

GENERAL NOTES

ESTABLISHMENT OF THE BLUEFIN KILLIFISH (*LUCANIA GOODEI*) IN URBAN STREAMS OF TEXAS**George J. Guillen and Stephen G. Curtis***Environmental Institute of Houston, University of Houston-Clear Lake
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Bluefin killifish (*Lucania goodei*) are a small fundulid native to Florida, southern Georgia, and southeast Alabama with introduced stable populations in North and South Carolina, California, and Texas (Lindquist et al. 1977; Gilbert & Burgess 1980; Mettee et al. 1996; Huang et al. 2003; Gallaway et al. 2008; Page & Burr 2011). Prior collections of *L. goodei* have all occurred in densely vegetated areas which the species utilizes for reproductive habitat and diet requirements, feeding primarily on small macroinvertebrates, crustaceans, epiphytes, and vascular plants (Gilbert & Burgess 1980; Streever & Crisman 1993; Mettee et al. 1996). The reported spawning and rearing requirements of this species is easily duplicated in captivity, and as a result, it is popular with aquarium hobbyists interested in the breeding and propagation of local native species (Goldstein et al. 2000). This popularity increases the probability of introductions of this species outside its native range.

Previous records of *L. goodei* in Texas are limited to Victoria County in the lower Guadalupe River basin (Gallaway et al. 2008). According to authors, introductions likely occurred during the creation of an artificial wetland in which aquatic vegetation was obtained from a Florida nursery and used during construction. A small reproducing population of *L. goodei* has established in the wetland and has dispersed into portions of the lower Guadalupe River (Gallaway et al. 2008).

This note reports and provides data on the first known occurrence of *L. goodei* within an urban watershed in southeast

Texas and the second documented population of this species in Texas. *Lucania goodei* were first discovered in Mason Creek, Harris County ($n=557$) while conducting a baseline assessment of aquatic communities in urban streams of the greater Houston area in May of 2010 (Table 1). Additional individuals were collected the following summer 2011 ($n=5$) at the same location. Voucher specimens have been confirmed and are being held at the Texas Natural History Collection at the University of Texas at Austin (TNHC 57580).

In order to assess the current distribution of *L. goodei* in the upper Buffalo Bayou watershed, eleven sites were selected above tidal influence and sampled in fall 2013 and spring 2014 (Fig. 1). Sites were spatially distributed throughout the watershed to represent available habitat within the basin. Sites one through four were located on main stem Buffalo Bayou; sites five and six on an unnamed tributary upstream of the Barker Reservoir dam; sites seven and eight on Mason Creek; sites nine and ten on an unnamed tributary downstream of the Barker Reservoir dam; and site eleven on Turkey Creek. Site seven was previously sampled in 2010 and 2011.

Sites were sampled using a 4.6-m by 1.2-m seine with 6.4-mm square mesh. A minimum of three seine hauls of 10 meters each were conducted at each site, specifically targeting habitat types most suitable to *L. goodei* based on known life history preferences (i.e., heavily vegetated areas with minimal current velocity). All sites were wadeable and consisted of shallow to moderate depths (range: 0.20–1.0 m). Main stem sites on Buffalo Bayou consisted of slow to swift current velocities (range: 0.00–0.98 m/s) with little to no aquatic vegetation and primarily sand and concrete rip rap substrate. All tributary sites, except site 11, consisted of slow current velocities (0.00–0.14 m/s) with thick stands of alligatorweed (*Alternanthera philoxeroides*), hydrilla (*Hydrilla verticillata*), parrot feather (*Myriophyllum aquaticum*) and/or cattail (*Typha* spp.) and mixed substrate types. Site 11 consisted of slow

Table 1. Location of sample sites and number of *Lucania goodei* individuals collected per sampling event in the Buffalo Bayou watershed, Harris County, Texas (site seven was the only site sampled in 2010 and 2011).

	Latitude	Longitude	2010	2011	2013	2014	Total
Main stem							
Site 1	29.722799°	-95.746254°	–	–	0	–	0
Site 2	29.736024°	-95.705032°	–	–	0	–	0
Site 3	29.773760°	-95.627540°	–	–	0	–	0
Site 4	29.760800°	-95.428420°	–	–	–	3	3
Tributary							
Site 5	29.741974°	-95.730388°	–	–	10	–	10
Site 6	29.736202°	-95.705366°	–	–	0	–	0
Site 7	29.794092°	-95.785119°	557	5	9	–	571
Site 8	29.759291°	-95.717527°	–	–	5	–	5
Site 9	29.710061°	-95.688372°	–	–	3	–	3
Site 10	29.755920°	-95.645766°	–	–	15	–	15
Site 11	29.777697°	-95.617726°	–	–	0	–	0
Total			557	5	42	3	607

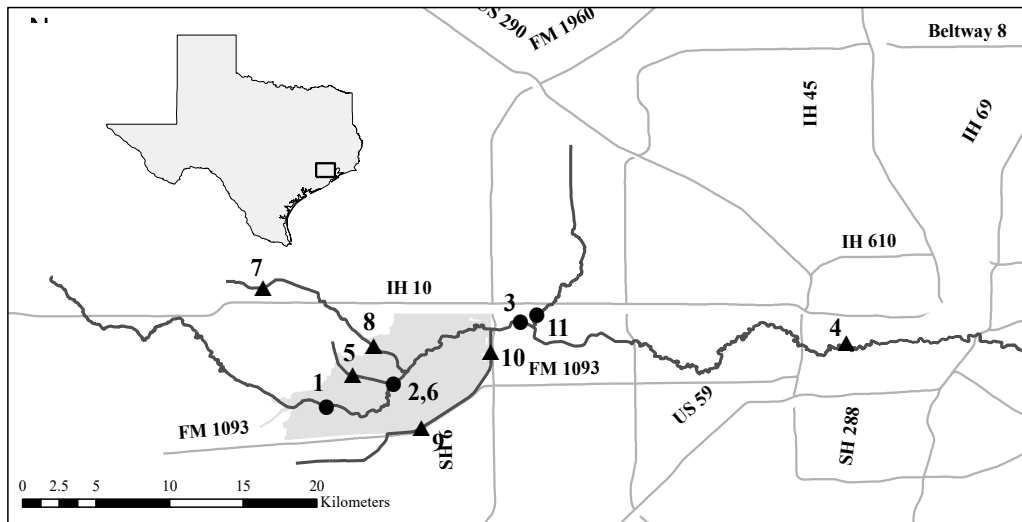


Figure 1. Sample sites in the upper Buffalo Bayou watershed above tidal influence in Harris County, Texas. (Triangle indicates presence and circle absence of *Lucania goodei* at the site during at least one sampling event; shaded area is Barker Reservoir).

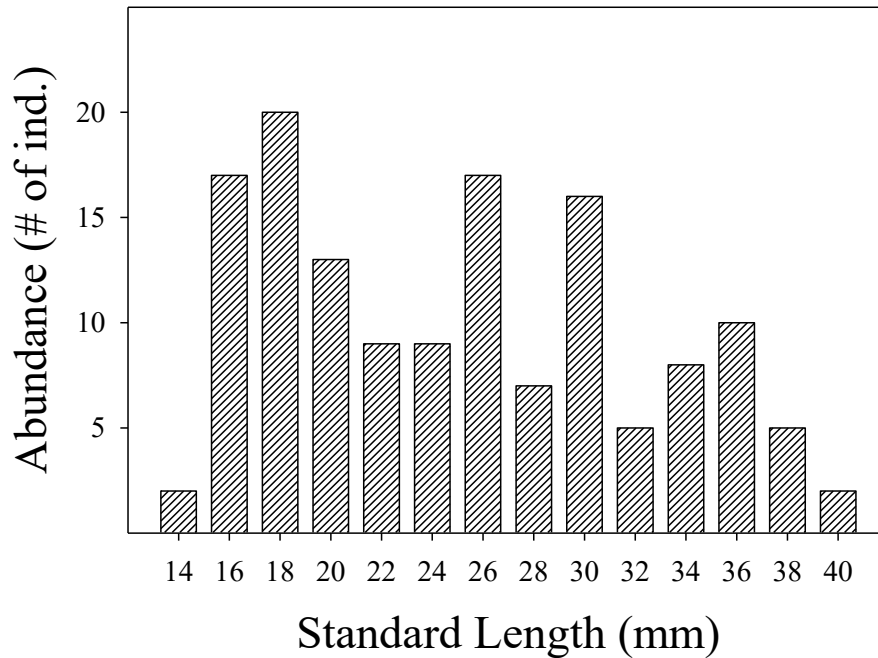


Figure 2. Length frequency of *Lucania goodei* collected in 2010 and 2011 in Mason Creek, Harris County, Texas.

current velocities (mean: 0.03 m/s) with no aquatic vegetation and sand and silt substrate.

A total of 42 *L. goodei* were collected in 2013 at five sites (sites: five, seven, eight, nine and ten), located in tributaries of Buffalo Bayou (Table 1). In addition, three individuals were collected in 2014 at site 11 on the main stem of Buffalo Bayou upstream of downtown Houston at the confluence with a small tributary. Standard lengths (mm) were recorded for 140 randomly selected *L. goodei* collected in 2010 and 2011 (Fig. 2). Sizes ranged from 12.2 – 39.2 mm with a mean of 24.2 mm. The collection of *L. goodei* during three consecutive years at the same site possessing a fairly bimodal size distribution suggests that the species has likely established itself in the upper Buffalo Bayou watershed.

Introduction of exotic fish species tends to occur through aquaria releases, aquaculture, bait bucket releases and stocking via state and

federal agencies (Howells 2001). *Lucania goodei* are common in the aquaria trade (Sterba 1966; Axelrod & Schultz 1971; Goldstein et al. 2000) and have been speculated as aquaria introductions in other parts of the country (Huang et al. 2003). In contrast to the Guadalupe population, it is highly probable that *L. goodei* were introduced to Buffalo Bayou as a result of aquaria release. The following non-native species have also been reported in the Buffalo Bayou watershed, Harris County and are likely aquaria introductions as well: Redbellied Pacu (*Piaractus brachypomus*), Suckermouth Catfish (*Hypostomus* spp.), Parana Sailfin Catfish (*Pterygoplichthys anisitsi*), Vermiculated Sailfin Catfish (*Pterygoplichthys disjunctivus*), black Sailfin Molly (*Poecilia latipinna*), Goldfish (*Carassius auratus*), and Rio Grande Cichlid (*Herichthys cyanoguttatus*) (Luedke 1994; Moring et al. 1998; Howells 2001; Robinson & Culbertson 2005). Persistence of non-natives will likely result in loss of taxa richness and diversity due to over-utilization of urban stream systems.

A reproducing population of *L. goodei* has been established in the upper Buffalo Bayou watershed utilizing thick vegetated habitat found primarily in the tributaries. Based on the low numbers of *L. goodei* caught in main stem Buffalo Bayou, it is likely that this species prefers smaller streams which contain higher amounts of instream vegetation and are generally less variable with lower stream velocities. Continued monitoring of urban streams in the greater Houston area will provide additional data on the extent of this range expansion of *L. goodei* and other non-native taxa.

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