Gulf and Caribbean Research

Volume 15 | Issue 1

January 2003

Status and Habitat Characteristics of the Saltmarsh Topminnow, *Fundulus jenkinsi* (Evermann) in Eastern Mississippi and Western Alabama Coastal Bayous

Mark S. Peterson
University of Southern Mississippi, mark.peterson@usm.edu

Gregory L. Fulling
National Marine Fisheries Service

Christa M. Woodley
University of California, Davis

DOI: 10.18785/gcr.1501.07

Gulf and Caribbean Research Vol 15, 51–59, 2003 Manuscript received June 1, 2002; accepted September 3, 2003

STATUS AND HABITAT CHARACTERISTICS OF THE SALTMARSH TOPMINNOW, *FUNDULUS JENKINSI* (EVERMANN) IN EASTERN MISSISSIPPI AND WESTERN ALABAMA COASTAL BAYOUS

Mark S. Peterson[1], Gregory L. Fulling[2], and Christa M. Woodley[3]
[1]*Department of Coastal Sciences, The University of Southern Mississippi, 703 East Beach Drive, Ocean Springs, MS 39564 USA, E-mail mark.peterson@usm.edu*
[2]*NOAA/NMFS, 3209 Frederic Street, Pascagoula, MS 39567*
[3]*Department of Wildlife, Fish & Conservation, Academic Surge Building, University of California-Davis, Davis, CA 95616*

ABSTRACT The saltmarsh topminnow, *Fundulus jenkinsi* (Evermann, 1892), occurs sporadically along the northern Gulf of Mexico and appears to prefer *Spartina* habitat. Throughout its range, it is considered rare or threatened and has been placed on the US Federal Register's List of Candidate Species. In order to determine the status and habitat characteristics of this species, we examined collections from 1985–1986, 1996, 1999, and 2001 from eastern Mississippi and western Alabama. We report on 868 *F. jenkinsi* collected in 82 locations using 414 seine hauls and 420 Breder traps over 40 dates. Results using all collections indicated *F. jenkinsi* is not as abundant as other fundulids in this area but is more abundant than previously thought. We also documented the first records for this species from the Pascagoula River drainage. For the Breder trap collections only, a stepwise linear regression indicated that water temperature and salinity explained 39.7% of the variance in $\log_{10}$(mean CPUE + 0.5) over the time of this study and this relationship was significant (ANOVA, $F_{3,59} = 13.95$, $P < 0.001$). The equation $\log_{10}(\text{mean CPUE} + 0.5) = 1.623 - 0.0150\,(\text{salinity}) + 0.77\,(\text{depth}) - 0.0584\,(\text{water temperature})$ indicated that mean CPUE of *F. jenkinsi* was higher when salinity and water temperature were lower. Using bag seine and Breder trap data, this species was most abundant (90.7% of total) in salinities ≤12‰ while being mainly collected in water depths near 0.5 m and water temperatures ≥ 20.0°C. We feel the use of sampling gear designed to collect resident marsh fishes is imperative and use of other gear types and/or variation in annual rainfall and the subsequent extent and patchiness of low salinity salt marsh area from year to year may explain why this species appears rare or absent in most fish studies of the northern Gulf of Mexico. Because of its distribution in low-salinity bayou habitats, this small fundulid will probably be continually placed in situations where the habitat will be impacted due to development.

Introduction

The saltmarsh topminnow, *Fundulus jenkinsi* (Evermann), occurs sporadically in *Spartina* marsh along the Gulf Coast from Galveston, Texas to Escambia Bay, Florida (Bailey et al. 1954, Thompson 1980, Boschung 1992). Thompson (1980) suggested that *F. jenkinsi* is mainly found where salinities range between 1 and 4‰. However, Griffith (1974) reviewed existing salinity tolerance data throughout its range and noted it has been found in salinities up to 15–20‰. Little is known, however, about the distribution and habitat characteristics of the saltmarsh topminnow in coastal marshes of the northern Gulf of Mexico. Simpson and Gunter (1956) collected 24 individuals from Texas *Spartina* marshes and discussed some aspects of their ecology. In west-central Louisiana *Spartina* marshes, Neill and Turner (1987), Rozas (1992a, 1992b) and Rozas and Reed (1993) documented this species in oligo- to mesohaline sites in low numbers using various collecting techniques. However, Peterson and Turner (1994) found that *F. jenkinsi* was the ninth most abundant species in a Louisiana *Spartina* marsh when collected with flume nets. Peterson and Ross (1991) collected 240 *F. jenkinsi* in Old Ft. Bayou, a coastal river in Mississippi. Ross and Brenneman (1991) also mention records of this species from coastal rivers and the Pearl River drainage and indicate that it has not been collected in the Pascagoula River drainage. In coastal Alabama, Swingle and Bland (1974) recorded 177 individuals from marshes of the Mobile Bay area between 2–25‰. In Florida, Bailey et al. (1954) collected 80 individuals from near the confluence of the Escambia River and Escambia Bay where surface salinity was 4.5‰. Gilbert and Relyea (1992) noted this species is considered "threatened" in Florida in part due to its restricted panhandle distribution, strong anecdotal evidence of its use of *Spartina* marsh habitat, and the fact that coastal marsh habitat world-wide is being altered. Gilbert and Relyea (1992) suggest that *Spartina* marsh should be conserved to protect this rare species.

Although it has been suggested that the distribution of *F. jenkinsi* is coupled with that of *Spartina* marsh, few quantitative data exist. Published data indicates that few or no *F. jenkinsi* are collected outside *Spartina* marsh habitats. It is clear, however, that this species

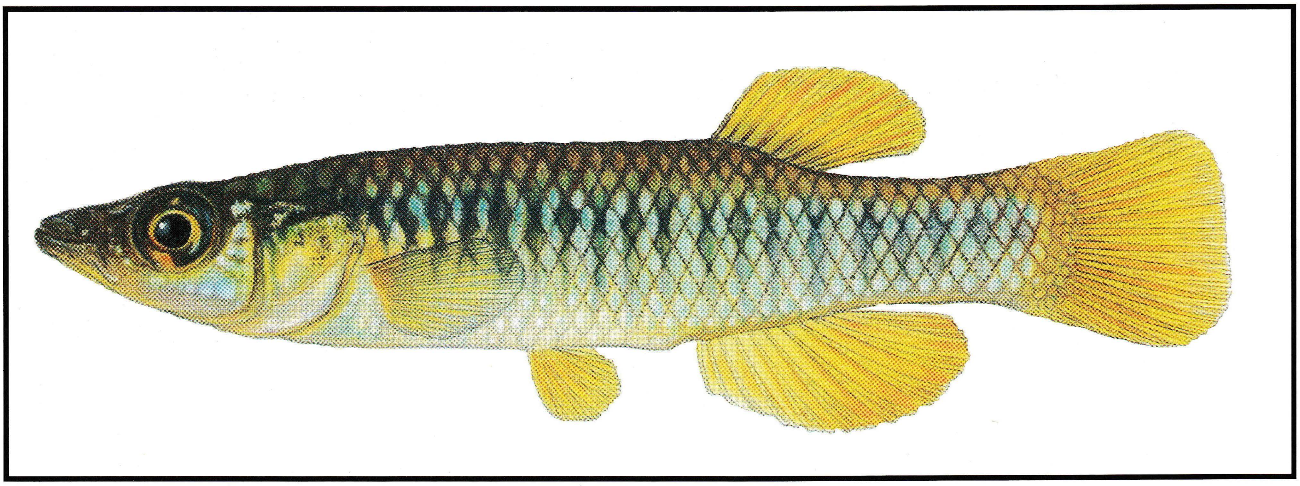

Figure 1. Saltmarsh topminnow, *Fundulus jenkinsi* (Evermann). Male, 43 mm SL (UAIC 10853.04), Dauphin Island, Mobile County, July 14, 1993. Illustration by Joseph R. Tomelleri is copyrighted.

appears to be a coastal fundulid which is most abundant within intermediate to low salinity habitats. The majority of these habitats in the northern Gulf of Mexico are either *Spartina alterniflora* or *Juncus roemerianus* (Tiner 1993). Coupling the low relative abundance and patchy distribution of *F. jenkinsi* along the northern Gulf of Mexico with increased development pressure suggests the need for the quantification of the habitat characteristics. The objective of this study was to document the distribution, catch-per-unit-effort (CPUE) and habitat characteristics of the saltmarsh topminnow, *F. jenkinsi* (Figure 1), in coastal bayous within eastern Mississippi and western Alabama and to review what is known about its habitat throughout its range.

STUDY LOCATIONS

The quantitative data for this study were collected in summers 1996 and 1999 but we also include data from Peterson (1987) and Peterson and Ross (1991) and recent unpublished data. All of these collections were made in small bayous ranging from Biloxi, Mississippi to Mobile, Alabama (Figure 2, Table 1). In Mississippi, *F. jenkinsi* were collected from a total of 57 locations in 1996 and 1999. We collected in 21 locations on 7 dates in 1996 (between 10 July and 23 September) from Halstead, Stark, Simmons, Heron, Graveline, and Mary Walker Bayous, and Grand Bayou on Deer Island. In 1999, we collected in 36 locations on 12 dates (between 26 May and 8 September) from Sioux Bayou, Snake Bayou, Coleson Bayou, Lowry Bayou, Krebs Lake, Lake Catch-em-all, McInnis Bayou, and around Rabbitt Island, Middle Bayou, Clay Bayou, Southwest Bayou, Mattie Clark Bayou, Bayou Cumbest, Bayou Heron, a bayou off of Bangs Lake, Crooked Bayou, and North Bayou. In Alabama, we collected in 20 locations on 7 dates (between 6 and 25 August) in 1999 from Bayou La Fouche, a tidal creek of Bayou La Fouche, Little River, Portersville Bay, Bayou Sullivan, Negro Bayou, Fowl River West, Fowl River East, Bayou Caddy, Grand Bayou, and Bulls Bay Bayou. These represent 420 Breder trap collection sites plus 36 seine haul sites in addition to the 258 seine collections in Peterson (1987) and Peterson and Ross (1991) and unpublished collections (n = 17 seine hauls) taken in 2001 from Simmons Bayou (on 25 January; Peterson and Slack, unpublished). The dominant emergent aquatic vegetation associated with all sites was *J. roemerianus* or *S. alterniflora*.

MATERIALS AND METHODS

We surveyed bayous of eastern Mississippi from Old Fort Bayou to bayous of western Mobile Bay with seine nets or Breder traps (Breder 1960) depending on date and system. Specific information of collection techniques for the 1985–1986 and 1996 data sets can be found in Peterson and Ross (1991) and Fulling et al. (1999), respectively. Four Breder traps per collection site were used in 1996 whereas six traps were used per site in 1999. These traps were constructed of 1/4 inch clear Plexiglas which was fused with methyl chloride. The traps had a 12 mm opening at the base of the "V" (the dimensions of the two wings of the V were 15 x 15 cm) and the box on the trap was 30 x 15 cm. These traps were set at high tide about 1.5 m apart and fished until the water passed the two wings, approaching low tide. Fishing from high to low tide was considered a CPUE.

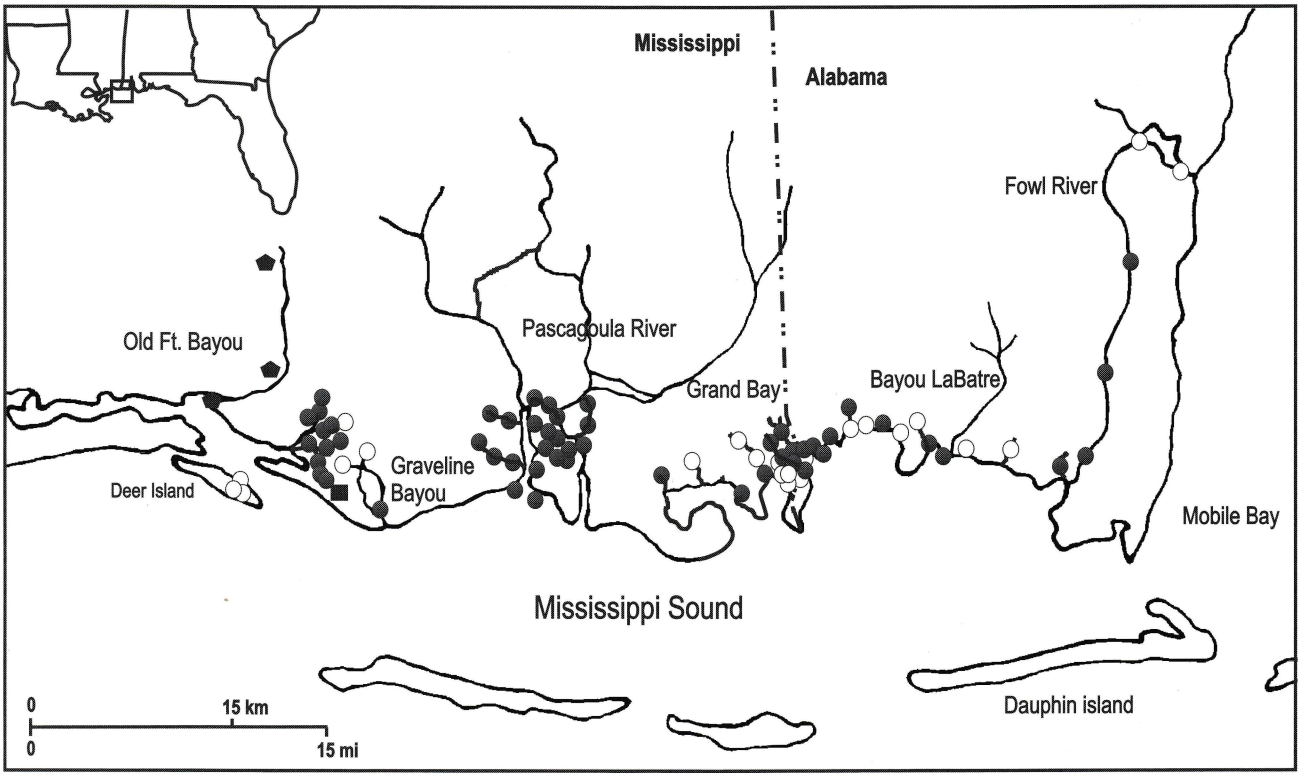

Figure 2. Map of the sampling sites in eastern Mississippi and western Alabama. Closed circle are 1996 and 1999 sites where *F. jenkinsi* was collected; open circles are 1996 and 1999 sites where *F. jenkinsi* were not collected; closed boxes are 2001 Simmons Bayou sites; and pentagons are Peterson and Ross 1991 sites.

Physical-chemical data were taken in surface waters near one trap when the traps were set and these data were used in analysis and presentation. All fish were euthanized in MS-222, fixed in 10% formalin for one week and then transferred to 70% ethanol for preservation. At each site we measured water temperature (°C), dissolved oxygen (DO; mg/l), turbidity (NTU) and salinity (‰). Salinity and water temperature were monitored with a YSI S-C-T meter (model 33), DO with a YSI oxygen meter (model 58), and turbidity with a LaMotte Digital turbidity meter. We geo-referenced each sample site with a Garmin 45 GPS system. Fish were catalogued into the Gulf Coast Research Laboratory (GCRL) Ichthyological Museum or the Mississippi Museum of Natural Science (MMNS).

Because the physical-chemical factors were measured at a set of four or six traps, we used mean CPUE in subsequent data analyses. A stepwise linear regression of mean CPUE ($x + 0.5$) as the dependent variable and all physical-chemical factors as the independent variables was calculated. All data were analyzed on SPSSW (version 10.0, SPSS Inc., Chicago, Ill.) and considered significant if $P < 0.05$.

Results

In four surveys (1985–1986, 1996, 1999, and 2001), we collected 868 *F. jenkinsi* in 311 seine hauls and 420 Breder trap collections over 40 dates in 82 locations (Figure 2). *Fundulus jenkinsi* was collected in 28 of 36 bayou systems examined in 1996 and 1999. Sites where we collected *F. jenkinsi* in our 1996 and 1999 surveys (Table 2) were similar in terms of dominant vegetation and range of environmental characteristics to those noted in 1985–1986 from Old Ft. Bayou during the appropriate season, and in 2001 collections in Simmons Bayou. Breder trap collections produced 393 *F. jenkinsi* (45.3% of total) whereas 475 (54.7% of total) were collected with bag seines (3 or 6 m in length). For the Breder trap collections only, a stepwise linear regression of $\log_{10}$ (mean CPUE + 0.5) as the dependent variable and all physical-chemical factors as the independent variables indicated that salinity, depth, and water temperature explained 39.7% (adjusted r^2) of the variance over the time of this study and this relationship was significant (ANOVA, $F_{3,59} = 13.95$, $P < 0.001$). The equation $\log_{10}$(mean CPUE + 0.5) = 1.623 − 0.0150 (salinity) + 0.77 (depth) − 0.0584 (water temperature) indicates that mean CPUE of *F. jenkinsi* was higher when

TABLE 1

Sampling localities and collection data. All 1996 collections used four Breder traps; all 1999 collections used six Breder traps. 2001 collections were made with a 3 m haul seine.

Date	Bayou	Latitude/Longitude	Museum #	# Specimens
7/10/96	Halstead Bayou	30E 23.75' N88E 47.99' W	GCRL26975	9
7/10/96	Halstead Bayou	30E 23.75' N88E 47.85' W	GCRL26982	3
7/10/96	Halstead Bayou	30E 23.70' N88E 47.68' W	GCRL26988	4
7/11/96	Stark Bayou	30E 23.91' N88E 47.51' W		0
7/11/96	Stark Bayou	30E 23.83' N88E 47.48' W	GCRL26998	6
7/11/96	Stark Bayou	30E 23.70' N88E 47.54' W	GCRL27001	5
7/29/96	Grand Bayou (Deer Island)	30E 22.28' N88E 50.28' W		0
7/29/96	Grand Bayou (Deer Island)	30E 22.29' N88E 50.14' W		0
7/29/96	Grand Bayou (Deer Island)	30E 22.39' N88E 50.13' W		0
8/09/96	Heron Bayou	30E 24.16' N88E 46.33' W	GCRL27017	1
8/09/96	Heron Bayou	30E 24.04' N88E 46.38' W	GCRL27024	2
8/09/96	Heron Bayou	30E 23.80' N88E 46.31' W	GCRL27028	13
8/26/96	Simmons Bayou	30E 23.50' N88E 45.20' W	GCRL27035	10
8/26/96	Simmons Bayou	30E 23.50' N88E 45.40' W	GCRL27043	5
8/26/96	Simmons Bayou	30E 22.78' N88E 46.05' W	GCRL27048	2
8/28/96	Graveline Bayou	30E 22.43' N88E 42.64' W		0
8/28/96	Graveline Bayou	30E 22.69' N88E 41.99' W		0
8/28/96	Graveline Bayou	30E 22.29' N88E 40.35' W	GCRL27049	4
9/23/96	Mary Walker Bayou	30E 22.78' N88E 46.05' W	GCRL27050	5
9/23/96	Mary Walker Bayou	30E 22.78' N88E 46.05' W	GCRL27051	22
9/23/96	Mary Walker Bayou	30E 22.78' N88E 46.05' W	GCRL27052	23
5/26/99	Sioux Bayou	30E 24.80' N88E 38.09' W	GCRL32341	21
5/26/99	Sioux Bayou	30E 24.45' N88E 37.07' W	GCRL32342	2
5/26/99	Pascagoula River	30E 14.74' N88E 53.06' W	GCRL32343	22
5/26/99	Pascagoula River	30E 22.56' N88E 36.31' W	GCRL32344	12
5/27/99	Pascagoula River	30E 22.21' N88E 36.50' W	GCRL32345	3
5/27/99	Pascagoula River	30E 21.65' N88E 35.94' W	GCRL32346	4
5/28/99	Lowery Bayou	30E 23.72' N88E 35.89' W	GCRL32347	26
5/28/99	Lowery Bayou	30E 23.07' N88E 35.22' W	GCRL32776	4
5/28/99	Lowery Bayou	30E 23.35' N88E 35.39' W	GCRL32348	4
7/12/99	Snake Bayou	30E 24.12' N88E 35.21' W	GCRL32349	28
7/12/99	Snake Bayou	30E 24.50' N88E 35.33' W	GCRL32350	33
7/12/99	Snake Bayou	30E 24.85' N88E 35.58' W	GCRL32351	14
7/13/99	Coleson Bayou	30E 25.58' N88E 35.31' W	GCRL32352	28
7/13/99	Coleson Bayou	30E 25.12' N88E 35.17' W	GCRL32353	5
7/13/99	Coleson Bayou	30E 25.36' N88E 34.98' W	GCRL32354	6
7/26/99	Southwest Bayou	30E 22.66' N88E 24.96' W		0
7/26/99	Southwest Bayou	30E 22.91' N88E 24.96' W	GCRL32355	1
7/26/99	Clay Bayou	30E 23.07' N88E 24.71' W		0
7/27/99	Middle Bayou	30E 23.64' N88E 24.96' W	GCRL32356	3
7/27/99	Middle Bayou	30E 23.54' N88E 24.74' W	GCRL32357	2
7/27/99	Middle Bayou	30E 23.28' N88E 24.49' W	GCRL32358	1
7/28/99	Bayou Heron	30E 24.70' N88E 24.19' W	GCRL32359	5
7/28/99	Bayou Heron	30E 23.82' N88E 24.20' W	GCRL32360	3
7/28/99	Bayou Heron	30E 23.30' N88E 23.84' W		0

TABLE 1. Continued.

Date	Bayou	Latitude/Longitude	Museum #	# Specimens
8/11/99	Bayou Cumbest	30E 23.35' N88E 26.69' W		0
8/11/99	Bayou Cumbest	30E 23.11' N88E 26.59' W		0
8/11/99	Bayou Cumbest	30E 22.43' N88E 26.64' W	GCRL32361	2
9/06/99	Bayou off Bangs Bayou	30E 21.84' N88E 26.87' W	GCRL32362	1
9/06/99	North Bayou	30E 22.28' N88E 27.39' W		0
9/06/99	Bayou off Bangs lake	30E 22.10' N88E 28.41' W	GCRL32363	4
9/07/99	Crooked Bayou	30E 22.03' N88E 25.94' W		0
9/07/99	Crooked Bayou	30E 22.42' N88E 25.41' W		0
9/07/99	Crooked Bayou	30E 22.01' N88E 24.98' W		0
9/08/99	Krebs Lake	30E 23.28' N88E 33.69' W	GCRL32364	6
9/08/99	Lake Catch-em-all	30E 23.89' N88E 33.92' W	GCRL32365	2
9/08/99	McInnis Bayou	30E 24.71' N88E 34.55' W	GCRL32366	6
8/06/99	Tidal creek off Bayou La Fourche	30E 25.56' N88E 23.67' W	GCRL32367	1
8/06/99	Tidal creek off Bayou La Fourche	30E 23.78' N88E 23.54' W	GCRL32368	2
8/06/99	Tidal creek off Bayou La Fourche	30E 23.54' N88E 23.52' W	GCRL32369	1
8/07/99	Bayou La Fourche	30E 23.90' N88E 22.27' W		0
8/07/99	Bayou La Fourche	30E 23.89' N88E 22.90' W	GCRL32370	3
8/07/99	Bayou La Fourche	30E 24.22' N88E 22.66' W	GCRL32791	2
8/20/99	Little River	30E 23.86' N88E 17.70' W		0
8/20/99	Little River	30E 23.43' N88E 17.57' W	GCRL32372	1
8/20/99	Little River	30E 23.34' N88E 17.04' W	GCRL32373	2
8/21/99	Portersville Bay	30E 22.90' N88E 15.71' W		0
8/21/99	Bayou Sullivan	30E 23.09' N88E 14.09' W		0
8/23/99	Negro Bayou	30E 23.11' N88E 14.01' W	GCRL32374	1
8/23/99	Fowl River West	30E 23.11' N88E 14.18' W	GCRL32375	2
8/23/99	Fowl River West	30E 23.11' N88E 14.10' W	GCRL32376	8
8/24/99	Fowl River East	30E 24.95' N88E 08.43' W	GCRL32377	6
8/24/99	Fowl River East	30E 26.32' N88E 08.39' W		0
8/24/99	Fowl River East	30E 26.79' N88E 07.72' W		0
8/25/99	Bayou Caddy	30E 24.29' N88E 20.33' W	GCRL32378	2
8/25/99	Grand Bayou	30E 24.01' N88E 19.73' W		0
8/25/99	Bulls Bay Bayou	30E 24.17' N88E 21.72' W		0
1/25/01	Simmons Bayou	30E 22.25' N88E 45.08' W	MMNS26826	2
1/25/01	Simmons Bayou	30E 22.35' N88E 44.58' W	MMNS26827	5
1/25/01	Simmons Bayou	30E 22.35' N88E 44.58' W	MMNS26828	1

TABLE 2

Listing of physical-chemical data by study. Top values in each cell are total range of conditions whereas the bottom values are those where fish were actually collected. na = not available. * = temperature data for these collections was influenced by an aquaculture facility discharge canal which was much warmer than ambient upstream water.

Study	Number of specimens	Salinity (‰)	Temperature (°C)	DO (mg/L)	Turbidity (NTU)	Depth (m)
1985–1986	19	0.0–4.0	10.0–32.0	1.0–9.8	1.6–10.8	0.2–0.80
	375	0.0–0.0	10.0–34.0	4.1–9.6	1.1–14.4	0.1–0.70
	49	2.4–8.5	8.0–31.5	5.1–9.5	2.0–36.0	0.3–0.75
1996	138	0.9–1.7	25.1–33.7	3.0–7.4	4.9–68.6	0.2–1.50
1999	MS:248	0.0–7.5	25.6–32.1	2.1–7.8	0.5–17.4	0.2–0.70
		2.4–7.5		2.7–7.8	3.2–17.4	
	AL:31	6.4–5.8	28.9–32.0	2.7–7.4	1.9–21.8	0.3–0.50
		12.8–5.4		2.8–5.8	4.5–21.3	
2001	8	0.2–6.0	10.2–26.2*	7.4–11.5	na	0.3–0.60
		2.4–6.0	10.2–17.3*	8.2–11.5	na	0.3–0.65

salinity and water temperature were low and depth was about 0.5 m. Higher water depth were related to sampling on high tides with bag seines. However, sampling occurred only in spring and summer in 1996 and 1999, thus water temperature only ranged from 25.1 to 33.7°C. We cannot predict the occurrence of *F. jenkinsi* at temperatures below this range. Patterns of abundance among salinity zones in collections obtained by bag seines or Breder traps were similar for zones below 12‰ but more *F. jenkinsi* were collected in Breder traps than bag seines in salinities > 12‰ (Figure 3A). Although Breder traps were set at high tide (regardless of time of day), water depth between gear types was similar (Figure 3B). The patterns of *F. jenkinsi* abundance relative to water temperature are biased between the two gear types (Figure 3C), with all Breder trap collections occurring only between late spring and late summer. Examination of all bag seine and Breder trap data, however, indicated *F. jenkinsi* were mainly collected when salinities were ≤ 12‰ (90.7% of total collected), depth were near 0.5 m, and water temperatures ranged between 20.0 and 32.0°C. Salt marsh collection sites which appeared appropriate in terms of dominant vegetation, depth and water temperature but that did not produce *F. jenkinsi,* had a mean salinity of 17.0‰ (2.5–26.4‰).

A combined total of 40 species were collected in the 1996 and 1999 collections. In the 1996 collections (Breder traps and bag seines), *F. jenkinsi* was second in abundance behind *Fundulus grandis* whereas in the 1999 collections (Breder traps only), it was third behind *F. grandis* and *Poecilia latipinna.*

DISCUSSION

Fundulus jenkinsi is generally considered rare and has a "special" status in many states in the northern Gulf of Mexico. The Mississippi Museum of Natural History, Wildlife Heritage Program considers this species important by placing it on their list of Priority Research Species. Gilbert and Relyea (1992) also state that this species is restricted to the extreme western Florida panhandle and is considered "threatened" in that area. Our results not only indicate that *F. jenkinsi* is more abundant than previously suggested in the central part of its range but that salinity is an important environmental factor influencing its CPUE and distribution. Habitats with salinities < 12‰ produced more *F. jenkinsi* in our region; indeed, salt marsh sites which appeared to be appropriate but did not produce *F. jenkinsi* had a mean salinity of 17.0‰ (0–27.5‰; 52.2% of those sites were ≤ 12‰). In fact, the majority of published studies support our salinity results.

In addition to being the center of its distribution range, the north-central Gulf of Mexico has produced the majority of recorded specimens (Gilbert and Relyea 1992) compared to those recorded to the west and east of our region. For example, in Texas Simpson and Gunter (1956) reported that 2 *F. jenkinsi* were collected between 1–9.9‰, 10 between 10.0–19.9‰, and 12

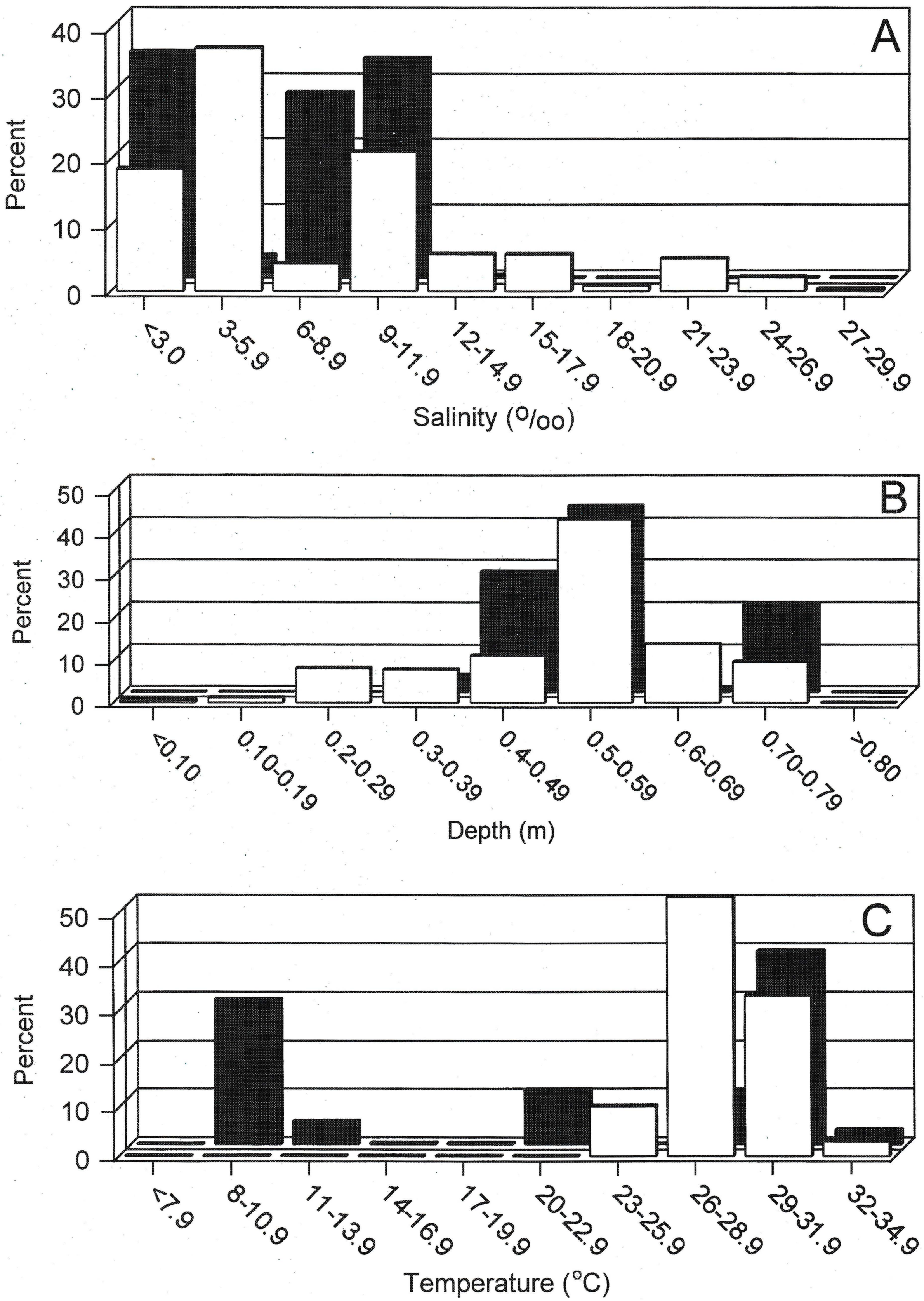

Figure 3. Plot of percent of the total number (n = 868) of *F. jenkinsi* in Breder traps (white histograms) and seines (black histograms) collected versus salinity (A), water depth (B), and water temperature (C) at the site.

between 20.0–29.9‰. In west-central Louisiana, Neill and Turner (1987) noted 7 specimens in Boston Bayou South of the Vermilion Bay system where salinity was 8‰. In a series of papers from the Terrebonne-Timbalier estuarine system, Rozas (1992a, 1992b) and Rozas and Reed (1993) documented this species in oligo- to mesohaline *Spartina* salt marshes in small numbers using lift nets or small trawls. In contrast, Peterson and Turner (1994) in the same marsh system indicated that using flume nets *F. jenkinsi* was the ninth most abundant species (n = 102) and was a marsh resident. In Mississippi, this species has been infrequently collected and when collections are made this species is typically not very abundant compared to other fundulids. Caldwell (1966) collected *F. jenkinsi* in an artesian well pool from an abandoned fish hatchery near Bay St. Louis and Cook (1959) noted that this species has been collected in Simmons Bayou off Biloxi Bay. Indeed, our collections in 1996 and 2001 confirmed the presence of this species in Simmons Bayou. Peterson (1987) and Peterson and Ross (1991) reported 443 *F. jenkinsi* were collected with a 6.1 m bag seine over 13 months in 1985–1986 from tidal freshwater to mesohaline sections of Old Fort Bayou, Mississippi. Recently, Suttkus et al. (1999) reported collecting 393 specimens between October 1950 and 1985 from 8 sites in St Louis Bay, Mississippi. Other Mississippi collections in a number of coastal drainages did not produce *F. jenkinsi* (Fowler 1945; Beckham 1977), however. In coastal Alabama, Swingle and Bland (1974) recorded 2 specimens from freshwater and 175 specimens taken between 2–25‰. Boschung (1992) lists this species from a number of coastal Alabama bayous. Bailey et al. (1954) collected 80 individuals from near the confluence of the Escambia River and Escambia Bay where surface salinity was 4.5‰. Thus, based on published data and the results of this study, it is clear this fundulid prefers oligohaline to mesohaline salinities (*sensu* Cowardin et al. 1979) associated with *Spartina* or *Juncus* salt marshes in the north-central Gulf of Mexico and is less abundant both east and west of this geographic location.

The ability to assess distribution and CPUE of rare species that are linked to tidal dynamics requires sampling with appropriate gear. For example, our earlier work on use of different sampling gears to collect this species (Fulling et al. 1999) illustrated that using a 3 m bag seine, *F. jenkinsi* was not collected very often during high and low tide seining efforts compared to collection at the same sites with Breder traps in our geographic region. Additionally, we documented the first records of *F. jenkinsi* (n = 50) in the Pascagoula River from one of its tributaries, Mary Walker Bayou, in 1996 using Breder traps (Fulling et al. 1999), a result which we speculate may not have occurred if we had used only bag seines. Finally, our data suggest that this species is more widely distributed and abundant along the Mississippi and Alabama coasts than previously suggested (Smith-Vaniz 1968, Ross and Brenneman 1991, Boschung 1992). Indeed, Mettee et al. (1996) does not list *F. jenkinsi* in their book detailing fishes of Alabama and the Mobile Basin. We feel the use of sampling gear designed to collect resident marsh fishes is imperative as noted in Fulling et al. (1999). Additionally, variation in annual rainfall and the subsequent extent and patchiness of low salinity salt marsh area from year to year may influence year class strength of this fundulid. These may explain why this species appears rare or absent in most fish studies of the northern Gulf of Mexico (Caldwell 1966, Hastings 1987, Hastings et al. 1987, Cashner et al. 1994).

Given the direct connection between coastal wetlands and fisheries species, and that coastal populations have increased by 40 million people since 1960 (Waste 1996), the Federal register (14 July 1997, Vol. 62(134)) placed *F. jenkinsi* on the list of Candidate Species. The recent, but extensive, development in coastal Mississippi of the dock-side gaming industry has added further concern about the status of *F. jenkinsi* in these north-central coastal wetlands because they have produced the majority of recorded specimens (Gilbert and Relyea 1992). Meyer-Arendt et al. (1998) indicated that over 13% (8,500 acres) of the saltmarsh in coastal Mississippi had been lost between the 1950's and 1992, with 40% of that acreage being converted directly from marsh to developed land. Because of its distribution in naturally variable and highly desired low-salinity bayou habitat, this small fundulid will continue to be impacted due to development.

ACKNOWLEDGMENTS

This project was conducted through funds from The Mississippi Wildlife Heritage Fund (C. Knight and T. Slack), the US Fish and Wildlife Service Section 6 Program (T. Slack), and The Nature Conservancy (D. Ruple). We are grateful to E. Pederson, G. Zapfe, R. Syring, T. Slack, and C. Vervaeke for field assistance, M. Cashner for taxonomic expertise, and N.J. Brown-Peterson for editorial comments.

LITERATURE CITED

Bailey, R.M., H.E. Winn, and C.L. Smith. 1954. Fishes from the Escambia River, Alabama and Florida, with ecologic and taxonomic notes. Proceedings of the Academy of Natural Sciences of Philadelphia 106:109–164.

Beckham, E.C. III. 1977. A report on the Escatawpa River system in Alabama and Mississippi. Southeastern Fishes Council, Proceedings 2:1–4.

Boschung, H.T. 1992. Catalogue of freshwater and marine fishes of Alabama. Bulletin of the Alabama Museum of Natural History 14:1–266.

Breder, C.M. Jr. 1960. Design of a fry trap. Zoologica 45:155–160.

Caldwell, R.D. 1966. Fishes from the freshwater streams of the Biloxi Bay and St. Louis Bay drainage systems of Mississippi. Journal of the Mississippi Academy of Science 12:213–231.

Cashner, R.C., F.P. Gelwick, and W.J. Matthews. 1994. Spatial and temporal variation in the distribution of fishes of the Labranche wetlands area of the Lake Pontchartrain estuary, Louisiana. Northeast Gulf Science 13:107–120.

Cook, F. A. 1959. Freshwater Fishes in Mississippi. Mississippi Game and Fish Commission, Jackson, MS, USA, 239 p.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. US Fish and Wildlife Service. FWS/OBS-79/31. 131 p.

Fowler, H.W. 1945. A study of the fishes of the southern piedmont and coastal plain. Academy of Natural Science Philadelphia, Monograph 7. Philadelphia, PA, USA.

Fulling, G.L., M.S. Peterson, and G.J. Crego. 1999. Comparison of Breder traps and seines used to sample marsh nekton. Estuaries 22(2A):224–230.

Gilbert, C.R. and K. Relyea. 1992. Saltmarsh topminnow, *Fundulus jenkinsi*. Pages 68–72. In: C.R. Gilbert, ed. Rare and endangered biota of Florida, Volume II. Fishes. University Press of Florida, Gainsville, FL, USA.

Griffith, R.W. 1974. Environment and salinity tolerance in the genus *Fundulus*. Copeia 1974:319–331.

Hastings, R.C. 1987. Fishes of the Manchac Wildlife Management area, Louisiana. Proceedings of the Louisiana Academy of Sciences 50:21–26.

Hastings, R.C., D.A. Turner, and R.G. Thomas. 1987. The fish fauna of Lake Pontchartrain estuary. Northeast Gulf Science 9:89–98.

Neill, C. and R.E. Turner. 1987. Comparisons of fish communities in open and plugged backfilled canals in Louisiana coastal marshes. North American Journal of Fisheries Management 7:57–62.

Mettee, M.F., P.E. O'Neal, and J.M. Pierson. 1996. Fishes of Alabama and the Mobile Basin. Oxmoor House, Birmingham, AL, USA, 820 p.

Meyer-Arendt, S.M. Oivanki, and B. Yassin. 1998. Wetland changes in coastal Mississippi, 1950s to 1992. In: Klein, L.A., M. Landry, and J.E. Seward, eds. Marine Resources and History of the Mississippi Gulf Coast, Volume II, Mississippi Department of Marine Resources, Biloxi, MS, USA, p. 377–401.

Peterson, G.W. and R.G. Turner. 1994. The value of salt marsh edge vs interior as a habitat for fish and decapod crustaceans in a Louisiana tidal marsh. Estuaries 17:235–262.

Peterson, M.S. 1987. Ecological and physiological factors affecting the assembly of littoral fish communities along an environmental gradient. Ph.D. Dissertation, The University of Southern Mississippi, Hattiesburg, MS, USA, 121 p.

Peterson, M.S. and S.T. Ross. 1991. Dynamics of littoral fishes and decapods along a coastal river-estuarine gradient. Estuarine, Coastal and Shelf Science 33:467–483.

Ross, S.T. and W.M. Brenneman. 1991. Distribution of freshwater fishes in Mississippi. D-J project F-69 Completion Report, Mississippi Department of Wildlife, Fisheries and Parks, Jackson, MS, USA, 548 p.

Rozas, L.P. 1992a. Bottomless lift net for quantitatively sampling nekton on intertidal marshes. Marine Ecology Progress Series 89:287–292.

Rozas, L.P. 1992b. Comparison of nekton habitats associated with pipeline canals and natural channels in Louisiana salt marshes. Wetlands 12:136–146.

Rozas, L.P. and D.J. Reed. 1993. Nekton use of marsh-surface habitats in Louisiana (USA) deltaic salt marshes undergoing submergence. Marine Ecology Progress Series 96:147–157.

Simpson, D.G. and G. Gunter. 1956. Notes on habitats, systematic characters and life histories of Texas salt water cyprinodontes. Tulane Studies in Zoology 4:115–134.

Smith-Vaniz, W.F. 1968. Freshwater Fishes of Alabama. Paragon Press, Montgomery, AL, USA, 211 p.

Suttkus, R.D., D.A. White, and M.F. Mettee. 1999. Atlas of fishes of the St. Louis Bay drainage in southern Mississippi. Gulf Research Reports 11 (Supplement 1):S1–S92.

Swingle, H.A. and D.G. Bland. 1974. A study of the fishes of the coastal watercourses of Alabama. Alabama Marine Resources Bulletin 10:17–104.

Thompson, B.A. 1980. *Fundulus jenkinsi* (Evermann), Saltmarsh topminnow. Page 518 In: D.S. Lee, et al. Atlas of North American Freshwater Fishes. North Carolina State Museum of Natural History, Raleigh, NC, USA, 854 p.

Tiner, R.W. 1993. Field Guide to Coastal Wetland Plants of the Southeastern United States. The University of Massachuetts Press, Amherst, MA, USA, 328 p.

Waste, S.M. 1996. The NMFS Office of Habitat Conservation: Protecting the habitats of living marine resources. Fisheries 21:24–29.