Lake Eustis Pupfish

Cyprinodon variegatus hubbsi

Photograph by D.G. Bass, FWC.

Species Overview

Status: Removed from Florida's Endangered and Threatened Species List.

Current Protections

- 68A-1.004, F.A.C., Take – The term take shall include taking, attempting to take, pursuing, hunting, molesting, capturing, or killing any wildlife or freshwater fish, or their nests or eggs by any means whether or not such actions result in obtaining possession of such wildlife or freshwater fish or their nests or eggs.
- 68A-4.001, F.A.C., General Prohibitions and Requirement – Prohibits the take, transport, sale, and possession of wildlife.

Biological Background

This section describes the biological background for this species and provides context for the following sections. It focuses on the habitats that support the Lake Eustis pupfish and threats faced by the species.

The Lake Eustis pupfish (*Cyprinodon variegatus hubbsi*) is a small fish ranging from 16 to 56 mm (0.5 to 2.2 in) in length. They are classified as a subspecies of the common sheepshead minnow (*Cyprinodon variegatus*). These stout, deep-bodied fish range in body color from beige to olive, have irregular dark stripes and clear dorsal and caudal fins. In breeding males, the dorsal surface is iridescent blue (FNAI 2012). To date, life history and specific habitat requirements are poorly understood for the Lake Eustis pupfish. However, fish in this genus are notably hardy and known to adapt to environmental change. Salinity tolerance testing on this species has shown that Lake Eustis pupfish endure salinities ranging from nearly pure to hypersaline (Jordan et al. 1993). With proper acclimation, sheepshead minnows can survive in temperatures ranging from 0.6 C° (33 F°) to 44.2 C° (111.0 F°) (Bennet and Beitinger 1997).

While the common sheepshead minnow has a large range and occupies estuarine waters from Massachusetts to northern Mexico and several Caribbean islands (Haney et al. 2007), the Lake Eustis pupfish has a very limited distribution. The species is endemic to eight central Florida lakes in the Ocklawaha River drainage; specifically, Lakes Beauclair, Carlton, Dora, Harris, Eustis, Griffin, Yale, and Weir (Bass et al. 2004, Benton 2015).

Lake Eustis pupfish are typically found in shallow areas with a gentle slope over sand or firm-substrate with little to no vegetation and heavy wave action (Gilbert et al. 1992, Bass et al. 2004, Benton 2015). This species has occasionally appeared in deepwater bottom trawls from occupied lakes during FWC fall trawl surveys, and likely inhabits larger areas of the lakes where they have not been readily accessible to standard sampling techniques (Hellman 1953; C. Steward, FWC, personal communication).

Threats

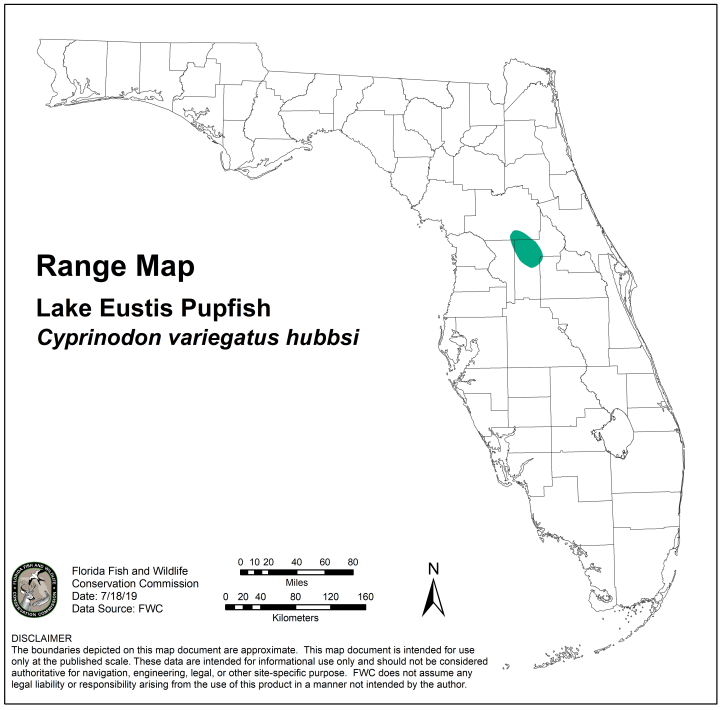
A Biological Status Review (BSR) completed in 2011 found that the Lake Eustis pupfish did not meet any of the criteria for state listing in Florida (FWC 2011). The population of Lake Eustis pupfish appears to be stable, with no documented fluctuations or declines in population size (FWC 2011). However, the small geographic range and narrow habitat niche this species inhabits make it vulnerable to anthropogenic impacts associated with this heavily populated Florida region. A Species Action Plan for the Lake Eustis Pupfish notes that primary threats to this endemic fish include habitat loss and degradation resulting from contamination of

surface waters, shoreline alteration and aquatic plant overgrowth, and the introduction of non-native predatory fish (FWC 2013).

In lakes occupied by Lake Eustis pupfish, shoreline alteration and loss of clean, sandy shorelines as a result of changes in land use practices could severely reduce available habitat. Increased stormwater runoff can carry detritus, contaminants, nutrients, and silt, which can smother or alter the sand bottoms preferred by this fish. Increased nutrients could also lead to overgrowth of native and non-native aquatic plants and reduce or eliminate suitable habitat. Shoreline alterations such as seawall construction, boat dock/marina construction, and dredge and fill operations can directly displace pupfish habitat and can modify preferred sandy bottom substrates with increased detritus accumulation.

Distribution and Survey Methodology

The range map represents the principle geographic range of the Lake Eustis pupfish, including intervening areas of unoccupied habitat. This map is for informational purposes only and not for regulatory use.



Counties: Lake, Orange, and Marion.

Recommended Survey Methodology

Surveys for determining the presence of Lake Eustis pupfish are recommended as this species is readily sampled using a seine in clear, unvegetated sandy habitats, and electrofishing in more vegetated habitats (generally with less than 35% vegetative cover). Electrofishing should only be conducted in clear waters where the bottom is visible, as this species does not rise to the top upon shocking and must be scooped from the lower water column or bottom when exposed to the electric current (Benton 2015). Electrofishing and seining surveys can be conducted during project planning by applicants that have a scientific collecting permit (see Permits for Justifiable Purposes). Visual surveys are not recommended but would not require a permit.

Recommended Conservation Practices

Recommended Conservation Practices are general measures that could benefit the species but are not required. No FWC permit is required to conduct these activities.

- Avoid activities that would degrade or alter clean, sandy, gently sloping shorelines in lakes occupied by the Lake Eustis pupfish.
- Provide adequate buffers (75 to 100 m) between septic systems and riparian habitat.
- Locate, design and operate stormwater management systems to provide the maximum treatment for any potential input into riparian habitat in the Ocklawaha River drainage.

Prohibitions and Permitting

Lake Eustis pupfish are protected by the general prohibitions outlined in Rule 68A-4.001, F.A.C.: no wildlife or freshwater fish or their nests, eggs, young, homes, or dens shall be taken, transported, stored, served,

bought, sold, or possessed in any manner or quantity at any time except as specifically permitted by these rules nor shall anyone take, poison, store, buy, sell, possess, or wantonly or willfully waste the same except as specifically permitted by these rules. Take is defined in Rule 68A-1.004, F.A.C., as pursuing, hunting, molesting, capturing, or killing (or attempting to do those things). A permit is required for any other activity that involves the possession, capture, sell, purchase, transport, hunting, or killing of Lake Eustis pupfish. These permits are issued for justifiable purposes as outlined in Rule 68A-9.002, F.A.C. Justifiable purposes are scientific, educational, exhibition, propagation, management, or other justifiable purposes. Collection (taking) of nongame fish is controlled by rules of Chapter 68A-23, F.A.C., which specify devices and methods that may be used to take nongame fish by persons that possess a valid freshwater fishing license. There is no documented importance of Lake Eustis pupfish to recreational anglers, although they may be taken as incidental catch during bait-collection activities. Rule 68A-23.003, F.A.C., governs persons fishing under a commercial fishing license. Currently, there are no known commercial fishing operations that take significant numbers of Lake Eustis pupfish. There are no known recreational or commercial uses of the Lake Eustis pupfish at this time.

No Permit Needed

The following activities could cause take, but are authorized in rule to be conducted without a permit:

- Silvicultural activities that follow the Silvicultural BMPs for special management zones (SMZ). (Florida Department of Agriculture and Consumer Services 2008, Florida Department of Environmental Protection [DEP] 2011).
- Bridge/culvert work that follows road construction best management practices.
- Agriculture, as defined in Section 570.02, F.S., conducted in accordance with Chapter 5I-8, F.A.C., and the wildlife best management practices (BMPs) adopted in Rule 5I-8.001 and 5M-18.001, F.A.C., by the Department of Agriculture and Consumer Service pursuant to Section 570.94, F.S., is authorized and does not require a permit authorizing take despite any other provision of rule 68A-27.005 or 68A-9.002, F.A.C.
- Unintentionally catching a Lake Eustis pupfish and immediately releasing it back into the wild.

Permits for Justifiable Purposes – Scientific Collecting and Educational Use

- Any survey methodology that requires handling, capturing, trapping, or taking a Lake Eustis pupfish requires a justifiable purposes permit. These permits are issued under the authority of Rule 68A-9.002, F.A.C.
- Individuals and institutions who desire to take or possess freshwater fish or their eggs for scientific, educational, propagation, exhibition, or other justifiable purposes require a scientific collector's permit. Permits are issued based on the applicant's county and not on the collection locality. Applications are available online at http://myfwc.com/license/freshwater/special-activities/.
- The Florida Fish and Wildlife Conservation Commission's Division of Freshwater Fisheries Management issues special use permits for situations requiring exemptions from the Commission's rules not already covered by existing regulations. You can contact a Regional Fisheries Administrator for more information.

Other Permits

For any other justifiable purpose permit that does not fall under scientific collecting or educational use, please submit your request to WildlifePermits@myfwc.com.

Additional Information

Information on Economic Assessment of this guideline can be found at:
http://myfwc.com/wildlifehabitats/imperiled/management-plans/

Contact

For more species-specific information or related permitting questions, contact FWC at (850) 921-5990 or WildlifePermits@myfwc.com. For more regional information visit https://myfwc.com/contact/fwc-staff/regional-offices.

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