BEFORE THE SECRETARY OF THE INTERIOR

PETITION TO LIST THE STIPPLED STUDFISH (*Fundulus bifax*) UNDER THE ENDANGERED SPECIES ACT

Stippled studfish (*Fundulus bifax*) Illustration © Joseph R. Tomelleri

Submitted by:

CENTER FOR BIOLOGICAL DIVERSITY

July 1, 2024

NOTICE OF PETITION

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Pursuant to section 4(b) of the Endangered Species Act ("ESA"), 16 U.S.C. § 1533(b); section 553(e) of the Administrative Procedure Act ("APA"), 5 U.S.C. § 553(e); and 50 C.F.R. § 424.14(a), the Center for Biological Diversity ("Center") hereby petitions the Secretary of the Interior, through the U.S. Fish and Wildlife Service ("Service"), to protect the stippled studfish (*Fundulus bifax*) as an endangered or threatened species under the ESA and to concurrently designate critical habitat with such listing.

The Service has jurisdiction over this petition, which sets in motion a specific process that places nondiscretionary response requirements on the Service. Specifically, the Service must issue an initial finding as to whether the petition "presents substantial scientific or commercial information indicating that the petitioned action may be warranted." 16 U.S.C. § 1533(b)(3)(A). The Service must make this initial finding "[t]o the maximum extent practicable, within 90 days after receiving the petition." *Id.* As indicated above, the Center also requests that critical habitat be designated for the stippled studfish concurrently with the species being listed, pursuant to 16 U.S.C. § 1533(a)(3)(A) and 50 C.F.R. § 424.12.

The Center is a non-profit, public interest environmental organization dedicated to the protection of native species and their habitats through science, policy, and environmental law. Supported by more than 1.7 million members and online activists, the Center works to secure a future for all species, great or small, hovering on the brink of extinction.

Petitioner submits this petition on behalf of the Center, our staff, and our members who hold an interest in protecting the stippled studfish and preventing its extinction.

Submitted this 1st day of July 2024.

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EXECUTIVE SUMMARY

The stippled studfish (*Fundulus bifax*) ("studfish") is a rare and highly imperiled fish, currently found only in a few tributary streams of the upper Tallapoosa River and a single tributary to the Coosa River in Alabama. The studfish was once widespread across the Coosa and Tallapoosa River systems in Alabama and Georgia, but it is now rare in Alabama and has not been found since 1990 in Georgia, where it is now presumed to be extirpated. Because the dazzling little studfish lives in only a few streams in low numbers, it is highly vulnerable to natural and human-caused threats.

The studfish is in danger of extinction, or likely to become so within the foreseeable future, due to habitat degradation and fragmentation and lack of federal protection. The studfish is a narrow endemic, meaning its limited distribution makes it highly susceptible to habitat alteration. Current regulations and management actions are inadequate to protect the studfish from the many threats to its existence. In 2012, the International Union for Conservation of Nature ("IUCN") placed the species on the Red List, with the status of near threatened, based on a decline in population and habitat.

ESA listing provides the only effective mechanism to protect the studfish from extinction. The Center, thus, respectfully requests that the Service list the studfish as an endangered or threatened species under the ESA and concurrently designate critical habitat to provide the studfish with essential and much-needed legal protections across what is left of its range.

A species is determined to be endangered if the species is at risk of extinction in all or a significant portion of its range. A species is threatened if the species is at risk of becoming endangered in the foreseeable future in all or a significant portion of its range. The Service shall list a species if any one of five factors is present:

(A) the present or threatened destruction, modification, or curtailment of its habitat or range;
(B) overutilization for commercial, recreational, scientific, or educational purposes;
(C) disease or predation;
(D) the inadequacy of existing regulatory mechanisms; or
(E) other natural or manmade factors affecting its continued existence.

This petition seeks ESA protection for this nationally and globally imperiled species based on the best scientific information and in the context of the five listing factors.

INTRODUCTION

The stippled studfish is a slender, iridescent freshwater fish, so named for the interrupted rows of red-orange speckles along its sides in a stippled pattern. The studfish once lived throughout the Tallapoosa River system of the Alabama River basin across both Alabama and Georgia, but the studfish now is considered extirpated in Georgia and is extremely rare in Alabama, where it is restricted to only a handful of tributary streams within the Tallapoosa River basin and one tributary to the Coosa River.

Due to its presence in only a few, fragmented streams often in very low numbers, the studfish faces a significant risk of extinction due to many threats to its existence, including residential and industrial development, agriculture, timber extraction, pipelines, dams, and climate change.

I. Natural History and Biology of the Stippled Studfish

a. Taxonomy

The studfish is a member of the *Xenisma* clade in the killifish genus *Fundulus,* more commonly known as topminnows, of which there are six extant *Xenisma* or studfish species (Ghedotti et al. 2004, p. 56). When first described, the stippled studfish was separated from the closely related southern studfish (*Fundulus stellifer*) based on pigmentation differences and complete allelic differentiation at six gene loci detected by allozyme tests (Cashner et al. 1988, pp. 676-678). The two studfish have parapatric distributions within the Alabama River system (*Id.*).

b. Species Description

The studfish is a light-gold iridescent topminnow with silver-blue sides marked by short, interrupted rows of dark red to reddish-orange spots, producing a staccato-like appearance (Freeman 1999, p. 1). The studfish's paired fins are blue-gray, and the caudal and dorsal fins lack marginal black bands (Cashner et al. 1988, p. 678; Freeman 1999, p. 1). During the breeding season, the flanks of the studfish turn sky blue, fading to dark blue-brown dorsally and white (Freeman 1999, p. 1). Cheeks are white with flecks of blue and gold (Cashner et al. 1988, p. 678). Spade-like upper and lower lips are used to dive into gravel and sand for spawning and food (Scanlan 2008, p. 10).

Adult studfish can reach 4.7 inches (120 mm) total length. A reproductive male with the breeding coloration is shown above and non-reproductive males are shown below.

c. Life History

Due to their flashy coloration and feeding habits, topminnows are often some of the most visible species in their native habitats. As their name suggests, topminnows feed at the top of the water column; as a result, they are typically observed near the surface of shallow waters in small groups, often lying motionless until startled (Cashner et al. 2019, p. 549). This top-feeding behavior is possible because topminnows have swim bladders, which allow them to maintain neutral buoyancy while using pectoral and other median fins for low-speed swimming or maneuvering (Cashner et al. 2019, p. 559).

Stippled studfish typically live about 2-3 years and are found in medium sized streams, typically along the edge of the current (Stallsmith 2013, p. 19).

d. Reproduction

Reproduction in topminnows typically involves depositing a relatively small number of large, clear, adhesive eggs onto some kind of instream substrate (Cashner et al. 2019, pp. 585-586). All *Xenisma* species spawn by diving into sand substrate and depositing eggs (Scanlan 2012, p. 17). Successful reproduction requires that the sand be clean with little

organic debris (Scanlan 2012, p. 21). Otherwise, microbial degradation of such debris consumes the oxygen from the sand and can smother developing eggs.

The studfish's spawning begins when the water temperature reaches 70 degrees Fahrenheit and peaks between 75-80 degrees Fahrenheit. Spawning begins in late April or early May, depending on the weather, and ceases altogether in hot July temperatures, corresponding to the lengthening of daylight and rising water temperatures (Scanlan 2012, p. 18).

When spawning, stippled studfish display a prolonged period of "cleaning" the gravel substrate that precedes the spawning act, during which the male leads off by picking up mouthfuls of gravel and spitting them out. Actual spawning begins when he displays before the female by snapping his head downward, to show the place of spawning. He does not actually pick up gravel during the spawning act itself, but rather moves his head as if he is going to. Only his chin or lips touch the gravel at this time (Scanlan 2008, p. 10).

The female appears to ignore the male's attention until she suddenly assumes a vertical position over the gravel and plunges her entire head into it, bringing up a large mouthful. She then positions herself over the small depression she has made in the gravel. The male immediately positions himself directly parallel to her, and both list at a 45˚ angle and, with much excited quivering, sink a little toward the small depression. The female spits out the gravel, either before, during, or after the sex act. Within a matter of seconds, or usually minutes, the act is repeated and continues for several hours, which may indicate that the female releases only a single egg at a time (Scanlan 2008, p. 10).

Studfish fry continue to appear over a period of two weeks, which may indicate that spawning activity continues almost daily. This is further evidenced by the fact that at the end of the two-week period of hatching, all the fry are of different sizes, with the first-hatched fry being almost twice as big as the last-hatched (Scanlan 2008, p. 10).

e. Diet

It is presumed that the studfish's diet is similar to those of the southern studfish and the northern studfish, whose diets range from aquatic and terrestrial insects and larvae to small snails, fish eggs, and tadpoles. According to Scanlan (2008), the feces of wild-caught stippled studfish usually contain insect parts, indicating they consume benthic insects. This may explain why the fish is not found in degraded streams (Scanlan 2008, p. 9).

f. Habitat Requirements

The studfish is a habitat specialist that inhabits clear, medium-sized streams. For successful spawning, the studfish requires extensive, clean benthic sand and fine gravel conditions with excellent filtration and aeration (Scanlan 2008, p. 11; Stallsmith 2013, p. 24). The studfish's preferred habitat includes pools, stream margins, and backwaters over sand or rocky substrate (Freeman 1999, p. 1).

g. Current and Historic Range

The studfish is endemic to the Tallapoosa River system of Alabama and northwest Georgia, and it has also been found more recently in Sofkahatchee Creek, a westward flowing

tributary of the lower Coosa River system of Elmore County, Alabama. Historically, the studfish could be found in streams across the watershed in both states, but it is now quite rare in Alabama (Cashner et al. 1988, p. 675), has not been collected in Georgia since the 1990s, and is presumed to be extirpated there (Stallsmith 2013, p. 24).

The studfish's current range is restricted to the upper Tallapoosa River in Alabama, above or near the Fall Line, and a single location in Sofkahatchee Creek, a tributary to the Coosa River in Alabama (Freeman 2019, p. 2). The studfish is only found in streams surrounded by healthy forests (Scanlan 2008, p. 11). Collections in 2013 found studfish at discrete locations in Sofkahatchee Creek, Elkahatchee Creek, Channahatchee Creek, Cornhouse Creek, Hillabee Creek, Broken Arrow Creek, and Emuckfaw Creek (Stallsmith 2013, p. 21).

The Coosa River originates in northwest Georgia, meanders in a southwesterly direction into Alabama and connects with the Tallapoosa River near the town of Wetumpka in the east-central portion of the state. These two rivers' union becomes the Alabama River, which continues to flow southwest until it reaches the headwaters of Mobile Bay. See map below.

The Alabama-Coosa-Tallapoosa River system flowing into Mobile Bay, Alabama

h. Population Status

The total adult studfish population is unknown due to a general lack of data. The University of Alabama Ichthyology Collection has studfish collections from thirteen sites in Alabama from Coosa, Elmore, Randolph, and Tallapoosa counties. Visits to those sites in 2008 found studfish at eight of the thirteen historic sites on six creeks (Stallsmith 2013, p. 21). At four of those sites, at least one studfish could be easily collected: Cornhouse Creek in Randolph County, Sofkahatchee Creek in Coosa County, and two sites on Hillabee Creek in Tallapoosa County (*Id.*). At another site, Sweetwater Creek, there were few fish found of any species, and the site showed evidence of severe stream degradation from timber harvesting (*Id.*, p. 22). The authors noted that the studfish were only found in creeks that, at the time of the collections in 2013, were "relatively pristine, with clear water and abundant clean sand that this species needs both for feeding and reproduction," and that the creeks all ran through "relatively undisturbed land, with woodlands or well-managed farms" making up much of the drainage (Stallsmith 2013, p. 24).

The last collection of the studfish in Georgia was in 1990, and the species is considered extirpated in the state (*Id.*). It is unknown whether populations of the studfish existed at sites between the current locations in east Alabama, and further north in Georgia in the Little Tallapoosa River system. Eleven possible sites in this gap were visited in 2008 in Clay, Cleburne and Randolph counties in Alabama, but no studfish were found at any of these sites, and many of them were degraded from poor land management (*Id.*, p. 22).

II. Threats to the Stippled Studfish (Five Listing Factors)

The studfish indisputably warrants listing under the ESA due to numerous threats to its continued survival, detailed below within the context of the five listing factors.

a. Factor 1: Present or Threatened Destruction, Modification, or Curtailment of Habitat

As discussed below, the studfish is at risk of extinction due to its extremely small range and the present and threatened destruction and modification of its habitat by degraded water quality and reduced water quantity. Legacy and ongoing pollution, nutrient loading, damage to spawning gravels, and loss of riparian shade due to residential, industrial, and agricultural development and timber operations all threaten the studfish's habitat.

The studfish's habitat has also been fragmented and further degraded by dams and reservoirs throughout the Alabama-Coosa-Tallapoosa watershed. The Coosa River is believed by scientists to "hold the dubious distinction of having more recent extirpations and extinctions of aquatic organisms than any other equally sized river system in the United States," with the loss of several fish species mostly caused by a series of large impoundments, pollution, and logging (Burkhead et al. 1997, p 6).

i. Pollution and Sedimentation from Agriculture, Timber, and Development

Because the studfish can only spawn and survive in streams with cool water and clean substrate, the greatest threat to the studfish is the fouling of streams by pollution (Scanlan

2008, p. 11). Degradation of stream margin habitat and excessive sedimentation due to poor riparian management, clearcutting, and aggressive timber operations threaten the studfish and its spawning habitat (Freeman 1999, p. 2).

The studfish thrives in cool upland streams that flow from densely forested areas, such as the Talladega National Forest (Scanlan 2008, p. 11). This indicates that, to survive, the studfish needs streams with high-quality water shaded by riparian trees. Excess siltation from logging and timber activities chokes spawning habitat for the studfish.

Sofkahatchee Creek is the single tributary to the Coosa River where stippled studfish can be found. When it rains, Sofkahatchee Creek is often buried by large amounts of dirt running off clear-cut timber lands (*see* Coosa Riverkeeper, p. 3). Sofkahatchee Creek has also been observed to be a dump site for household trash, and visitors often find car batteries, tires, toilets, sinks, electronics such as radios and televisions, and other discarded items (*Id.*; *see* Arwood 2017 Article from Wetumpka Herald, p. 2).

The ecological integrity of the Alabama-Coosa-Tallapoosa watershed, which includes the Tallapoosa and Coosa rivers, is threatened by human population expansion and urbanization, which increases pressures on the rivers' water supplies (Freman et al. 2005, p. 562). As the rapid expansion of the human population drives increased residential development and urbanization, the deforestation and increased runoff that invariably goes along with it will drive further declines of this species and harm to its habitat.

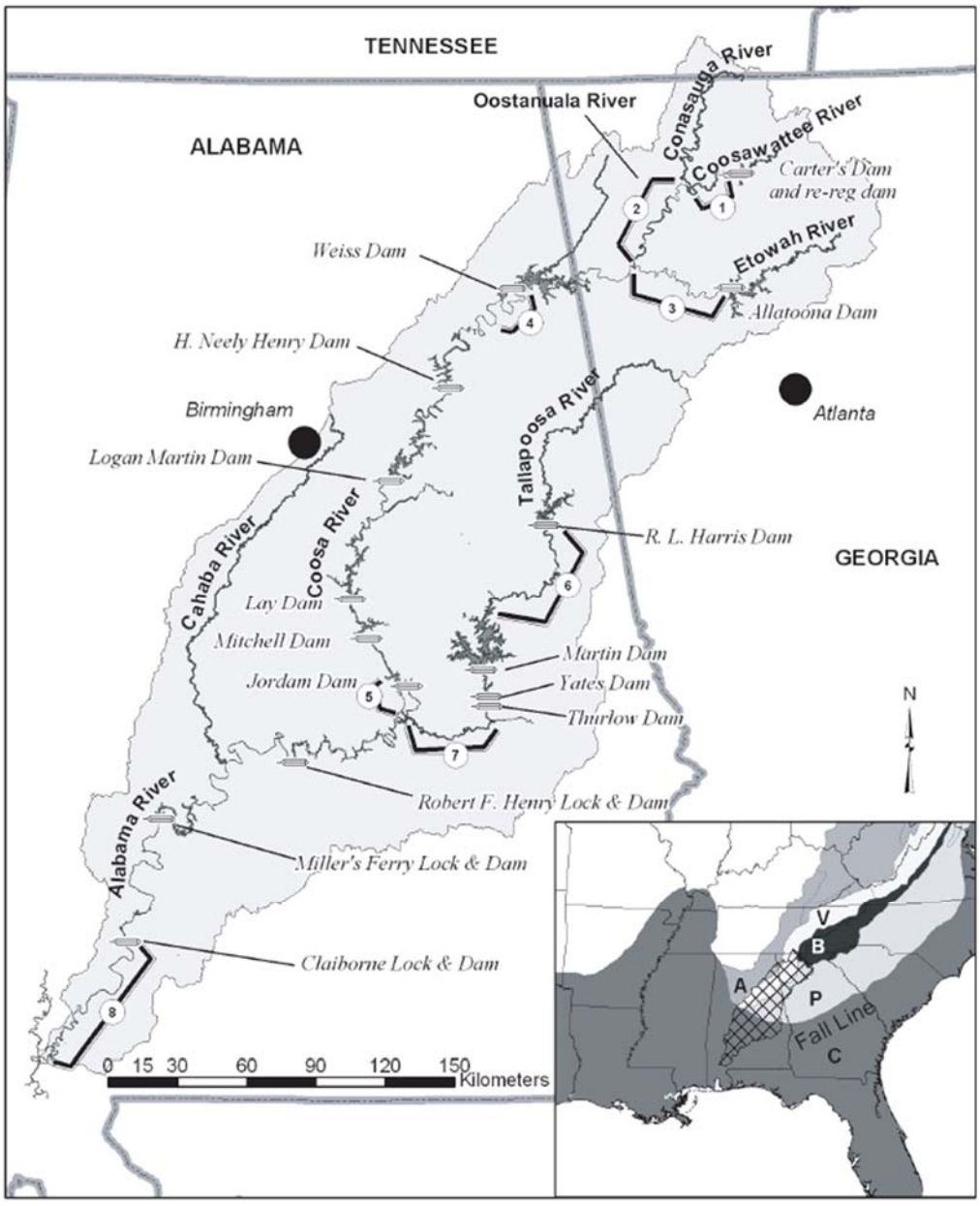
For decades, large poultry farms and farming activity has expanded in western Georgia, where no studfish has been collected since 1990. Due to agricultural development in the area, the Tallapoosa River is loaded with nutrients as it enters Alabama. Lake Wedowee (R. L. Harris Reservoir) traps these nutrient-rich waters, serving as a filter, and the water coming out below the dam is of better quality than the water flowing into it from the state of Georgia (Scanlan 2008, p. 11). Nevertheless, as described below, dams throughout the studfish's range pose additional threats.

ii. Dams and Reservoirs

The Alabama-Coosa-Tallapoosa watershed is managed by the U.S. Army Corps of Engineers ("Corps") Mobile District, under the supervision of the Corps' South Atlantic Division headquartered in Atlanta, Georgia. The Alabama-Coosa-Tallapoosa watershed contains a series of dams, reservoirs, and locks controlled by the Corps, as well as dams and reservoirs controlled by the Alabama Power Company.

River impoundment drastically changes rivers and riverine habitat, and permanently alters the natural environment. The construction of dams on the Coosa River has already sent 36 species into extinction (Lydeard et al. 2004, entire). The effects of large dams on aquatic organisms and their habitats in large rivers have been well documented: Dams prevent migration of fish and other aquatic animals, effectively preventing gene flow and eliminating significant areas of spawning habitat by preventing upstream movement and burying habitat under impoundments (Chen et al. 2023, pp. 3-6). Dams also create sediment-laden reservoirs that change the hydrology, temperature, and flow of rivers and create unsuitable habitat conditions for native fishes (*Id.* pp. 6-14). Reservoirs also increase the likelihood of predation and disease (*Id.* p. 17).

The studfish's native range is fragmented by four large dams and reservoirs on the Tallapoosa River before it joins the Coosa River near Montgomery to become the Alabama River, and eight Alabama Power dams on the Coosa River that hold back six recreational lakes used for fishing, lake homes, and boating (see map below). In the area along the Tallapoosa River where studfish were collected in 2013, two dams and large reservoirs both block the studfish's ability to disperse and change riverine habitat to lacustrine, degrading habitat necessary for the studfish to successfully spawn (Stallsmith 2013, p. 23).



Map of Alabama-Coosa-Tallapoosa watershed, including Alabama, Coosa and Tallapoosa main stems, major tributaries, and locations of main-stem dams. Flow-regulated reaches are numbered 1-8. Inset shows watershed (cross-hatched) overlain on physiographic provinces: Appalachian Plateau (A), Valley and Ridge (V), Blue Ridge (B), Piedmont (P), and coastal plain (C). The fall line separates the coastal plain from upland provinces.

iii. Pipelines

The studfish in Hillabee Creek are threatened by inevitable leaks from the Sabal Trail Pipeline (*see* Arwood 2017, article from Wetumpka Herald at 2).

The Sabal Trail Pipeline is a 517-mile interstate pipeline that transports fracked gas from stations in Tallapoosa County, Alabama, through southwest Georgia to Orlando, Florida that became operative in 2017 (*see* https://sabaltrailtransmission.com/about/).

Fracked or natural gas pipelines threaten freshwater fish in multiple ways, including by causing erosion during construction, vegetation disturbance during pipeline maintenance, and stream pollution from ongoing herbicide use and any spills or leaks. The construction and operation of pipelines can harm fish when sediment is released into streams and rivers during road building, road washouts, and the construction of water crossings (*see generally* The Nature Conservancy 2015). Certain concentrations of sediment can kill fish directly, and sediments can also increase the amount of stress that fish experience, disrupting their feeding, growth, social behavior, and susceptibility to disease (Burtwell 2000, p. 34). Sediments may also impact fish eggs and affect the survival of juvenile fish, and make water cloudy, interfering with light penetration, reducing the number of plants, and decreasing the habitat for insects that fish rely on for food.

When fracked gas pipelines cross rivers and streams, any ruptures, spills, and leaks can be devastating for the waters and the wildlife who live in them. Areas downstream of a spill are at significant risk of short- and long-term negative impacts, such as death or disease of fish, aquatic insects, birds and other wildlife, and contamination of water supplies (*see generally* West Coast Environmental Law).

From 1986 to 2013 there were more than 8,000 significant pipeline leaks in the United States (Stover & Center for Biological Diversity 2014), and the number of significant pipeline leaks has increased by nearly another 3,000 in the past decade as new pipelines have been constructed (*see* PHMSA Report 2004-2023).

In 2016, during the Sabal Trail Pipeline's construction, the pipeline leaked drilling mud into the Withlacoochee River (*see* Evans, WFSU Public Media article 2016) and leaked mercaptan into the air twice in 2017 (*see* Lipscomb, Miami News Times article 2017).

b. Factor 4: The Inadequacy of Existing Regulatory Mechanisms

Despite a variety of federal and state laws that generally protect the environment and wildlife, there is simply no existing regulatory or legal mechanism sufficiently protective of the studfish, much less any mechanism for protecting a fish species that is on the precipice of extinction to ensure its ultimate survival and recovery. Based on this regulatory vacuum that neglects and wholly fails to protect the species, we strongly recommend listing to ensure that appropriate resources and conservation efforts are maximized to give the stippled studfish the optimal chance of survival. 16 U.S.C. § 1533(a)(1)(D).

In Alabama, the stippled studfish is classified as an imperiled species, although it is not included on the list protected nongame fishes (Alabama Code § 9-2-7 2020), nor is it listed

as a Species of Greatest Conservation Need in the State Wildlife Action Plan (Alabama State Wildlife Action Plan 2015 – 2025). In fact, the Alabama Department of Conservation and Natural Resources has listed the species within its "Freshwater Fishing" section (Alabama Department of Conservation and Natural Resources, S*tippled Studfish* 2024).

In Georgia, the stippled studfish is listed as endangered (Georgia Biodiversity Portal, *fundulus bifax* 2016).

c. Factor 5: Other Natural or Manmade Factors

i. Climate Change

Earth's climate system is rapidly changing, causing widespread impacts that are projected to increasingly affect humans and animals, especially those species that cannot adapt quickly. Climate change also causes increased severity and occurrence of droughts, and the percentage of the southeast United States experiencing moderate to severe drought has already increased over the past several decades (Karl et al. 2009, p. 33). Since the mid-1970s, the area of moderate-to-severe spring and summer drought in the southeast has increased by 12 percent and 14 percent, respectively (*Id.* p. 111). Although fall precipitation tended to increase in most of the southeast, the extent of region-wide drought still increased by 9 percent (*Id.*). From 2007-2008, the Coosa River watershed in Alabama and Georgia experienced severe drought that brought congressional attention to the resulting and ongoing interstate water conflict among Alabama, Florida, and Georgia over water allocation (Brougher et al. 2008, entire).

Climate models project both continued warming in all seasons across the southeast and an increase in the rate of warming (Karl et al. 2009, p. 111-112). The warming projected for the southeast during the next 50 to 100 years is projected to create heat-related stress for people, agricultural crops, livestock, trees, transportation and other infrastructure, fish, and wildlife (*Id.* p. 113). Several climate models have projected more frequent drought, more extreme heat (resulting in increased air and water temperatures), increased heavy precipitation events (e.g., flooding), more intense storms (e.g., increased frequency of major hurricanes), and rising sea level and accompanying storm surge (Seneviratne 2021, entire).

When considering future climate projections for temperature and precipitation for the areas of the southeastern United States where the studfish occurs, warming is expected to be greatest in the summer, which is predicted to increase drought frequency. Nevertheless, annual mean precipitation is expected to increase slightly, leading to a slight increase in flooding events (Thackeray et al. 2022, entire; Seneviratne 2021, entire; USGS 2020, unpaginated; Alder & Hostetler 2013, unpaginated).

Changes in climate may affect ecosystem processes and communities by altering the abiotic conditions experienced by biotic assemblages, resulting in harmful effects on community composition and individual species interactions (USGCRP Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II 2018, entire).

As climate change increases the frequency, duration, and intensity of droughts in the southeast (Konrad et al. 2013, p. 34), it is likely to negatively affect stream flows in the region. Stream flow is strongly correlated with important physical and chemical parameters

that limit the distribution and abundance of riverine species (Power et al. 1995, entire; Resh et al. 1988, pp. 438–439) and regulates the ecological integrity of flowing water systems (Poff et al. 1997, p. 770).

This projected warming and resulting drought will negatively affect the studfish. The studfish's breeding typically begins when instream temperatures reach 70 degrees Fahrenheit and peaks when they reach the upper 70 degrees Fahrenheit (Scanlan 2008, p. 9). If the temperature exceeds 80 degrees Fahrenheit, however, spawning activity slows and eventually ceases (Scanlan 2008, p. 9). Hence, warming that results in increased stream temperatures in the region is likely to negatively affect the studfish's breeding patterns and spawning success. Additionally, warming and drought are likely to increase the incidence and intensity of wildfire (Robbins et al. 2024, pp. 2, 23-25), resulting in reduced riparian vegetation to shade and buffer the studfish's habitat from heat and sedimentation.

ii. Low Genetic Diversity, Low Gene Flow, and Potential Loss of Genetic Integrity

The studfish's disjunct populations are vulnerable to diminished gene flow due to low genetic diversity within each population. Although a 2013 survey determined that the studfish was relatively easy to catch in four streams, the survey determined that there is little genetic diversity within these populations, which makes the studfish's few populations less able to respond to stochastic events and habitat disturbance (Stallsmith 2013, p. 24). The threat to the studfish from low genetic diversity is even greater because these populations are now either largely or entirely isolated through habitat fragmentation by the impoundment of the Tallapoosa River that historically connected most studfish populations (Stallsmith 2013, p. 24).

When a species is restricted in range and population size, the species is more likely to suffer loss of genetic diversity due to genetic drift, potentially increasing their susceptibility to inbreeding depression, and reducing the fitness of individuals (Soulé 1980, pp. 157–158). The resulting loss of genetic variation can further result in depressed reproductive success and reduced ability to respond to changes in the physical environment, parasites, and disease (*Id.*). In turn, these effects can increase a population's risk of extirpation (*Id.*)

A study examining the genetic variation between existing populations and between two closely related species compared 852 bases of the mitochondrial cytochrome *b* gene of 10 individuals through neighbor-joining Bayesian tree-building and by calculating genetic distance, *D* (Stallsmith 2013, p. 22). Both analyses showed that the existing population of studfish is monophyletic, with low genetic variation between them (Stallsmith 2013, p. 24). In addition, neither *Fundulus catenatus* nor *Fundulus stellifer* were found to be more closely related to the stippled studfish (*Id.*).

Thus, with only a few disjunct populations, a risk of further habitat degradation, and diminished gene flow, the studfish faces a significant risk of extinction.

III. Request to Designate Critical Habitat Concurrent with Listing

The Center requests that critical habitat for the stippled studfish be designated concurrently with the listing, as required by 16 U.S.C. 1533(b)(6)(C). We request that the

Service designate critical habitat for the studfish in all areas where it is currently located as well as all areas deemed suitable habitat in order to ensure the ultimate survival and recovery of this species.

Federally listed species with designated critical habitat are more likely to make progress toward recovery than species lacking it (Taylor et al. 2005, p. 361-63). Critical habitat designation provides the most effective means of assuring that a listed species' habitat is managed to ensure the species' survival and recovery.

The Secretary is required by the ESA to designate critical habitat concurrent with a determination that a species is endangered or threatened. 16 U.S.C. § 1533(a)(3)(A). Critical habitat is defined as:

> (i) the specific areas within the geographical area occupied by the species, at the time it is listed …, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and
> (ii) specific areas outside the geographical area occupied by the species at the time it is listed …, upon a determination by the Secretary that such areas are essential for the conservation of the species.

16 U.S.C. §1532(5).

The designation and protection of critical habitat is one of the primary ways to achieve the fundamental purpose of the ESA, "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved." 16 U.S.C. § 1531(b).

The few remaining studfish populations will benefit from the designation of critical habitat. The added layer of protection provided by critical habitat will allow the Service to mandate reasonable and prudent alternatives to activities that are impeding recovery but not necessarily causing immediate jeopardy to the continued survival of the species. For these reasons, we request critical habitat designation concurrent with species listing.

CONCLUSION

The Center hereby petitions the Service to list the stippled studfish as an endangered or threatened species under the ESA. Listing is warranted given the rarity of this species and ongoing threats to its continued existence. The studfish is threatened by at least three of the five listing factors under the ESA: A) the present or threatened destruction, modification, or curtailment of its habitat or range; D) the inadequacy of existing regulatory mechanisms; and E) other natural or manmade factors affecting its continued existence. The Center also requests that the Service designate critical habitat for the studfish in occupied habitat and suitable unoccupied habitat concurrently with listing. Designating critical habitat for this species will support its recovery and protect areas crucial to the long-term survival of the few remaining studfish populations.

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