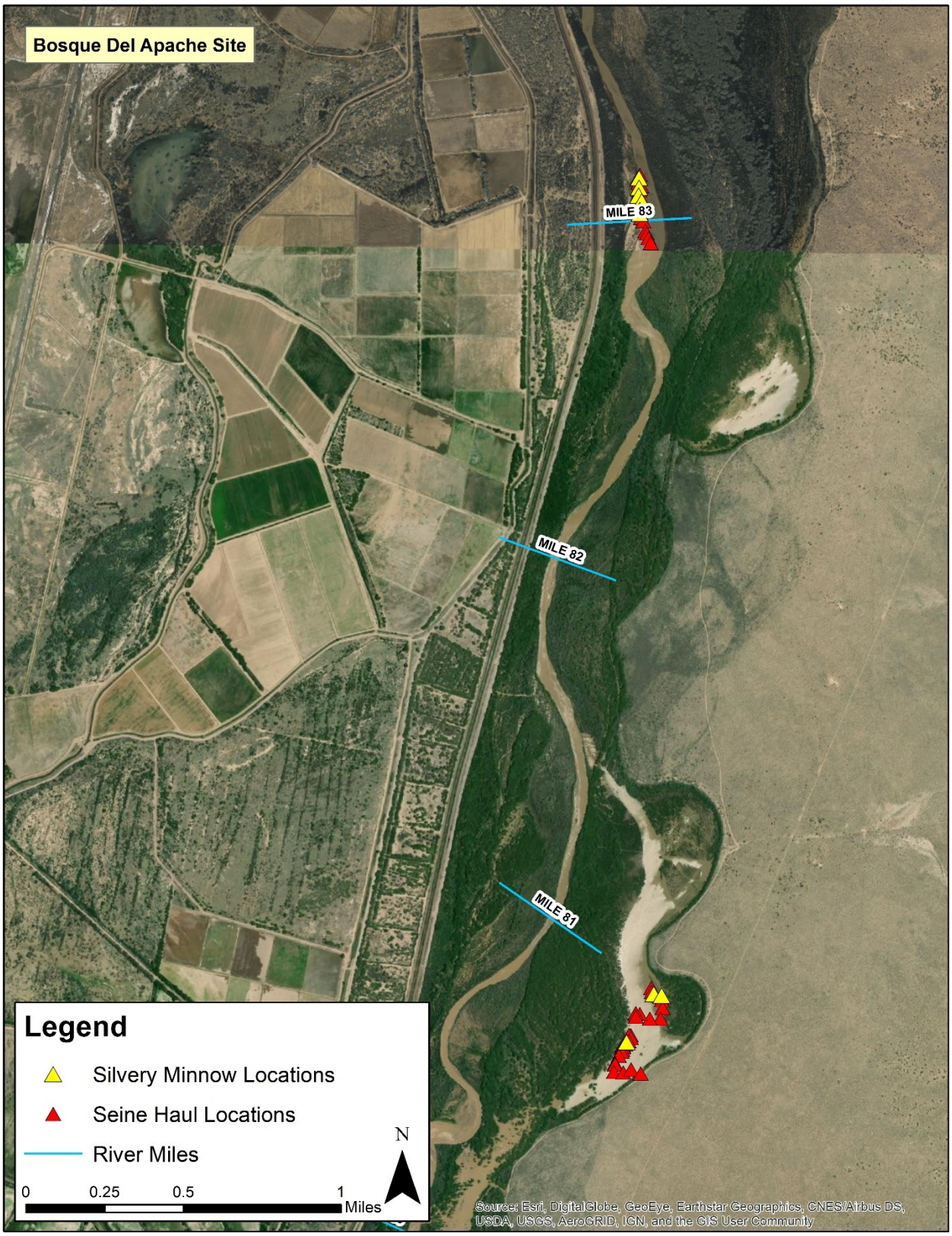


Figure 24. Bosque del Apache Site silvery minnow seining locations, February 2020.

4.5. Rio Grande Silvery Minnow Visible Implant Elastomer

Of the 191 silvery minnows captured, 5 had the VIE markers. Table 11 illustrates the locations where each VIE tagged silvery minnow was captured during the February sampling efforts, and the stocking information associated with that specific VIE tag. All five silvery minnows captured were released in the San Acacia reach in February or November of 2019.

Table 11. Summary of the Visible Implant Elastomer tagged fish.

Species	Capture Location	VIE Tag	Source	Date Released	Release Reach
RGSM	Escondida	Right Dorsal Red	SNARRC/ABQ	11/21/2019	San Acacia
RGSM	BDA	Right Dorsal Red	SNARRC/ABQ	11/21/2019	San Acacia
RGSM	BDA	Right Dorsal Red	SNARRC/ABQ	11/21/2019	San Acacia
RGSM	BDA	Right Dorsal Red	SNARRC/ABQ	11/21/2019	San Acacia
RGSM	BDA	Left Dorsal Red	SNARRC/ABQ	2/13/2019	San Acacia

4.6. Discharge and Water Quality Parameters

The 2020 daily average discharge for survey locations within the Angostura (e.g. Bernalillo – Sandia and Montano – Interstate 40), Isleta (Los Lunas, Sevilleta NWR), and San Acacia (San Acacia, Escondida, Bosque del Apache NWR, LFCC, and LFCC Confluence) reaches are presented in Figure 25 through Figure 27 (USGS; http://waterdata.usgs.gov/nm/nwis/rt). Other biologically relevant parameters such as temperature and dissolved oxygen were also recorded during February 2020 surveys and are summarized in Table 12. Water quality parameters were found to be within acceptable levels for silvery minnow survival.

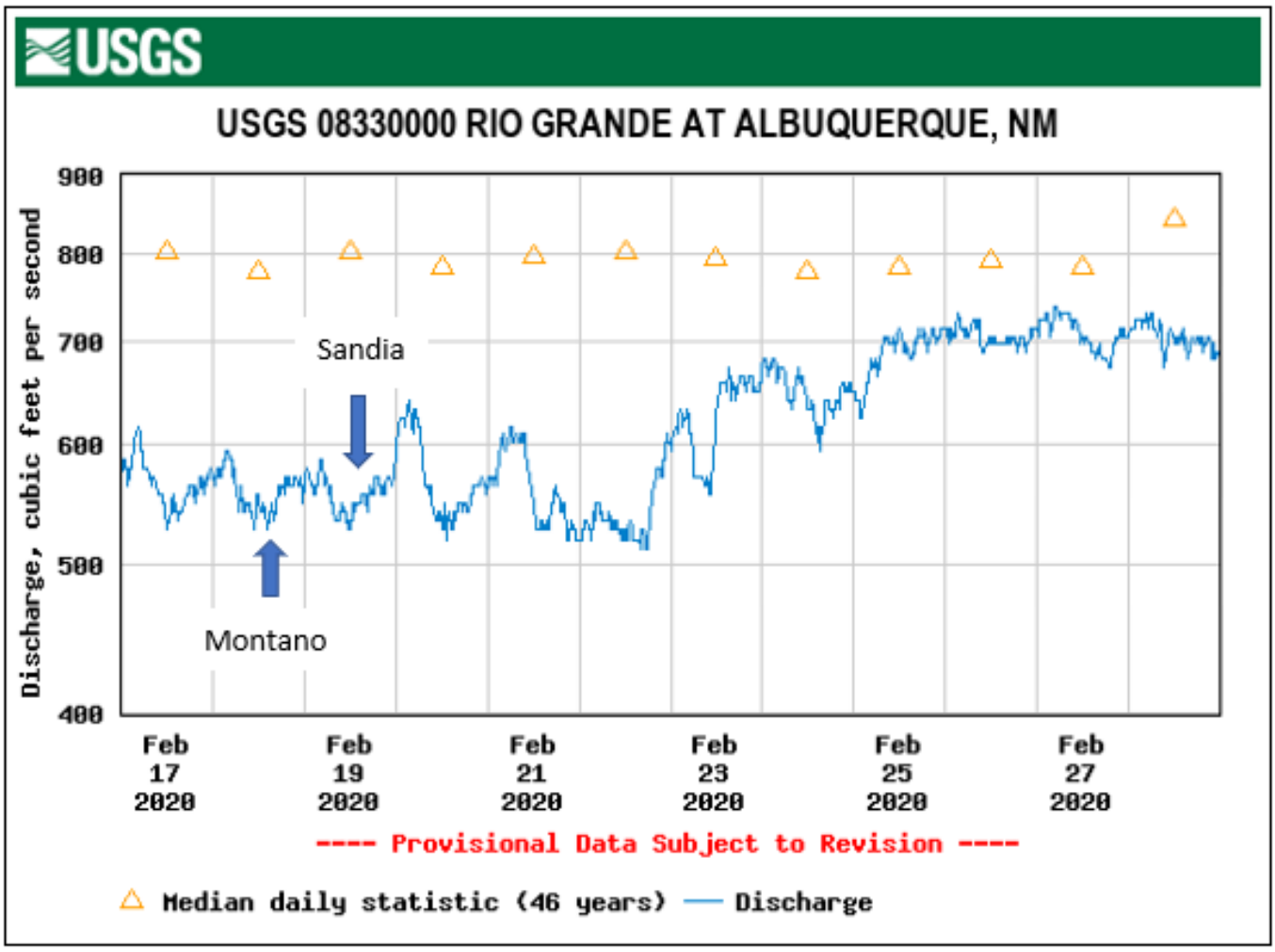


Figure 25. Mean daily discharge for sites within the Angostura Reach during late February 2020. Arrows depict dates when sites were sampled.

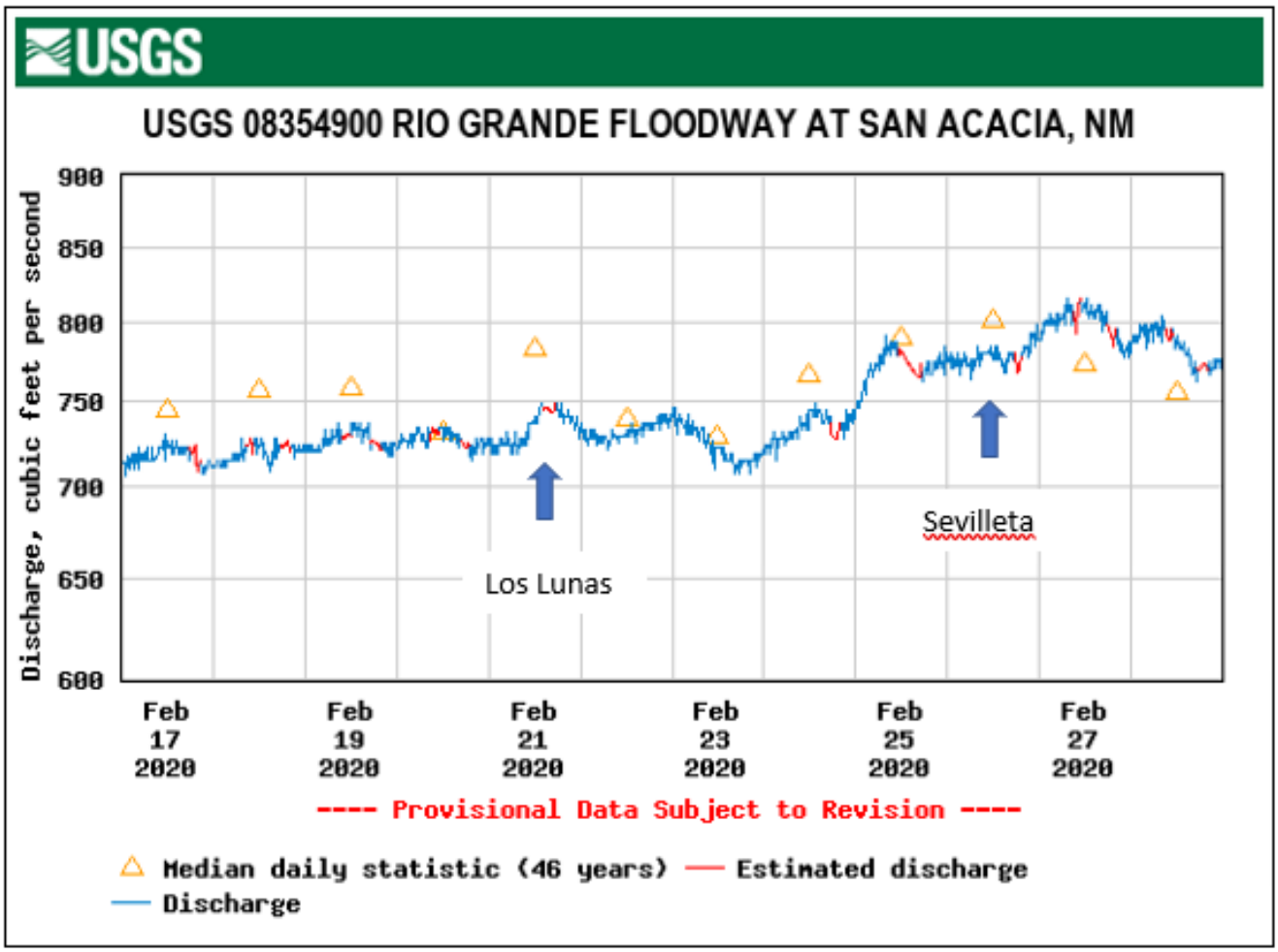


Figure 26. Mean daily discharge for sites within the Isleta Reach during late February 2020. Arrows depict dates when sites were sampled.

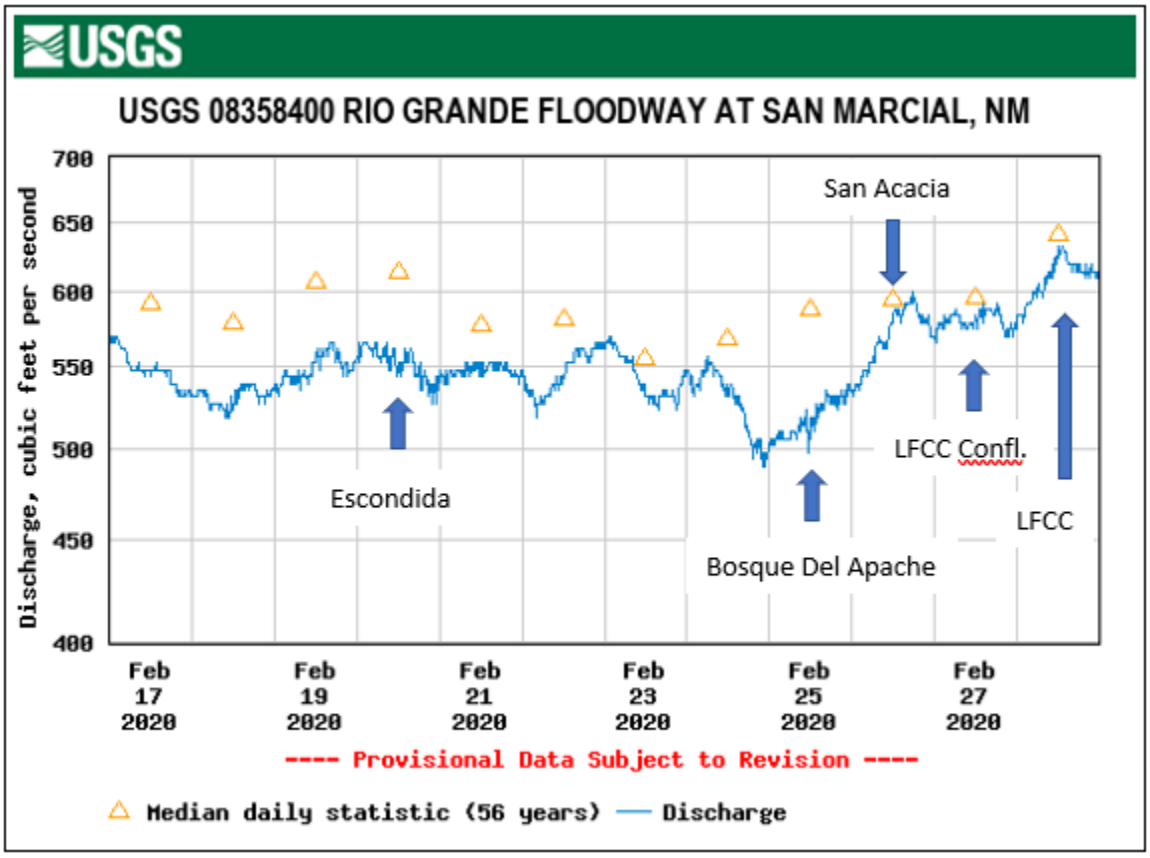


Figure 27. Mean daily discharge for sites within the San Acacia Reach during late February 2020. Arrows depict dates when sites were sampled.

Table 12. Water Quality Measurements for all survey locations. [mg/l = milligrams per liter; % percent saturation; C = Celsius; µS/cm = micro Siemens per centimeter]

Location	Date	D.O. (mg/l)	Oxygen Saturation (%)	Temp. (C)	Specific Conductivity (µS/cm)
Sandia	2/19/2021	9.63	77.9	6.1	323.5
Montano	2/18/2021	9.47	79.1	7.5	355.9
Los Lunas	2/21/2021	9.5	80.5	9.5	NA
Sevilleta NWR	2/26/2021	9.5	75.5	5.5	502.6
San Acacia	2/26/2021	9.85	97.4	8.2	402.5
Escondida	2/20/2021	8.61	75.8	9.7	590.4
Bosque del Apache	2/25/2021	12.2	101.3	6.5	632
LFCC	2/28/2021	7.7	70	10.5	996
LFCC Confluence	2/27/2021	9.96	80.5	6.2	613

µS/cm =microSiemens per centimeter

5. Discussion

In 2020, the number of fish species per site was highest at Montano (n=11), Sandia and Escondida (n=8), and San Acacia (n=7). Catch per unit effort, for silvery minnows, was highest at the Escondida site followed closely by San Acacia. The number of electrofishing transects ranged from 5 to 10 across survey locations—which contributed to a degree of uncertainty in CPUE at sites with fewer survey locations. Also, a mix of survey methods, specifically seining Los Lunas and the Bosque Del Apache resulted in incomparable CPUE when compared to sites sampled with electrofishing gear. No silvery minnows were captured in the Low Flow Conveyance Channel site in 2020. While previous emphasis has been placed on surveying the LFCC, no silvery minnows have been captured here in the last several years. We advise this location should be reconsidered in future surveys and efforts redirected towards adding a new site.

The Escondida site produced the most silvery minnows numerically and the majority of them were without VIE markers and assumed to be wild fish. The Escondida site is annually stocked with silvery minnows. Since the fall of 2018, this portion of the Rio Grande has been continuous and could contribute to a higher proportion of wild fish caught. Silvery minnows' recruitment is largely dependent on the annual spring runoff. In 2019, the flows were favorable to the silvery minnows. The standard lengths of the silvery minnows caught in February 2020 ranged from 25-83 mm—suggesting that two age classes were caught. Most of the silvery minnows were between 40-50 mm and likely be around 1.5 years old with one full year in the river (Horwitz et. al. 2017).

Fish population monitoring in the San Acacia reach remains a high priority because of large morphological changes to the Middle Rio Grande (e.g., the formation of sediment plugs and the channel realignment in Bosque del Apache NWR) and higher levels of operational activities such as conveyance channel maintenance and habitat restoration at these locations. While several sites have been standardized, we remain fluid with additional site selection as future river maintenance and program needs arise. Efforts are focused in the winter, prior to the irrigation season, and often incorporate seining as well as electrofishing. Such information could help with baseline data and assist with evaluating restoration efforts in the future. In addition, meeting provisions set forth by the USFWS 2016 Biological Opinion, remain a priority.

6. References

Archdeacon, T. 2020. New Mexico Fish and Wildlife Conservation Office. USFWS, Albuquerque, New Mexico, personal communication.

Bestgen, K.R. and S.P. Platania. 1991 Status and conservation of the Rio Grande Silvery Minnow, *Hybognathus amarus*. The Southwestern Naturalist, 36(2):225-232.

Dudley, R.K., S.P. Platania, and G.C. White. 2020. Rio Grande Silvery Minnow population monitoring during 2019. Submitted to Reclamation, Albuquerque, New Mexico. https://doi.org/10.13140/RG.2.2.30586.52160

Horwitz, R. J., D. H. Keller, P. F. Overbeck, S. P. Platania, R. K. Dudley, and E. W. Carson. 2018. Age and growth of Rio Grande Silvery Minnow *Hybognathus amarus*, an endangered, short-lived cyprinid of the North American Southwest. Transactions of the American Fisheries Society 147:265–277.

Propst, D. L. 1999. Threatened and endangered fishes of New Mexico (pp. 1-84). Santa Fe: New Mexico Department of Game and Fish.

Reclamation. 2010. Summary report: February raft- mounted electrofishing surveys on the middle Rio Grande, 2001 through 2010. Bureau of Reclamation, Albuquerque Area Office, pp. 29.

Sallenave, R., C.P. Carrasco, and D.E. Cowley. 2010. Fishes in the Middle and Lower Rio Grande Irrigation Systems of New Mexico. NM State University, Cooperative Extension Service, College of Agricultural, Consumer and Environmental Sciences.

USFWS. 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.

USFWS. 2003. Endangered and Threatened Wildlife and Plants; Final rule for the Designation of Critical Habitat for the Rio Grande silvery minnow. Federal Register, 68, 8088-8135.

USFWS. 2007. Rio Grande silvery minnow (*Hybognathus amarus*) draft revised recovery plan. U.S. Fish and Wildlife Service, Albuquerque, NM.

USFWS. 2016. Final Biological and Conference Opinion for Bureau of Reclamation, Bureau of Indian Affairs, and Non-Federal Water Management and Maintenance Activities on the Middle Rio Grande, New Mexico. Albuquerque, New Mexico: New Mexico Ecological Services Field Office

USGS. 2020 (Albuquerque). National Water Information System data available on the World Wide Web (USGS Water Data for the Nation), accessed [August 10, 2020], at URL [http://waterdata.usgs.gov/nwis/uv?site_no=08330000].

USGS. 2020.(San Acacia) National Water Information System data available on the World Wide Web (USGS Water Data for the Nation), accessed [August 10, 2020], at URL [http://waterdata.usgs.gov/nwis/uv?site_no=08354900].

USGS. 2020 (San Marcial). National Water Information System data available on the World Wide Web (USGS Water Data for the Nation), accessed [August 10, 2020], at URL [http://waterdata.usgs.gov/nwis/uv?site_no=08358400]

Appendix

February 2020 RGSM Collection Data

Electrofishing

Scientific Name	Survey Date	Easting/Northing		UTM Zone	Site	Species not found	VIE Tag Info	Standard Length mm
Hybognathus amarus	2/18/2020	347009	3890383	13	Montano			60
Hybognathus amarus	2/18/2020	346226	3889309	13	Montano			52
Hybognathus amarus	2/18/2020	345857	3887024	13	Montano			77
Hybognathus amarus	2/18/2020	345852	3886909	13	Montano			45
Hybognathus amarus	2/19/2020	355622	3900852	13	Sandia			81
Hybognathus amarus	2/19/2020	355622	3900852	13	Sandia			43
Hybognathus amarus	2/19/2020	355622	3900852	13	Sandia			37
Hybognathus amarus	2/20/2020	326861	3774292	13	Escondida			52
Hybognathus amarus	2/20/2020	326864	3774290	13	Escondida			50
Hybognathus amarus	2/20/2020	327112	3774013	13	Escondida			55
Hybognathus amarus	2/20/2020	327191	3773924	13	Escondida			51
Hybognathus amarus	2/20/2020	327191	3773922	13	Escondida			54
Hybognathus amarus	2/20/2020	327191	3773919	13	Escondida			59
Hybognathus amarus	2/20/2020	327191	3773919	13	Escondida			42

Scientific Name	Survey Date	Easting/Northing		UTM Zone	Site	Species not found	VIE Tag Info	Standard Length mm
Hybognathus amarus	2/20/2020	327279	3773322	13	Escondida			50
Hybognathus amarus	2/20/2020	327433	3773267	13	Escondida			51
Hybognathus amarus	2/20/2020	327434	3773266	13	Escondida			57
Hybognathus amarus	2/20/2020	327434	3773266	13	Escondida			54
Hybognathus amarus	2/20/2020	327821	3772797	13	Escondida			49
Hybognathus amarus	2/20/2020	327821	3772795	13	Escondida			58
Hybognathus amarus	2/20/2020	327820	3772794	13	Escondida			51
Hybognathus amarus	2/20/2020	327806	3772773	13	Escondida			51
Hybognathus amarus	2/20/2020	327795	3772745	13	Escondida			46
Hybognathus amarus	2/20/2020	327668	3772237	13	Escondida			51
Hybognathus amarus	2/20/2020	327667	3772233	13	Escondida			53
Hybognathus amarus	2/20/2020	327660	3772199	13	Escondida			50
Hybognathus amarus	2/20/2020	327405	3771890	13	Escondida			46
Hybognathus amarus	2/20/2020	327403	3771886	13	Escondida			43
Hybognathus amarus	2/20/2020	326936	3770429	13	Escondida			44
Hybognathus amarus	2/20/2020	326936	3770413	13	Escondida			39
Hybognathus amarus	2/20/2020	326938	3770397	13	Escondida			59
Hybognathus amarus	2/20/2020	326940	3770395	13	Escondida			44

Scientific Name	Survey Date	Easting/Northing		UTM Zone	Site	Species not found	VIE Tag Info	Standard Length mm
Hybognathus amarus	2/20/2020	326940	3770393	13	Escondida			47
Hybognathus amarus	2/20/2020	327033	3770174	13	Escondida			50
Hybognathus amarus	2/20/2020	327047	3770137	13	Escondida			59
Hybognathus amarus	2/20/2020	327047	3770137	13	Escondida			48
Hybognathus amarus	2/20/2020	327048	3770132	13	Escondida			48
Hybognathus amarus	2/20/2020	327378	3769467	13	Escondida			51
Hybognathus amarus	2/20/2020	327380	3769464	13	Escondida			44
Hybognathus amarus	2/20/2020	327382	3769463	13	Escondida			45
Hybognathus amarus	2/20/2020	327632	3769245	13	Escondida			48
Hybognathus amarus	2/20/2020	327632	3769244	13	Escondida			53
Hybognathus amarus	2/20/2020	327634	3769241	13	Escondida			43
Hybognathus amarus	2/20/2020	327636	3769239	13	Escondida		Right dorsal red	46
Hybognathus amarus	2/20/2020	327978	3768742	13	Escondida			46
Hybognathus amarus	2/20/2020	328012	3768435	13	Escondida			53
Hybognathus amarus	2/20/2020	328005	3768411	13	Escondida			45
Hybognathus amarus	2/20/2020	327931	3768134	13	Escondida			46
Hybognathus amarus	2/20/2020	327916	3768115	13	Escondida			45
Hybognathus amarus	2/20/2020	327916	3768115	13	Escondida			50

Scientific Name	Survey Date	Easting/Northing		UTM Zone	Site	Species not found	VIE Tag Info	Standard Length mm
Hybognathus amarus	2/20/2020	327916	3768115	13	Escondida			41
Hybognathus amarus	2/20/2020	327916	3768115	13	Escondida			51
Hybognathus amarus	2/20/2020	327916	3768115	13	Escondida			45
Hybognathus amarus	2/20/2020	327916	3768115	13	Escondida			37
Hybognathus amarus	2/20/2020	327916	3768115	13	Escondida			59
Hybognathus amarus	2/20/2020	327916	3768115	13	Escondida			52
Hybognathus amarus	2/20/2020	327916	3768115	13	Escondida			48
Hybognathus amarus	2/20/2020	327916	3768115	13	Escondida			38
Hybognathus amarus	2/20/2020	327916	3768115	13	Escondida			50
Hybognathus amarus	2/20/2020	327916	3768115	13	Escondida			49
Hybognathus amarus	2/20/2020	327916	3768115	13	Escondida			50
Hybognathus amarus	2/20/2020	327916	3768115	13	Escondida			40
Hybognathus amarus	2/20/2020	327916	3768115	13	Escondida			50
Hybognathus amarus	2/20/2020	327879	3768742	13	Escondida			50
Hybognathus amarus	2/20/2020	327879	3768742	13	Escondida			56
Hybognathus amarus	2/20/2020	327925	3766660	13	Escondida			55
Hybognathus amarus	2/20/2020	327926	3766657	13	Escondida			53
Hybognathus amarus	2/20/2020	327952	3766616	13	Escondida			47

Scientific Name	Survey Date	Easting/Northing		UTM Zone	Site	Species not found	VIE Tag Info	Standard Length mm
Hybognathus amarus	2/20/2020	327624	3765108	13	Escondida			54
Hybognathus amarus	2/20/2020	327624	3765108	13	Escondida			44
Hybognathus amarus	2/20/2020	327624	3765108	13	Escondida			53
Hybognathus amarus	2/20/2020	327624	3765108	13	Escondida			51
Hybognathus amarus	2/20/2020	327193	3764284	13	Escondida			48
Hybognathus amarus	2/20/2020	327193	3764284	13	Escondida			50
Hybognathus amarus	2/20/2020	327193	3764284	13	Escondida			43
Hybognathus amarus	2/20/2020	327189	3764271	13	Escondida			40
Hybognathus amarus	2/20/2020	327189	3764271	13	Escondida			50
Hybognathus amarus	2/20/2020	327177	3764238	13	Escondida			43
Hybognathus amarus	2/20/2020	327177	3764238	13	Escondida			45
Hybognathus amarus	2/20/2020	327176	3764235	13	Escondida			45
Hybognathus amarus	2/20/2020	327176	3764235	13	Escondida			46
Hybognathus amarus	2/20/2020	327176	3764233	13	Escondida			49
Hybognathus amarus	2/20/2020	327176	3764233	13	Escondida			48
Hybognathus amarus	2/20/2020	327175	3764230	13	Escondida			43
Hybognathus amarus	2/20/2020	327175	3764230	13	Escondida			47
Hybognathus amarus	2/20/2020	327175	3764230	13	Escondida			53

Scientific Name	Survey Date	Easting/Northing		UTM Zone	Site	Species not found	VIE Tag Info	Standard Length mm
Hybognathus amarus	2/20/2020	327175	3764230	13	Escondida			48
Hybognathus amarus	2/20/2020	327175	3764230	13	Escondida			46
Hybognathus amarus	2/26/2020	330458	3794792	13	Sevilleta			53
Hybognathus amarus	2/26/2020	330458	3794792	13	Sevilleta			52
Hybognathus amarus	2/26/2020	330458	3794792	13	Sevilleta			52
Hybognathus amarus	2/26/2020	330458	3794792	13	Sevilleta			55
Hybognathus amarus	2/26/2020	330458	3794792	13	Sevilleta			48
Hybognathus amarus	2/26/2020	330458	3794792	13	Sevilleta			61
Hybognathus amarus	2/26/2020	330458	3794792	13	Sevilleta			60
Hybognathus amarus	2/26/2020	330458	3794792	13	Sevilleta			45
Hybognathus amarus	2/26/2020	330458	3794792	13	Sevilleta			43
Hybognathus amarus	2/26/2020	330458	3794792	13	Sevilleta			46
Hybognathus amarus	2/26/2020	330458	3794792	13	Sevilleta			52
Hybognathus amarus	2/26/2020	330458	3794792	13	Sevilleta			49
Hybognathus amarus	2/26/2020	330458	3794792	13	Sevilleta			54
Hybognathus amarus	2/26/2020	330458	3794792	13	Sevilleta			55
Hybognathus amarus	2/26/2020	330423	3794751	13	Sevilleta			55
Hybognathus amarus	2/26/2020	330423	3794751	13	Sevilleta			56

Scientific Name	Survey Date	Easting/Northing		UTM Zone	Site	Species not found	VIE Tag Info	Standard Length mm
Hybognathus amarus	2/26/2020	330423	3794751	13	Sevilleta			83
Hybognathus amarus	2/26/2020	330423	3794751	13	Sevilleta			60
Hybognathus amarus	2/26/2020	330423	3794751	13	Sevilleta			56
Hybognathus amarus	2/26/2020	330423	3794751	13	Sevilleta			53
Hybognathus amarus	2/26/2020	330423	3794751	13	Sevilleta			48
Hybognathus amarus	2/26/2020	330423	3794751	13	Sevilleta			42
Hybognathus amarus	2/26/2020	329300	3794292	13	Sevilleta			44
Hybognathus amarus	2/26/2020	329300	3794292	13	Sevilleta			60
Hybognathus amarus	2/26/2020	329204	3794263	13	Sevilleta			57
Hybognathus amarus	2/26/2020	329204	3794263	13	Sevilleta			53
Hybognathus amarus	2/26/2020	329151	3794239	13	Sevilleta			50
Hybognathus amarus	2/26/2020	329151	3794239	13	Sevilleta			50
Hybognathus amarus	2/26/2020	328948	3793928	13	Sevilleta			53
Hybognathus amarus	2/26/2020	328948	3793928	13	Sevilleta			54
Hybognathus amarus	2/26/2020	328948	3793928	13	Sevilleta			51
Hybognathus amarus	2/26/2020	328948	3793928	13	Sevilleta			59
Hybognathus amarus	2/27/2020	325912	3792160	13	SADD			60
Hybognathus amarus	2/27/2020	325912	3792160	13	SADD			60

Scientific Name	Survey Date	Easting/Northing		UTM Zone	Site	Species not found	VIE Tag Info	Standard Length mm
Hybognathus amarus	2/27/2020	325879	3792176	13	SADD			54
Hybognathus amarus	2/27/2020	325879	3792176	13	SADD			60
Hybognathus amarus	2/27/2020	325715	3792189	13	SADD			57
Hybognathus amarus	2/27/2020	325715	3792189	13	SADD			59
Hybognathus amarus	2/27/2020	325514	3792060	13	SADD			57
Hybognathus amarus	2/27/2020	325514	3792060	13	SADD			53
Hybognathus amarus	2/27/2020	325514	3792060	13	SADD			55
Hybognathus amarus	2/27/2020	325514	3792060	13	SADD			56
Hybognathus amarus	2/27/2020	325106	3790987	13	SADD			46
Hybognathus amarus	2/27/2020	325098	3790932	13	SADD			53
Hybognathus amarus	2/27/2020	325159	3790743	13	SADD			49
Hybognathus amarus	2/27/2020	325357	3790512	13	SADD			58
Hybognathus amarus	2/27/2020	325351	3790121	13	SADD			55
Hybognathus amarus	2/27/2020	325351	3790121	13	SADD			60
Hybognathus amarus	2/27/2020	325351	3790121	13	SADD			53
Hybognathus amarus	2/27/2020	325294	3790060	13	SADD			55
Hybognathus amarus	2/27/2020	325294	3790060	13	SADD			59
Hybognathus amarus	2/27/2020	325177	3789998	13	SADD			63

Scientific Name	Survey Date	Easting/Northing		UTM Zone	Site	Species not found	VIE Tag Info	Standard Length mm
Hybognathus amarus	2/27/2020	325177	3789998	13	SADD			50
Hybognathus amarus	2/27/2020	325177	3789998	13	SADD			58
Hybognathus amarus	2/27/2020	325177	3789998	13	SADD			58
Hybognathus amarus	2/27/2020	325161	3789982	13	SADD			51
Hybognathus amarus	2/27/2020	325161	3789982	13	SADD			60
Hybognathus amarus	2/27/2020	325161	3789982	13	SADD			53
Hybognathus amarus	2/27/2020	325068	3789860	13	SADD			65
Hybognathus amarus	2/27/2020	325068	3789860	13	SADD			55
Hybognathus amarus	2/27/2020	325091	3789717	13	SADD			55
Hybognathus amarus	2/27/2020	325091	3789717	13	SADD			55
Hybognathus amarus	2/27/2020	325091	3789717	13	SADD			52
Hybognathus amarus	2/27/2020	325281	3789140	13	SADD			60
Hybognathus amarus	2/27/2020	325281	3789140	13	SADD			50
Hybognathus amarus	2/27/2020	325338	3789116	13	SADD			50
Hybognathus amarus	2/27/2020	325490	3788895	13	SADD			55
Hybognathus amarus	2/27/2020	325490	3788895	13	SADD			54
Hybognathus amarus	2/27/2020	325490	3788895	13	SADD			51
Hybognathus amarus	2/27/2020	325525	3788796	13	SADD			58

Scientific Name	Survey Date	Easting	Northing	UTM Zone	Site	Species not found	VIE Tag Info	Standard Length mm
Hybognathus amarus	2/27/2020	325525	3788796	13	SADD			51
Hybognathus amarus	2/27/2020	325551	3788686	13	SADD			52
Hybognathus amarus	2/27/2020	325531	3788554	13	SADD			55
Hybognathus amarus	2/27/2020	325523	3788525	13	SADD			62
Hybognathus amarus	2/27/2020	325523	3788525	13	SADD			51
Hybognathus amarus	2/27/2020	325523	3788525	13	SADD			45
Hybognathus amarus	2/27/2020	325591	3788185	13	SADD			62
Hybognathus amarus	2/27/2020	325751	3788028	13	SADD			60
Hybognathus amarus	2/27/2020	325751	3788028	13	SADD			54
Hybognathus amarus	2/27/2020	325804	3788003	13	SADD			54
Hybognathus amarus	2/27/2020	325859	3787982	13	SADD			50
Hybognathus amarus	2/28/2020	303262	3709178	13	Confluence			51
Hybognathus amarus	2/28/2020	302797	3706814	13	Confluence			55
Hybognathus amarus	2/28/2020	302797	3706814	13	Confluence			59
Hybognathus amarus	2/28/2020	302783	3706788	13	Confluence			37
	2/28/2020				LFCC	X		

Seining

Scientific Name	Survey Date	Easting/Northing		UTM Zone	Site	Species not found	VIE Tag Info	Standard Length mm
Hybognathus amarus	2/25/2020	329346	3743346	13	BDA Channel Realignment			57
Hybognathus amarus	2/25/2020	329386	3743338	13	BDA Channel Realignment			59
Hybognathus amarus	2/25/2020	329207	3743100	13	BDA Channel Realignment			35
Hybognathus amarus	2/25/2020	329346	3743346	13	Bosque Del Apache			33
Hybognathus amarus	2/25/2020	329386	3743338	13	Bosque Del Apache			54
Hybognathus amarus	2/25/2020	329207	3743100	13	Bosque Del Apache		Right dorsal red	30
Hybognathus amarus	2/25/2020	329271	3747510	13	Bosque Del Apache			49
Hybognathus amarus	2/25/2020	329271	3747510	13	Bosque Del Apache			47
Hybognathus amarus	2/25/2020	329271	3747510	13	Bosque Del Apache			45
Hybognathus amarus	2/25/2020	329271	3747510	13	Bosque Del Apache			36
Hybognathus amarus	2/25/2020	329270	3747461	13	Bosque Del Apache			46
Hybognathus amarus	2/25/2020	329270	3747461	13	Bosque Del Apache			31
Hybognathus amarus	2/25/2020	329268	3747422	13	Bosque Del Apache			50
Hybognathus amarus	2/25/2020	329268	3747422	13	Bosque Del Apache		Left dorsal red	40
Hybognathus amarus	2/25/2020	329284	3747392	13	Bosque Del Apache			48
Hybognathus amarus	2/25/2020	329284	3747392	13	Bosque Del Apache			42
Hybognathus amarus	2/25/2020	329274	3747347	13	Bosque Del Apache		Right dorsal red	40
Hybognathus amarus	2/25/2020	329274	3747328	13	Bosque Del Apache		**Right dorsal red**	**25**
	2/21/2020				Los Lunas	X		