PETITION TO LIST THE SALTMARSH TOPMINNOW *(Fundulus jenkinsi)* UNDER THE U.S. ENDANGERED SPECIES ACT

Photo: © Gretchen L. Grammer

Photo: NOAA, National Marine Fisheries Service

Petition Submitted to the U.S. Secretary of Commerce, Acting Through the National Oceanic and Atmospheric Administration Fisheries Service & the U.S. Secretary of Interior, Acting through the U.S. Fish and Wildlife Service

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WILDEARTH GUARDIANS
A FORCE FOR NATURE

I. INTRODUCTION

WildEarth Guardians and Sarah Felsen hereby petition the Secretary of Commerce, acting through the National Marine Fisheries Service ("NMFS") within the National Oceanic and Atmospheric Administration ("NOAA"), and the Secretary of the Interior, acting through the U.S. Fish and Wildlife Service ("FWS"), to list and thereby protect under the Endangered Species Act ("ESA"),[1] the Saltmarsh Topminnow, *Fundulus jenkinsi* (Evermann, 1892) (hereinafter "Saltmarsh Topminnow" or "Topminnow").[2] Concurrent with its listing, Petitioner seeks the designation of critical habitat for this species throughout its range.

The Saltmarsh Topminnow occurs sporadically in fragile marsh habitat along the U.S. coast of the Gulf of Mexico, from Galveston, Texas to Escambia Bay, Florida (Peterson et al. 2003). Specialists in marine science have long considered this fish to be extremely rare. It either occurs in very small populations or is simply absent from the reports of most fish studies of the northern Gulf of Mexico. *Id.* The Topminnow's imperilment is directly linked to the destruction of its habitat, the saltmarsh. Recent scientific research confirms that there is a direct link between *Fundulus jenkinsi* abundance and coastal saltmarsh habitat embedded within a reduced range of estuarine salinity (Lopez et al. 2010). "Subtle habitat differences such as vegetation density and complexity, water depth, and bank slope may affect…local abundance of *F. jenkinsi* in selected marsh areas." *Id.* The dendritic nature of the saltmarsh habitat is vital to the Saltmarsh topminnow; the small dendritic creeks off of main channels in saltmarshes are "important vectors for marsh access by *F. jenkinsi.*" *Id.*

Coastal development, levee and canal construction, pollution, and other threats cumulatively imperil saltmarsh habitat and, consequently, this fish. In addition to the inadequate legal protections, the curtailment of its historic habitat range, and the threats to its current habitat, other natural factors make the Saltmarsh topminnow especially vulnerable to extinction (NatureServe 2009). This biological vulnerability should be factored into an ESA status review, both singly and in combination with the other threats to the Topminnow's existence.

Moreover, the 2010 collapse of British Petroleum's Deepwater Horizon oil well could very well sound the death knell for this vulnerable species. The oil slick from Deepwater Horizon will likely spread to a significant portion of this fish's range; the fish's habitat is vulnerable to contamination by the oil slick; and the fish itself is vulnerable to changes in its aquatic habitat. On the basis of the threat posed to the Topminnow by the collapse and spewage from Deepwater Horizon, Petitioners request emergency listing of this species.

The current legal protections for this species are not sufficient to protect it from extinction. In the states where it occurs, it has a status of special concern or an analogous designation. NMFS has previously considered it a candidate for ESA listing and now ranks it a species of concern. These designations fail

[1] 16 U.S.C. §§ 1531-1544.

[2] The ESA indicates that either the Secretary of Commerce or the Secretary of the Interior (or both) receives petitions for placement on the Endangered Species list. 16 U.S.C. § 1533(15). NOAA, including NMFS has jurisdiction over ESA listing of marine species and anadromous fish, while FWS has jurisdiction over freshwater fish. Although some scientists discuss the occurrence of the Saltmarsh Topminnow in freshwater (*see* Exhibit 16 at 70), its habitat is saltmarsh, which occurs in salt water. In light of these facts, Petitioners believe that petitioning both agencies is appropriate.

to provide sufficient safeguards from degradation of the Topminnow's coastal marsh habitat, whether from development, human population growth, or devastation from the massive Deepwater Horizon oil slick. Biological parameters exacerbate the effects of these anthropogenic threats.

Congress enacted the ESA precisely to protect wildlife such as the Saltmarsh Topminnow. A safety net for declining wildlife, fish, and plants, the Act works to halt declines of species facing extinction, coordinate and strengthen the effectiveness of existing conservation actions, and achieve the recovery of the species. The best available science shows that without protection under the ESA, the Topminnow will continue to decline toward extinction as a multiple listing factors. Federal protection through the ESA will give this fish its best chance of survival.

II. ENDANGERED SPECIES ACT AND ITS IMPLEMENTING REGULATIONS

In light of the Saltmarsh Topminnow's imperilment, Petitioners request listing of this species under the ESA as either threatened or endangered, throughout its historic and current range. Taxa eligible for ESA listing include "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature" (16 U.S.C. § 1532(16)).[3] Both the statute (16 U.S.C. § 1532) and regulations implementing the Endangered Species Act (50 C.F.R. § 424) are applicable to this petition. Subsections that concern the formal listing of the Saltmarsh Topminnow as an Endangered or Threatened species are:

> "*Endangered species* means a species that is in danger of extinction throughout all or a significant portion of its range."…(k) "species" includes any species or subspecies that interbreeds when mature. *See* 16 U.S.C § 1532(6), 50 C.F.R. § 424.02(e).
>
> "*Threatened species* means any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." *See also* 16 U.S.C § 1532(20), 50 C.F.R. § 424.02(m).

This Petition demonstrates that the Topminnow is imperiled to the extent that it warrants listing as either Endangered or Threatened under the ESA.

ESA Section 4 (16 U.S.C. § 1533(a)(1)) sets forth listing factors under which a species can qualify for ESA protection (see also 50 C.F.R. § 424.11(c)):

A. The present or threatened destruction, modification, or curtailment of habitat or range;
B. Overutilization for commercial, recreational, scientific, or educational purposes;
C. Disease or predation;
D. The inadequacy of existing regulatory mechanisms; and
E. Other natural or manmade factors affecting its continued existence.

[3]The sole exclusion is for "a species of the Class Insecta determined by the Secretary to constitute a pest whose protection…would present an overwhelming and overriding risk to man." 16 U.S.C. § 1532(6). It is difficult to imagine an insect so imperiled as to warrant ESA protection that presents a grave risk to humans.

At least three factors set forth in ESA Section 4 have resulted in the continued decline of the Saltmarsh Topminnow and are causing the species to face extinction or endangerment.[4] This species has declined, and continues to decline, due to the destruction of its habitat (Factor A); inadequate state and federal protections (Factor D); and other factors, such as specialized habitat requirements, low reproductive rate, and increasing human populations (Factor E). A species need meet only one of the listing factors outlined in the ESA to qualify for federal listing. Because the species meets not only one but several requirements, the Secretary should list the Saltmarsh Topminnow as endangered or threatened under the ESA.

Because of the dire threat to the Topminnow posed by the Deepwater Horizon oil spill, WildEarth Guardians requests emergency listing. The ESA gives the Secretaries the power to list species on an emergency basis. 16 U.S.C. § 1533(b)(7). Based on information in this petition, it is clear that there will be "significant risk to the well being" of the Saltmarsh Topminnow if it is not immediately listed under the ESA. See 16 U.S.C. § 1533(b)(3)(C)(iii).

Description of Petitioner

WildEarth Guardians is a non-profit environmental organization with over 4,500 members throughout the United States. WildEarth Guardians has an active endangered species protection campaign. As part of this campaign, Guardians works to obtain ESA protection for a wide variety of imperiled wildlife and plants and the ecosystems on which they depend.

III. THE SALTMARSH TOPMINNOW

A. Classification and Nomenclature

Common Name. *Fundulus jenkinsi* is known by the common name "Saltmarsh topminnow" or "sardinilla del Bravo."[5]

Taxonomy. The petitioned species is *Fundulus jenkinsi* Evermann 1892. The taxonomic classification for *Fundulus jenkinsi* is shown in Table 1.

Table 1. Taxonomy of Saltmarsh Topminnow

Phylum	Chordata
Class	Actinoptergii
Order	Cyprinodontes
Family	Fundulidae
Genus	*Fundulus*
Species	*Fundulus jenkinsi*

The ESA allows any species of fish or wildlife or plants to be listed under the provisions of the Act. Evermann formally described it as a species in 1892. There is no dispute regarding the validity of this taxon.

[4] 16 U.S.C. § 1533(a)(1)(b)(A), (D), and (E).
[5] ITIS REPORT, *FUNDULUS JENKINSI* (EVERMANN, 1892) (2010), *available at* http://www.itis.gov/servlet/SingleRpt/SingleRpt. Enter "Fundulus jenkinsi." (Accessed May 3, 2010) (hereinafter "Exhibit 11").

B. Description

Figure 1. Photo of Breeding Male Saltmarsh Topminnow

Photo © Gretchen L. Grammer

The Saltmarsh Topminnow is one of the smallest members of the topminnow/killifish family (*Fundulidae*). Generally, individuals are smaller than 1.75 inches (40-45 mm) long. The Topminnow has cross-hatching on its backs and sides that may be gray-green (Figure 1). Additionally, most individuals have 12-13 dark round spots arranged in rows along their sides from above the pectoral fin to the base of the caudal fin (NMFS 2010). Sexual dimorphism amongst Saltmarsh Topminnows includes a longer median fin length in males and a lemon-yellow color[6] on the anterior base of the male's anal fins.[7] The male's dorsal fin develops a deep orange over the entire fin, a slight orange tint to the caudal fin, and a bright yellow on the pelvic fins (*see* Exhibit 12 at 4). Mature females also have a sheath on the anterior base of the anal fin that is used to help position eggs during spawning (*see* Exhibit 13 at 518; *see also* Exhibit 14 at 4 & Exhibit 9, not paginated). There is no chromatic coloring in females (*see* Exhibit 13 at 518).

C. Geographic Distribution: Historic and Current

In the 1940s, scientists reported finding the Saltmarsh Topminnow as far west as the Rio Grande in Texas.[8] In the 1950s, scientists estimated the Saltmarsh Topminnow range as extending over most of the Gulf coast, from the Escambia River (near Pensacola, Florida) to Galveston, Texas (*Id.*). Today, while the general parameters of the 1950s range still apply (from Galveston Bay, Texas to Escambia

[6] Other studies have concluded that the "lemon yellow" description of the male's anal fin is "incomplete." *See* B. THOMPSON & G.W. PETERSON, NATIONAL FISH AND WILDLIFE FOUNDATION, EXAMINING ARTIFICIAL WETLANDS: ARE WE BUILDING SUITABLE HABITAT FOR *FUNDULUS JENKINSI*, A FEDERAL CANDIDATE SPECIES? FINAL REPORT, 1 August 2001 (hereinafter "Exhibit 12" at 4). "The anal fin becomes a deep yellow, almost a yellow-orange over the entire fin." (*Id.*).

[7] *See* B. Thompson, *Fundulus jenkinsi (Evermann). Saltmarsh topminnow, in* ATLAS OF NORTH AMERICAN FRESHWATER FISHES 518 (D.S. Lee, et al. 1980) (hereinafter "Exhibit 13"); *see also* B. THOMPSON, NATIONAL MARINE FISHERIES SERVICE, AN EVALUATION OF THE SALTMARSH TOPMINNOW, *FUNDULUS JENKINSI,* FINAL REPORT, 20 August 1999 revision (hereinafter "Exhibit 14"); *see also* Exhibit 9, not paginated.

[8] D.G. Simpson & G. Gunter, *Notes on Habitats, Systematic Characters and Life Histories of Texas Salt Water Cyprinodontes*, 4 TULANE STUDIES IN ZOOLOGY 115-134 (1956) (hereinafter "Exhibit 15," at 115).

Bay in the western panhandle of Florida),[9] the Saltmarsh Topminnow's range has become spotty; for example, scientists can no longer locate Saltmarsh Topminnows between Galveston Bay and southeastern Louisiana (*see* Exhibit 13 at 518). This may represent a sampling anomaly, but other studies suggest that this distribution pattern is accurate (*see* Exhibits 13 & 15). One cause for the gap in the Topminnow's range could be pollution; both the federal and Texas state governments have long recognized that the centuries-old oil-refining industry has significantly polluted coastal land straddling the Texas-Louisiana (in particular, the Port Arthur, Texas area). Since 1993, Texas has worked with the federal government to remediate and restore wetland areas around Port Arthur, Texas.[10] Furthermore, scientists have only located sparse individual Saltmarsh Topminnows in the saltmarshes of Perdido, Escambia, and East Bays of Florida (*see* Exhibit 9, not paginated). Today, as is shown in Figure 2, the most significant populations of Saltmarsh Topminnows are located along the coast of southeastern Louisiana, Mississippi, and Alabama (*see* Exhibit 4, not paginated; *see also* Exhibit 10, not paginated). Mississippi localities near the Biloxi River have yielded up to 270 specimens per collection cycle (*see* Exhibit 4, not paginated). Similarly, scientists collected 240 individuals among three sites at Old Fort Bayou, Mississippi between June 29, 1995, and September 20, 1996 (*see id.*). Scientists gathered all other significant collections from sites less than about 125 km to the west (Denis Pass and Ft. Jackson, Louisiana) or less than 125 km to the east (Fish River, Alabama, draining eastern Mobile Bay and the Escambia River in western Florida) (*see id.*).

Figure 2. Current Saltmarsh Topminnow Range

Source: NatureServe (2010).

[9] *See* C. Gilbert & K. Relyea, *Saltmarsh Topminnow, Fundulus jenkinsi*, *in* 2 RARE AND ENDANGERED BIOTA OF FLORIDA 68-72 (R. Ahston, Jr. ed., 1992) (hereinafter "Exhibit 16"); *see also* Exhibit 3 at 51; Exhibit 9, not paginated.

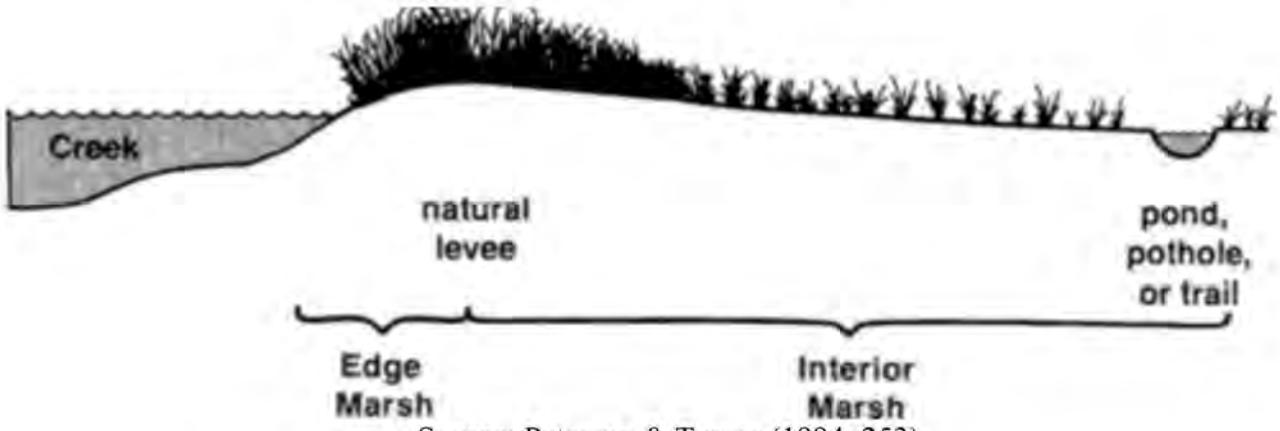
[10] *See, generally*, NOAA'S OFFICE OF RESPONSE & RESTORATION, RESTORATION IN PORT ARTHUR (April. 2006), *available at* http://www.response.restoration.noaa.gov/book_shelf/1019_CPRD_TX_Restoration_Port_Arthur_508.pdf. (Accessed May 3, 2010) (hereinafter "Exhibit 26").

D. Habitat Requirements

Although habitat needs for the Saltmarsh Topminnow may vary somewhat across its range, experts report that the species prefers the brackish water of the *Spartina* saltmarsh, also known as cord grass marsh.[11] In fact, researchers have collected few or no Saltmarsh Topminnows outside of the *Spartina* saltmarsh (*see* Exhibit 3 at 51). The fish are most common in small, shallow tidal meanders of *Spartina* saltmarsh, where the salinity is usually between 1-4ppt (*see* Exhibit 13 at 518; *see also* Exhibit 16 at 70). Saltmarsh Topminnows live among aquatic plants known as *Juncus roemerianus* or *Spartina alterniflora* (*see* Exhibit 3 at 52). The salinity of the water within *Spartina* saltmarshes determines the abundance of Saltmarsh Topminnows (*see id.*; *see also* Exhibit 13 at 518); saltmarsh sites that appeared to be appropriate habitat but did not produce Topminnows had a mean salinity of less than 16 ppt (*see* Exhibit 3 at 56; Exhibit 10; Exhibit 43 at 143).

The variety inherent in the saltmarsh environment is critically important to the Saltmarsh Topminnow in order for it to complete its lifecycle (*see* Exhibit 14 at 4-5). In addition to salinity, multiple environmental factors create the Saltmarsh Topminnow's preferred habitat within the saltmarsh, including water depth, bank slope, and plant stem density. These factors are inter-related within marsh environments (*see* Exhibit 10, not paginated). The flooded marsh surface is an integral part of the habitat of *Fundulus jenkinsi,* and, although the interior marsh is not; Saltmarsh Topminnows prefer depth around 50 cm ("edge marsh") in main channel marsh habitats (*see* Figure 3; *see also* Exhibit 14 at 4-5).

Figure 3: Saltmarsh Zones.[12]



Source: Peterson & Turner (1994: 253).

Scientists report that it is only when the marsh periodically dewaters that one could find Saltmarsh Topminnows along the edges of the deeper meanders. *Id.* Additionally, Topminnows prefer marsh

[11] *Id.*; *see also* L. Rozas, L & T.J. Minello, *Nekton Use of Vallisneria Americana Michx. (Wild Celery) and Adjacent Habitats in Coastal Louisiana*, 29 ESTUARIES AND COAST 297-310 (2006) (hereinafter "Exhibit 17"); FLORIDA FISH AND WILDLIFE COMMISSION, FRESHWATER FISHES-ENDANGERED, THREATENED, OR OF SPECIAL CONCERN (2010), *available at* http://myfwc.com/WILDLIFEHABITATS/Freshwater_threatened.htm. (Accessed May 3, 2010) (hereinafter "Exhibit 19").

[12] G.W. Peterson & R.E. Turner, *The Value of Salt Marsh Edge vs. Interior as a Habitat for Fish and Decapod Crustaceans in a Louisiana Tidal Marsh*, 17 ESTUARIES 235-262 (1994) (hereinafter "Exhibit 37").

habitats with high vegetation biomass or stem density, because they provide greater food availability and refuge from predation compared with less dense or complex habitats. *Id.* The species appears to depend on the presence of vegetation; they are completely absent from unvegetated or large, deep, unprotected saltmarsh areas (*see* Exhibit 12 at 5; *see also* Exhibit 17 at 297).

E. Life History

The lifespan of the average individual Saltmarsh Topminnow is only 1-2 years and individuals are relatively isolated, which leaves the species particularly vulnerable to extinction (Exhibit 4, not paginated ("[L]ocal populations are relatively vulnerable to extirpation with a reduced capacity for re-colonization"); Exhibit 14 at 3; Exhibit 18, not paginated ("[T]he species only lives for one to two years, making this species vulnerable to drastic year class various and susceptible to local extinctions")). Individuals live their lives in a small physical area within their habitat (*see* Exhibit 4, not paginated). The species' short lifespan makes it vulnerable to drastic class variations and local extinction (*see id.*). Few adults live longer than one reproductive cycle, or two years (*see* Exhibit 14 at 3).

Scientists are beginning to focus on the Saltmarsh Topminnow's reproductive biology (*see generally,* Exhibit 10). Research shows that Saltmarsh Topminnows are in reproductive condition from March into August, and that they probably spawn earlier (*see* Exhibit 10, not paginated; *see also* Exhibit 12 at 4 & Exhibit 14 at 3). Spawning probably occurs only once in an individual's lifetime (*see* Exhibit 11, not paginated). Within that one reproductive season, researchers suggest that Topminnows produce several hundred eggs (*see* Exhibit 4, not paginated). As mentioned above, given their short lifespan and the limited range of each individual, scientists report that, "significant genetic mixing of separate populations is not likely, putting the species genetic diversity at risk" (Exhibit 9, not paginated).

F. Historic and Current Population Status and Trends

In 1998, researchers concluded that many of the locations where researchers had once collected the Saltmarsh Topminnow had not been re-sampled for long periods of time, thus "hindering conclusions on its conservation status" (Exhibit 12 at 2). Scientists note that older studies confused *F. pulverous, F. grandis, F. chrystous*, and *Gambusia affinis* for *F. jenkinsi* (*see* Exhibit 14 at 2), which makes an accurate determination of historic *Fundulus jenkinsi* populations difficult. Today, scientists agree that the species is rare. For example, the same scientists who recently reported that the Topminnow is "more abundant than previously suggested in the central part of its range" also report that the species exists only in "low relative abundance" (Exhibit 3 at 52). Additionally, scientists consider the Topminnows that live off of the western Florida panhandle to be "threatened" (Exhibit 14 at 8; Exhibit 16 at 71). The IUCN, American Fisheries Society and the NMFS Species of Concern program each state that the Saltmarsh Topminnow may require conservation (*see* Exhibit 9, not paginated). Similarly, NMFS describes the abundance of the Saltmarsh Topminnow as "declin[ing]" (*Id.*). Today's scientists and researchers agree—the Topminnow is imperiled.

V. THREATS TO THE SALTMARSH TOPMINNOW

The Saltmarsh Topminnow meets several of the criteria for listing under the ESA (bolded below):

A. Present and threatened destruction, modification, and curtailment of habitat and range;
B. Overutilization for commercial and recreational purposes;
C. Disease or predation;
D. The inadequacy of existing regulatory mechanisms; and
E. Other natural or manmade factors affecting its continued existence.

The habitat of the Saltmarsh Topminnow has been reduced over the past century and is now facing an imminent threat from the Deepwater Horizon oil spill (Factor A). While state governments and NMFS have recognized the imperilment of this species, they have generally failed to provide adequate legal protections to ensure the Topminnow persists (Factor D). These anthropogenic threats are exacerbated by biological parameters, such as the fish's low reproductive rate (Factor E). The species is in dire need of the additional protections that only listing under the ESA can provide.

A. The Saltmarsh Topminnow is Threatened by Present Destruction, Modification, or Curtailment of Range and Habitat

Threats to wetland in general, and to its marsh habitat, specifically, have caused the decline and imperilment of the Saltmarsh Topminnow (*see* Exhibit 3 at 52). When the Topminnow's requisite *Spartina* marsh habitat is harmed, this fish is likewise harmed (*see* Exhibit 3 at 52; *see also* Exhibit 13 at 518). Not only has the Topminnow's historic range been curtailed, the fish faces a variety of threats that further imperil both the fish and its remaining habitat.

1. Destruction of Historic Range

The Saltmarsh Topminnow's historic range has shrunk significantly. Today, while the general parameters of the 1950s range still apply (from Galveston Bay, Texas to Escambia Bay in the western panhandle of Florida), it has become spotty. Scientists can no longer locate Saltmarsh Topminnows between Galveston Bay and southeastern Louisiana (*see* Exhibit 13 at 518). This may be due to significant long-term pollution from oil-refineries in the area (*see generally,* Exhibit 26). Scientists have only located sparse individual Saltmarsh Topminnows in Florida saltmarshes (*see* Exhibit 9, not paginated). Today, scientists have gathered all significant collections of the species from sites less than about 125 km to the west (Denis Pass and Ft. Jackson, Louisiana) or less than 125 km to the east (Fish River, Alabama) of Misssissippi's Biloxi River (*Id.*).

2. Threats to Current Range

In its remaining habitat, the Topminnow faces a variety of threats. Human-caused threats are many and severe, including oil and gas drilling and contamination, development, subsidence and sea level rise, as well as levee and canal construction. In addition, wetland shift can alter a saltmarsh in ways that make it uninhabitable for this species. Anthropogenic threats may exacerbate the effects of this natural process on the Topminnow.

Total Wetland and Marsh Loss

Scientists agree that wetland loss threatens the habitat upon which the Saltmarsh Topminnow depends (*see* Exhibit 12: 3; *see also* Exhibit 3: 58). Researchers have discovered that a net amount of wetland is disappearing along the Gulf Coast.[13] Some of this wetland loss may be natural, due to a phenomenon known as "subsidence," during which river delta soils naturally compact and sink over time, eventually giving way to open water unless fresh layers of sediment are deposited (*see* Exhibit 19: 379). However, wetland is currently disappearing more quickly than ever before; scientists blame human activities for speeding up the process (*see* Exhibit 12 at 2 & Exhibit 25, not paginated). Indeed, wetland decline is despite the federal government's and many states' policy of "no net loss of wetland areas and function…" (Exhibit 21: 10). In Mississippi, for example, 13% of the state's coastal wetlands were lost permanently between 1950 and 1992 (*see* Exhibit 19: 393). The Environmental Protection Agency (EPA) states that "[b]y 2050 one third of coastal Louisiana will have vanished into the Gulf of Mexico" (Exhibit 23; *see also* Figure 4 (for projected loss up to 2020)).

As NMFS recognized recently in its proposed rule for ESA protection of the Largetooth Sawfish:

> Coastal habitats in the southern U. S. Gulf of Mexico region have experienced and continue to experience losses due to urbanization. Wetland losses in the Gulf of Mexico region of the U.S. averages annual net losses of 60,000 acres (242.8 km2) of coastal and freshwater habitats from 1998 to 2004. Although wetland restoration activities are ongoing in this region of the U.S., the losses significantly outweigh the gains. These losses have been attributed to commercial and residential development, port construction (dredging, blasting, and filling activities), construction of water control structures, modification to freshwater inflows (Rio Grande River in Texas), and gas and oil related activities.

See 75 Fed. Reg. 25174 at 25180, internal citations omitted.

The loss of wetland also means the loss of wetland saltmarshes. Scientists indicate that coastal Mississippi lost over 13% (8,500 acres) of saltmarsh between the 1950s and 1992 (*see* Exhibit 19: 386). A more recent report has found that, "from the Mississippi border to the Texas state line, Louisiana is losing its protective fringe of marshes…faster than any place in the United States" and that Louisiana "continues to lose about 25 square miles of land each year, roughly one acre every 33 minutes."[14] The loss of wetlands, and the saltmarshes within them, "translates to a loss of valuable habitat for many fish species,"[15] including the Topminnow.

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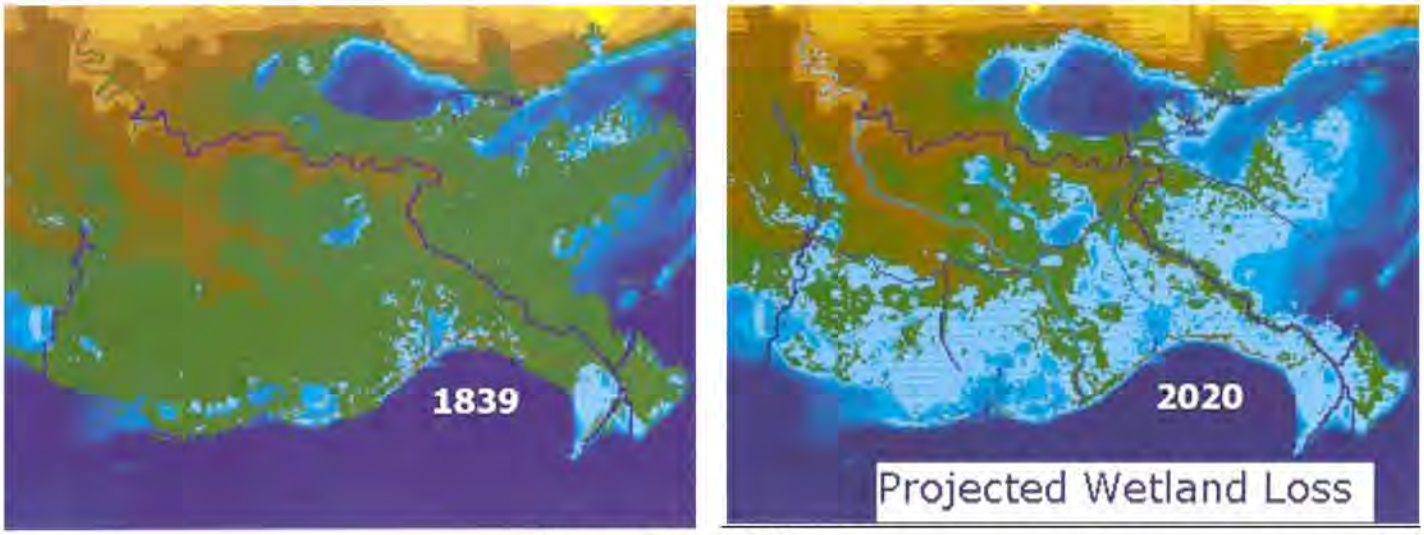
[13] *See* K.M. WICKER, OFFICE OF BIOLOGICAL SERVICES. U.S. FISH AND WILDLIFE SERVICE, MISSISSIPPI DELTAIC PLAIN REGION ECOLOGICAL CHARACTERIZATION: A HABITAT MAPPING STUDY (1980), *available at* http://www.gomr.mms.gov/PI/PDFImages/ESPIS/3/4037.pdf. (Accessed May 3, 2010) (hereinafter "Exhibit 24"); *see also* Exhibit 19 at 377.

[14] J. Bourne, *Gone with the Water*, 206 NATIONAL GEOGRAPHIC 88-103 (Oct. 2004), *available at* http://ngm.nationalgeographic.com/ngm/0410/feature5/index.html. (Accessed May 3, 2010) (hereinafter "Exhibit 27").

[15] Exhibit 12 at 2; *see also* B. THOMPSON & G.W. PETERSON, LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES, EVALUATING SPORTFISH USE OF HABITAT CREATED BY COASTAL RECREATION PROJECTS. FINAL REPORT, 14 October 2003 (hereinafter "Exhibit 25," not paginated).

Figure 4. Louisiana Coastland Wetland (and Saltmarsh) Loss Projection[16]



Source: EPA (2010).

Development

Human activity along the Gulf Coast has accelerated the erosion of coastal wetlands at "an alarming rate" (Exhibit 12: 2; *see also* Exhibit 25). Scientists trace the net loss of wetland acreage to coastal development and other infrastructure built to cater to a growing human population. Coastal populations have increased to 40 million people since 1960, and the growing population's demand for development has changed the coastal habitat (*see* Exhibit 20: 28). Some 40% of the marsh acreage lost from 1950-1992 was destroyed through conversion directly from marsh to developed land (*see* Exhibit 19: 379). "[T]he extensive urban development along the shoreline of the USA will preclude the strip of fringing tidal wetlands from migrating upslope" (Exhibit 19: 379). The loss of wetland translates into a loss of habitat necessary to support the Topminnow's survival.

State Lopez et al. (2010) (Exhibit 43):

> Alteration of the salt marsh edge by plot-scale destruction (e.g. bulkheads and rip-rap), which leads to large-scale cumulative impacts (Peterson & Lowe 2009) and fishery resource reduction in estuaries (Jordan et al. 2008), can interrupt, modify, and ultimately eliminate access to mid- and high marsh for reproduction and foraging of all species that link subtidal and intertidal habitats. Recent modeling studies have shown that hard structures in fringing salt marsh change marsh–shoreline relationships considerably, such that function is modified; this is rarely considered in management scenarios (Mattheus et al. 2010). *Fundulus jenkinsi*, as well as other species, use high spring tides to enhance spawning and foraging activities, and thus preservation of 'dendritic' tidal creeks that provide high marsh access is an important consideration when developing a comprehensive conservation plan for the species and its habitat.

[16] Environmental Protection Agency: Coastal Wetlands Planning, Protection, & Restoration, http://www.epa.gov/region6/water/ecopro/em/cwppra/index.htm (last visited May 3, 2010) (hereinafter "Exhibit 23").

Scientists are particularly concerned about the affects of dock-side gambling in Mississippi (which legalized the practice in 1989[17]), and in Louisiana[18] on the Topminnow and its habitat, because it contributes to permanent wetland loss. One scientist writes, "[the] extensive development in coastal Mississippi of the dock-side gaming industry has added further concern about the status of *F. jenkinsi*" (Exhibit 3: 58; *see also* Exhibit 13: 518). The success of the gaming industry in attracting tourists has inspired developers to create huge "off shore" casinos that drain wetlands (*see* Exhibit 38). "[Developers] are making $1 and $2 billion investments…these 'mega casinos' may have five or six casinos, hotels, restaurants, amusement parks, marinas, and other large amenities…All of this development affects the wetlands. You can't build anymore without impacting wetlands." *Id.* Additionally, the human waste from these casinos pollutes the water in whatever wetland territory remains. *Id.* The human waste and over-development of the gambling industry undoubtedly leads to wetland erosion and to the subsequent loss of Saltmarsh Topminnow habitat.

Pollution

Another threat to Topminnow habitat is pollution. Oil and gas refining and its byproducts, including spillage and leaks, are significant sources of pollution in the Saltmarsh Topminnow's wetland-based range. This is vividly seen at present with the Deepwater Horizon oil disaster (See Figure 5). This disaster began on April 20, 2010, when this oil rig exploded and collapsed, subsequently causing months of massive spewage of oil into the northern Gulf of Mexico. This oil spill is causing extreme degradation of the Gulf's wetlands and saltmarsh.[19] James H. Cowan, Jr., a professor in the Department of Oceanography and Coastal Sciences at Louisiana State University, warns of the spill's threat to the "brackish water" of the Topminnow's saltmarsh, in particular.[20]

[17] NOAA Coastal Services Center, *Gambling with the Environment? Casinos Change the Coastal Management Game*, COASTAL SERVICES (Jan./Feb. 1999) available at http://www.csc.noaa.gov/magazine/back_issues/janfeb99/gambling.html. (hereinafter "Exhibit 38," not paginated).

[18] Ross I. Landau, *A Theoretical Possibility of Navigation*, 32 TUL. MAR. L. J. 249-275, 249 (2007).

[19] *See generally*, Associated Press, *Gulf Oil Spill Threatens Already Weakened Wetlands*, May 10, 2010, *available at* http://www.nola.com/news/gulf-oil-spill/index.ssf/2010/05/gulf_oil_spill_threatens_alrea.html (accessed May 18, 2010) (hereinafter "Exhibit 31").

[20] Editorial, *What the Spill Means for Offshore Drilling*, N.Y. TIMES, Apr. 29, 2010, *available at* http://roomfordebate.blogs.nytimes.com/2010/04/29/what-the-spill-means-for-offshore-drilling/?scp=3&sq=oil%20industry%20wetland&st=cse (accessed May 18, 2010) (hereinafter "Exhibit 32").

Figure 5. The Estimated Range Impacted by the Gulf Oil Spill

Source: National Center for Atmospheric Research.

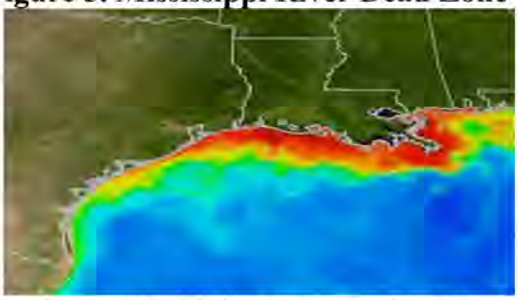
Scientists at the federal and state levels acknowledge that pollution from the oil industry causes long-term damage to wetlands in general and to saltmarshes in particular. For example, both the federal and Texas state government have recognized that long-term oil refining activities have significantly polluted the coastal land straddling the Texas-Louisiana border (in particular, the Port Arthur, Texas, area) (*see* Exhibit 26). Such efforts must be long-term and are, therefore, expensive (*see* Exhibit 30: 3). Furthermore, pollution from an oil spill is long-lasting: it can damage a wetland for several decades. *Id.*

Additional sources of pollution include the increased use of nitrogen fertilizers and livestock manure from upstream farms, which contaminate river delta wetlands, destroying habitat for the fish that live within them, including the Topminnow.[21] Concentrations of agricultural chemicals can increase the salinity of the saltmarsh, destroying *Spartina* marsh. The increased nutrients from agricultural chemicals that spill into rivers can also create hypoxic zones, commonly known as "dead zones." The excess nutrients cause algal blooms that rob underwater species of oxygen, killing them (*see* Figure 5). The largest dead zone in the United States (also one of the largest in the world) is in the Gulf of Mexico, squarely within the Topminnow's range, at the Mississippi River Delta.[22]

[21] E. Matthews & Allen Hammond, *Critical Consumption Trends and Implications: Degrading Earth's Ecosystems* (1999), *available at* http://pdf.wri.org/critcons.pdf. (Accessed May 3, 2010) (hereinafter "Exhibit 28").

[22] U.S.G.S., RESTORING LIFE TO THE DEAD ZONE: ADDRESSING GULF HYPOXIA, A NATIONAL PROBLEM, FS-016-00 (June 2000), *available at* http://www.nwrc.usgs.gov/factshts/016-00.pdf (Accessed May 19, 2010) (hereinafter "Exhibit 41").

Figure 5. Mississippi River Dead Zone[23]



Source: Exhibit 42, not paginated.

Researchers note that the "[a]verage nitrate-nitrogen concentration in the [Mississippi] river's main stem has doubled since 1950, with commercial fertilizers being the largest source" (Exhibit 41). Hypoxic zones threaten the survival of wetlands and the survival of those species that live within them, across the Gulf Coast. The Saltmarsh Topminnow's already limited historic range is threatened by one of the largest dead zones in the world, the Mississippi River Dead Zone.

Subsidence and Sea Level Rise

Under natural conditions, the stability of marsh wetlands depends on an interaction between relative sea level and marsh accretion. "High rates of the former, along with low rates of the latter, will restrict regenerative ability and lead to wetland deterioration" (Exhibit 19: 379). Relative sea level is a general term that includes both process of subsidence and the rise of the water level (*Id.*).

Wetlands are currently subject both to increased subsidence and an increased rate of sea level rise. Oil and gas withdrawal, prevalent in the Gulf of Mexico, increases natural subsidence rates (*see* Exhibit 27). "The removal of millions of barrels of oil, trillions of cubic feet of natural gas, and tens of millions of barrels of saline formation water lying with the petroleum deposits cause a drop in subsurface pressure—a theory known as regional depressurization. That led nearby underground faults to slip and the land above them to slump" (*Id.*). As the wetland beds sink, scientists agree that, glacial melt caused by global warming has led to rising ocean levels that "will submerge coastal wetlands and accelerate wetland degradation."[24] In the Mississippi River basin alone, scientists predicted a 20% increase in river water discharge "which will elevate nutrient loading [agricultural run-off] and lead to a…an expansion of the oxygen-depleted area [the dead zones]."[25] Increased water depth in wetland areas usually increases salinity, which, because the plants and animals in the *Spartina* saltmarsh thrive only in medium salinity, could lead to *Spartina* saltmarsh death. This increased salinity, combined with an expanding hypoxic zone, is an undeniable threat to the survival of the saltmarsh habitat and to the Topminnow that lives within it.

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[23] P. Hutner, Mississippi River 'Dead Zone' Largest Ever, MPR News, June 25, 2009, http://minnesota.publicradio.org/collections/special/columns/updraft/archive/2009/06/weather_in_the_news.shtml (Accessed May 19, 2010) (hereinafter "Exhibit 42").

[24] K.L. McKee, et al, *Acute Salt Marsh Dieback in the Mississippi River Deltaic Plain: A Drought-Induced Phenomenon?* 13 GLOBAL ECOLOGY AND BIOGEOGRAPHY, 65-73, 65 (2004) *available at* ftp://ftpext.usgs.gov/pub/er/md/laurel/GCC/Chapter%203%20Lit%20Cited/McKee%20et%20al%202004.pdf (Accessed May 3, 2010) (hereinafter "Exhibit 34").

[25] R. J. Diaz & R. Rosenberg, *Spreading Dead Zones and Consequences for Marine Ecosystems*, 321 SCIENCE 926- 929, 929 (August 15, 2008) (hereinafter "Exhibit 35").

Levees/Diversions

Levees constructed by state and federal governments for flood control have destroyed wetlands and saltmarshes. For example, the U.S. Army Corps of Engineers has constructed levees along Louisiana's coast. The levees are lined with concrete, which funnels marsh-building sediment into the deep waters of the Gulf (*see* Exhibit 27). In addition to robbing marshes of needed sediment deposits, levees can prevent species' access to their natural habitats, including the Topminnow. Levees are a "significant impediment to *Fundulus jenkinsi* being able to gain access to the vegetated, flooded surface [of the wetland] during high tide. Only where access cuts were made through the levees have scientists found any significant numbers of the species."[26]

Construction of canals has had a similar effect. "Since the 1950s engineers have . . . cut more than 8,000 miles of canals through the marsh for petroleum exploration and ship traffic" (*Id.; see also* Exhibit 31); the canals allowed for "lethal doses" of salt water to infiltrate brackish and freshwater marshes" (*see* Exhibit 27; *see also* Exhibit 31). The increased salinity in waters that have been controlled by levees would be lethal for the Topminnow, given its specific salinity requirements (*see* Exhibit 13: 518; *see also* Exhibit 16: 70).

Federal and state governments have worked together to remedy the destruction of wetland by canals and levees through diversion projects. Engineers create diversion projects to divert water around levees and canals in order to mimic marsh-restoring flooding. These projects have had only mixed success. On the one hand, diversion projects in the Atchafalaya River delta, for example, have reportedly restored "large, healthy populations" of *Fundulus jenkinsi* since 2001 (Exhibit 12: 5). On the other hand, private interests, such as fishermen, frequently oppose diversion projects. One diversion, the Caernarvon Freshwater Diversion Project in the Mississippi River Delta, became controversial when freshwater releases timed to emulate spring flooding harmed oyster beds. Oyster fishermen sued and were awarded $1.3 billion. Louisiana successfully appealed the trial judge's ruling,[27] but the case threw a "major speed bump into [saltmarsh] restoration efforts" (Exhibit 27).

Natural Wetland Shift

Wetland shifting affects the Topminnow's range. Natural shifting within the wetland habitat, which can curtail the borders of the species' range, influences the size of the Saltmarsh Topminnow population in any given year (*see* Exhibit 3: 51). Left to their natural cycle, wetlands form as rivers deposit sediment, then erode as the rivers change course (*see* Exhibit 12: 2; *see also* Exhibit 25). The patchiness of suitable wetland area that results from natural wetland shifting changes the amount of habitat for the species, thereby influencing class strength (*see* Exhibit 3: 51). Given the species' low rate of reproduction (*see* Exhibit 11; *see also* Exhibit 4) and anthropogenic threats the species faces, wetland shifting that leads to even temporary loss of habitat could ultimately contribute to the Saltmarsh Topminnow's extinction.

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[26] Exhibit 12 at 5; *see also* B. THOMPSON & G.W. PETERSON, LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES, EVALUATING SPORTFISH USE OF HABITAT CREATED BY LOUISIANA COASTAL RESTORATION PROJECTS: CAN WE MAKE POST-CONSTRUCTION ALTERATIONS TO THESE HABITATS TO MAKE THEM MORE SUITABLE FOR FISH LIFE CYCLES? FINAL REPORT, 14 November 2006 (hereinafter "Exhibit 33") & Exhibit 27, not paginated.

[27] *See Slavich v. Louisiana*, 2007-1149 (La. App. 1 Cir. 8/21/08); 994 So. 2d.85.

B. Existing Regulatory Mechanisms Fall Short of Protecting the Saltmarsh Topminnow

State and federal regulatory mechanisms have failed to protect the Topminnow and its habitat.

State Regulations

Of the Gulf Coast states that contain Topminnow habitat, Florida state law, as mentioned above, goes the furthest to protect the Saltmarsh Topminnow, and even its efforts are inadequate. In placing it on its species of special concern list, Florida law recognized that *Fundulus jenkinsi* is particularly vulnerable "to habitat modification, environmental alteration, human disturbance, or human exploitation which, in the foreseeable future, may result in its becoming a threatened species unless appropriate protective or management techniques are initiated or maintained."[28] Florida's administrative code states that,

> No person shall take, possess, transport, or sell any species of special concern included in this paragraph or parts thereof or their nests or eggs except as authorized by Commission regulations or by permit from the executive director or by statute or regulation of any other state agency, permits being issued upon reasonable conclusion that the permitted activity will not be detrimental to the survival potential of the species.[29]

While Florida's administrative code gives some teeth to the state's species of special concern list, so few Saltmarsh Topminnows have been found in Florida's saltmarshes that the state's measures are insufficient to protect the species as a whole.

No other Gulf Coast state has followed Florida's example. Alabama law offers no endangered species protection to this fish on the state level. Mississippi's placement of *Fundulus jenkinsi* on their list of "Species of Greatest Conservation Need Associated with Estuarine Bays, Lakes, and Tidal Streams" offers no legal safeguards (Exhibit 5). Louisiana has neither placed *Fundulus jenkinsi* on its state Endangered Species List, nor does the species' inclusion on the state's list of Marine Species of Conservation Concern offer it any legal protection (*see* Exhibit 6). State regulation is not adequately protecting this species.

In 2006, the federal Species of Concern Grant Program[31] funded the Mississippi Department of Marine Resources for five years to research the species and develop a region-wide conservation plan. This conservation plan could serve as the basis for recovery planning after the Topminnow is listed under the ESA.

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[28] *Id.*
[29] FLA. ADMIN. CODE ANN. 68A-27.005(a)(1).
[31] *See* A. Somma, et al, Conservation and the Endangered Species Act: The National Marine Fisheries Service's Cooperative and Proactive Approach, 6 OUR LIVING OCEANS 89-99, *available at* http://spo.nmfs.noaa.gov/olo6thedition/10--Feature%20Article%204.pdf (Accessed May 3, 2010) (hereinafter "Exhibit 36").

Federal ESA Status

The Saltmarsh Topminnow was previously a candidate for ESA listing.[32] In April 2004, NMFS transferred the Saltmarsh Topminnow from its candidate list to its species of concern list (along with 24 other species).[33] It remains on the species of concern list.[34] According to NMFS:

> Species of concern are those species about which NOAA's National Marine Fisheries Service (NMFS) has some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the Endanger Species Act (ESA). We wish to draw proactive attention and conservation action to these species. 'Species of Concern' status does not carry any procedural or substantive protections under the ESA.[35]

While the federal government has a long history of recognizing the imperilment of the Saltmarsh Topminnow, it is time to heed compelling scientific evidence and list the species as either threatened or endangered under the ESA so that this fish can enjoy the protections it affords.

The Coastal Wetlands Planning, Protection, and Restoration Act

The Coastal Wetlands Planning, Protection, and Restoration Act ("CWPPRA" or "Breaux Act") created a program to fund small-scale, localized wetland restoration projects.[36] By the late 1990s, it became apparent that CWPRA's scope and funding, though effective for implementing local projects quickly, was inadequate in the face of large-scale wetlands degradation. The U.S. Army Corps of Engineers has admitted that, although the Breaux Act is the primary vehicle for restoring wetlands in Louisiana (*see* Exhibit 20), a "much broader approach and substantially more resources would be necessary to reverse the breakdown of an ecosystem.[37]

Louisiana Area Ecosystem Restoration Study

Another failed federal regulatory plan is the 1999 Louisiana Coastal Area Ecosystem Restoration Study ("LCA"). Scientists, environmental groups, business leaders, and various federal agencies including the U.S. Army Corps of Engineers, the EPA, the U.S. Natural Resources Conservation Service, NMFS, FWS, and the U.S. Geological Service worked together on this plan (*see* Exhibit 27; *see also* Exhibit 29). Released for public comment in 2004, the federal government initially estimated that the LCA

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[32] Endangered and Threatened Species; Revision of Candidate Species List under the Endangered Species Act, 62(134) Fed. Reg. 061097B (July 14, 1997); Endangered and Threatened Species; Revision of Candidate Species List under the Endangered Species Act, 64(120) Fed. Reg. 061699A (June 23, 1999);

[33] Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species list Under the Endangered Species Act. 69(73) Fed. Reg. 020304D (April. 15, 2004).

[34] Endangered and Threatened Species; Revision of Candidate Species List under the Endangered Species Act, 71(200) Fed. Reg. 101106D (October 17, 2006). The list is on the NOAA webpage; *see* Exhibit 9.

[35] See http://www.nmfs.noaa.gov/pr/species/concern/#list [Accessed June 2010].

[36] 16 USC § 3951, et seq.

[37] U.S. ARMY CORPS OF ENGINEERS, LOUISIANA COASTAL AREA ECOSYSTEM RESTORATION STUDY (2010), *available at* http://www.mvn.usace.army.mil/environmental/lca.asp. (Accessed May 3, 2010) (hereinafter "Exhibit 29").

would cost up to $14 billion over 30 years (*see* Exhibit 27). However, the federal government was unwilling to follow up on this plan—and proposed to Congress that LCA be granted only $2 billion for select projects (*Id.*). While Hurricane Katrina's destruction re-inspired the federal government to seek a more comprehensive solution to wetland loss and various agencies have been working on recovery plans, very little action has been taken since 2005 (*see* Exhibit 29).

Inadequate Regulation of Coastal Development

Both federal and state actions have failed to adequately regulate the dock-side gaming industry. The Clean Water Act at the federal level, and the Mississippi Wetlands Protection Act at the state level, are the two main pieces of legislation that federal and state agencies use to regulate dock-side gambling in Mississippi. In spite of these laws "there are weaknesses in the permit approval process that are allowing for the continued deterioration of the coastal environment."[38] Yet, despite these significant weaknesses, the state of Mississippi holds out its experience as a model for other Gulf coast states to follow: "[s]tates that are looking at doing . . . gaming . . . should come and study Mississippi's experience" (Exhibit 38). A spokesperson for the Mississippi Department of Marine Resources considers its dock-side gambling experience a success because dock-side gambling's economic advantages outweigh its permanent wetland impact. A spokesperson for the Mississippi Department of Marine Resources revealed "[Mississippi's coastal program] allows for the destruction of wetlands if the economic impact outweighs the environmental concerns. A billion dollars outweighs a lot of concerns" *Id.* In encouraging other Gulf Coast states to follow their example, Mississippi invites them to permanently discard their wetlands and any species that depend on this habitat, including the Topminnow. When considering listing a species under the ESA, the Secretary may not take economic concerns into account. In the face of weak state legislation, such as the Mississippi Wetlands Protection Act, the ESA's provisions offer the Saltmarsh Topminnow its best chance of survival.

Inadequate Protection Through the Clean Water Act

The primary federal statute designed to address water pollution, the Clean Water Act ("CWA")[39] fails to protect wetlands from dead-zone-inducing agricultural run-off pollution. As one scholar points out, the CWA "contains exemptions for many agricultural activities and more importantly completely excludes from its major regulatory program the majority of pollution-laden runoff (e.g. fertilizers, pesticides, and animal wastes) from farms into the nation's waters."[40] The CWA created a National Pollutant Discharge Elimination System ("NPDES"), which requires polluters to obtain permits for any pollutant discharge into the waters of the United States.[41] However, the CWA, which breaks down pollution into two broad categories, point source and nonpoint source, defines agricultural run-off as a non-point source--NPDES permitting requirements do not extend to nonpoint source water pollution.[42] Petitioners previously

[38] Amanda B. Wallis, *Gaming and the Environment on the Mississippi Gulf Coast*, 12 GAMING L. REV. & ECON. 1-19,1 (2008).
[39] 33 U.S.C. §§ 1251-1387.
[40] Mary Jane Angelo, *Corn, Carbon, and Conservation: Re-Thinking U.S. Agricultural Policy in a Changing Global Environment*, 17 GEO. MASON L. REV. 593-660, 613(2010).
[41] 33 U.S.C. § 1342.
[42] The CWA defines the term "point source" as "any discernable, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture." 33 U.S.C. §1362(14).

discussed the adverse effects of these agricultural pollutants on the Topminnow. The CWA continues to leave the nation's wetlands and the species that depend on them, including the Topminnow, susceptible to hydroxic zones.

C. Other Natural or Manmade Factors Affect the Continued Existence of the Saltmarsh Topminnow

Biological Vulnerability

As discussed above, the Topminnow has a very low rate of reproduction (*see* Exhibit 11; *see also* Exhibit 4). Additionally, as noted above, due to the limited individual range of each Saltmarsh Topminnow, different populations do not intermix (*see* Exhibit 9). The resultant genetic isolation and small population sizes increase the likelihood of extinction. FWS has recognized this threat for other species. For the Langford's tree snail (*Partula langfordi*), the Service relies on citations not specific to *Partula langfordi* that indicate the threat to survival presented by limited population numbers even without other known threats; for another imperiled snail (*Ostodes strigatus)*, FWS states, "[e]ven if the threats responsible for the decline of this species were controlled, the persistence of existing populations is hampered by the small number of extant populations and the small geographic range of the known populations."[43] NMFS and/or FWS should similarly analyze whether population size and isolation are threats to the Topminnow or may become threats in the foreseeable future.

Human Population Growth

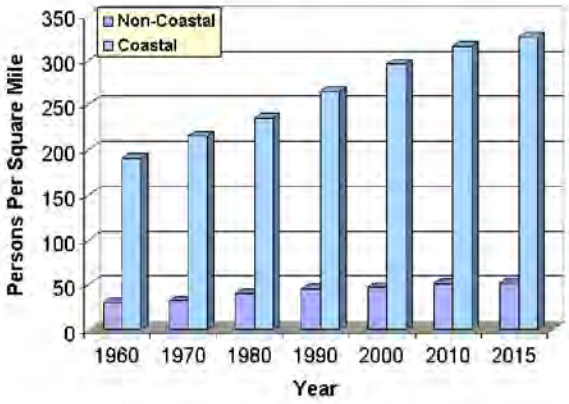
Human population increase within the range of the Saltmarsh Topminnow presents an additional threat to this species. The National Oceanic and Atmospheric Administration (NOAA) has noted the pressure of growing human populations on coastal ecosystems:

> As the global population continues to increase and demographic shifts toward coastal areas persist, even greater pressures will be placed on nearshore resources to satisfy human desires for food, culture, tourism, recreation, and profit (Waddell and Clarke 2008).

Figure 7, developed by NOAA, illustrates vividly the greater human population density in coastal areas since the 1960s and projected to increase in the future.

[43] Listing Form for *Partula langfordi*. 2009, *available at* http://ecos.fws.gov/docs/candforms_pdf/r1/G0A1_I01.pdf. (Accessed May 3, 2010) (hereinafter "Exhibit 39"); Listing Form for *Ostodes strigatus*. 2009, *available at* http://ecos.fws.gov/docs/candforms_pdf/r1/G0A5_I01.pdf. (Accessed May 3, 2010) (hereinafter "Exhibit 40").

Figure 6: Population density in coastal versus non-coastal areas of the US.



Source: NOAA.[45]

The pressures of human population growth are especially present along the United States Gulf Coast, within the Topminnow's range. The EPA Gulf of Mexico Program reports:

> The coastal population of the five states of the Gulf of Mexico is projected by the Census Bureau to increase from a total of 44.2 million in 1995 to an estimated 61.4 million in 2025, nearly a 40% increase. Texas and Florida are the most rapidly growing states.

See EPA (2010).[46]

Cumulative Impacts

Most scientists recognize that multiple threats imperil the Saltmarsh Topminnow. The loss of habitat (due to various factors), combined with a low reproduction rate and population isolation should be considered a cumulative threat to this species. NMFS and/or FWS should assess the synergistic effects of multiple factors in its ESA status review for this species.

VI. VALUE OF ESA LISTING

The Saltmarsh Topminnow is unique to waters off several U.S. states. Federal listing of this species under the ESA would help ensure (for example):

- Adequate habitat protections, recovery planning, and funding for this species.
- Consultation by NMFS and FWS with other federal agencies on projects that entail federal permitting or funding. These projects include (for example) coastal and off-shore drilling permitted by the U.S. Department of the Interior and levee and canal construction by the U.S. Army Corps of Engineers, that may jeopardize the species.

[45] See http://www.csc.noaa.gov/coastal/images/NeedFig1.gif [Accessed July 2010].
[46] U.S. Environmental Protection Agency. 2010. "General Facts about the Gulf of Mexico". EPA Gulf of Mexico Program. Available at: www.epa.gov/gmpo/about/facts.html. Accessed July 2010.

- Preservation of saltmarshes and the wetlands within which they exist. Wetlands are an invaluable national resource.[47] Researchers note that more than 60% of commercially important fish species on the Atlantic and Gulf of Mexico coasts depend on wetlands during their life cycle.[48] Wetlands also serve as efficient filters for contaminants in industrial discharges and runoff, help maintain water quality, retard erosion, retain flood waters, and provide recreational activities (*See* Exhibit 19: 377).

VII. CRITICAL HABITAT

Petitioners also request the designation of critical habitat for the Topminnow concurrent with its listing.[49] Critical habitat should include areas on the Texas, Louisiana, Mississippi, Alabama, and Florida coasts that lie within the range of this species (*see* Figure 2 for current range). The constituent elements of the critical habitat should include shallow tidal meanders of *Spartina* saltmarsh (Peterson and Turner 1994 at p. 253; Peterson et al. 2003) of around 50 cm (Thompson 1999: 4-5) with a salinity level between 1-4ppt (Thompson 1980 at 518; Gilbert and Relyea at 70) and not more than 20ppt (*see* Peterson et al. 2003 at 56; *see also* Exhibit 10; Exhibit 13 at 518; Exhibit 43 at 142). The meanders should contain aquatic vegetation such as *Juncus roemerianus* or *Spartina alterniflora* (Peterson et al. 2003 at 51; Thompson 1980 at 518).

VIII. CONCLUSION

As Petitioners have demonstrated, the Saltmarsh Topminnow, a recognized species, is in danger of extinction throughout all or a significant portion of its range, and therefore, should be listed as endangered or threatened under the ESA. As discussed at the outset, this Petition seeks the listing of the species throughout its historic and current range. The listing is warranted, given the threats this species faces. The Saltmarsh Topminnow is threatened by at least three listing factors: present destruction, modification, or curtailment of its range or habitat; the inadequacy of existing regulatory mechanisms; and other natural or manmade factors affecting its continued existence. ESA listing will permit the development of regulations outside the scope of its present designation by NMFS as a species of concern. Petitioners also request that critical habitat be designated for this species concurrent with final ESA listing.

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[47] *See, generally,* S. Meyer-Arendt et al., *Wetland Changes in Coastal Mississippi, 1950s to 1992*, *in* 2 MARINE RESOURCES AND HISTORY OF THE MISSISSIPPI GULF COAST 377-401 (L.A. Klein, M. Landry, and J.E. Seward eds., 1998) (hereinafter "Exhibit 19").

[48] S.W. Waste, *NMFS Office of Habitat Conservation: Protecting the Habitats of Living Marine Resources*, 21 FISHERIES 24-29 (1996) (hereinafter "Exhibit 20" at 27).

[49] *See* 16 U.S.C. § 1533(a)(3)(A); *see also* 50 C.F.R. § 424.12.

VIV. REFERENCES CITED

Exhibit 1: C.M. Roberts & J.P. Hawkins, *Extinction Risk in the Sea*, 14 TRENDS IN ECOLOGY AND EVOLUTION 241-246 (1999).

Exhibit 2: J.A. Musick et al., *Marine, Estuarine, and Diadromous Fish Stocks at Risk of Extinction in North America (Exclusive of Pacific Salmonids)*, 25 ENDANGERED SPECIES 6-30 (1999), *available at* http://www.cresli.org/cresli/pdf%20documents/fisheriesnov.pdf. (Accessed May 3, 2010).

Exhibit 3: M.S. Peterson et al, *Status and Habitat Characteristics of the Saltmarsh Topminnow, Fundulus jenkinsi (Evermann)*, *in* 15 EASTERN MISSISSIPPI AND WESTERN ALABAMA COASTAL BAYOUS 51-59 (2003), *available at* http://www.usm.edu/gcrl/user_files/user_files/291/Peterson%20et%20al%20Fjenkinsi.pdf. (Accessed May 3, 2010).

Exhibit 4: NATURESERVE, *FUNDULUS JENKINSI* (EVERMANN, 1892), CONSERVATION STATUS FACTORS (2010), *available at* http://www.natureserve.org/explorer/servlet/NatureServe?searchSciOrCommonName=fundulus+jenkinsi. (Accessed May 3, 2010).

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Exhibit 8: FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION, FLORIDA'S WILDLIFE LEGACY INITIATIVE: COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY (2005), *available at* http://www.myfwc.com/docs/WildlifeHabitats/Legacy_Strategy.pdf. (Accessed May 3, 2010).

Exhibit 9: NOAA, SPECIES OF CONCERN, *SALTMARSH TOPMINNOW: FUNDULUS JENKINSI* (2010), *available at* http://www.nmfs.noaa.gov/pr/pdfs/species/saltmarshtopminnow_highlights.pdf. (Accessed May 3, 2010).

Exhibit 10: J.D. Lopez et al., *Distribution, Abundance, and Habitat Characterization of the Saltmarsh Topminnow, Fundulus jenkinsi (Everman 1892)*, ESTUARIES AND COASTS (forthcoming (a)).

Abstract online at: http://www.springerlink.com/content/q027j4122gn71001/. (Accessed September 2, 2010).

Exhibit 11: ITIS REPORT, FUNDULUS JENKINSI (EVERMANN, 1892) (2010), *available at* http://www.itis.gov/servlet/SingleRpt/SingleRpt. Enter "fundulus jenkinsi." (Accessed May 3, 2010).

Exhibit 12: B. THOMPSON & G.W. PETERSON, NATIONAL FISH AND WILDLIFE FOUNDATION, EXAMINING ARTIFICIAL WETLANDS: ARE WE BUILDING SUITABLE HABITAT FOR *FUNDULUS JENKINSI*, A FEDERAL CANDIDATE SPECIES? FINAL REPORT, 1 August 2001.

Exhibit 13: B. Thompson, *Fundulus jenkinsi (Evermann). Saltmarsh topminnow, in* ATLAS OF NORTH AMERICAN FRESHWATER FISHES 518 (D.S. Lee, et al. 1980).

Exhibit 14: B. THOMPSON, NATIONAL MARINE FISHERIES SERVICE, AN EVALUATION OF THE SALTMARSH TOPMINNOW, *FUNDULUS JENKINSI,* FINAL REPORT, 20 August 1999 revision.

Exhibit 15: D.G. Simpson & G. Gunter, *Notes on Habitats, Systematic Characters and Life Histories of Texas Salt Water Cyprinodontes*, 4 TULANE STUDIES IN ZOOLOGY 115-134 (1956).

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