

Southern Tessellated Darter

Etheostoma olmstedii maculaticeps



Photograph by D.G. Bass, FWC.

Species Overview

Status: Listed as state Threatened on Florida's Endangered and Threatened Species List.

Current Protections

- 68A-27.003(2)(a), F.A.C. No person shall take, possess, or sell any of the endangered or threatened species included in this subsection, or parts thereof or their nests or eggs except as allowed by specific federal or state permit or authorization.
- 68A-27.001(4), F.A.C. Take – to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in such conduct. The term “harm” in the definition of take means an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. The term “harass” in the definition of take means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering.

Biological Background

This section describes the biological background for this species and provides context for the following sections. It focuses on the habitats that support essential behaviors for the southern tessellated darter, threats faced by the species, and what constitutes significant disruption of essential behaviors.

The tessellated darter (*Etheostoma olmstedii*) is a moderate-sized darter regularly obtaining sizes of 60 mm (2.36 in) standard length (Gilbert and Yerger 1992). It is typically tan or light brown in color and has a series of 9 to 11 X- or W-shaped brown markings on the side. They have a slightly subterminal mouth, moderately blunt snout and black teardrop below the eye (Robins et al. 2018).

The southern tessellated darter (*Etheostoma olmstedii maculaticeps*), 1 of 3 subspecies of *E. olmstedii*, and is distinguished from the other subspecies by having 2 anal spines. There have been no studies on spawning and fecundity specific to the *E. o. maculaticeps* subspecies, however many studies exist on the spawning behaviour of the tessellated darter. Spawning occurs in the spring, with local temperature dictating the exact timing within a location (Raney and Lachner 1943, Tsai 1972). Tessellated darters spawn in crevices, with eggs generally laid on the underside of objects (usually stones). Males clean and guard the eggs (Constantz 1979). Sexual maturity is reached at 1 year, while maximum age is around 4 years (Raney and Lachner 1943).

The tessellated darter ranges from Ontario, Canada, to northern Florida and is considered common or abundant throughout most of its range (Page and Burr 2011). The southern tessellated darter (*Etheostoma olmstedii maculaticeps*) ranges from North Carolina to northern Florida (Page and Burr 2011).

Habitat Features that Support Essential Behavioral Patterns

The southern tessellated darter typically occurs in small and medium-sized streams in areas with less than maximum flow and a variety of habitat types, including sand, mud, silt, and gravel bottoms (Gilbert and

Yerger 1992). Studies from across its southern range have found evidence of strong seasonal variation in habitat use (Henry and Grossman 2008) as well as habitat selection variation based on the presence or absence of the banded darter (*Etheostoma zonale*, Gray et al. 2005). Shallower regions with slower flows and smaller substrates were selected when banded darters were present, and deeper areas with larger substrates and faster flows were selected when banded darters were absent from a location. As crevice spawners, they require access to complex habitat substrates, usually larger rocks and stones upon which to deposit eggs, which are guarded by males (Constantz 1979). In Florida, it has only been collected from 5 general locations within the Ocklawaha River Basin, with the next closest known population separated by over 200 km (over 124 mi) at the Altamaha River Basin in Georgia (Gilbert and Yerger 1992). The 5 collection locations in the Ocklawaha River Basin include: Davenport Landing, Eaton Creek, Little Orange Creek, and 2 locations in Orange Creek (Figure 1). The first collections were made at Davenport Landing in 1948 and 1949 (McLane 1955). However, follow-up attempts for collecting additional specimens at Davenport Landing in the 1970s and 1994 were unsuccessful (Gilbert and Yerger 1992, Jordan 1994). The Little Orange Creek collection was only made once in 1977. At least 2 collections have been taken from Eaton Creek since 1976. Orange Creek is the only known location in Florida where the southern tessellated darter can be and has been regularly found (Gilbert and Yerger 1992). Since 1975, there have been at least 16 collections made at Orange Creek near County Road 315 and State Road 21, with the most recent collection being taken as recently as June 2015 (Tuten et al. 2016).

Threats

Primary threats to this species include anthropogenic sources of pollution, habitat alteration, population fragmentation, reduced flows, and potential predation, competition, or hybridization with introduced species. Non-point source input of fine sediment into the occupied habitat could adversely affect the tessellated darters by smothering available spawning habitat and or suffocating nests. Additionally, Bass et al. (2004) suggests that habitat fragmentation/destruction due to construction of impoundments has already reduced available habitat for this species in Florida (i.e., Rodman Reservoir). Hybridization could become a threat if other *Etheostoma* species are introduced. Raesly et al. (1990) reported hybrids between *Etheostoma olmstedi* and an introduced species in Pennsylvania.

Habitat degradation is often considered the greatest threat to imperiled species (Wilcove et al. 1998). Certain land practices within the Ocklawaha watershed, and specifically the Orange Creek region could negatively impact southern tessellated darter populations. Land use practices that result in both increased sediment and nutrient loads in the streambed, alterations in the hydrologic regime, destruction of habitat, and changes in shoreline morphology are the primary stressors affecting imperiled aquatic taxa (Richter et al. 1997). Land use changes and the addition of water control structures have altered the hydrologic flows and water quality within the Ocklawaha watershed (Hall 2005), with approximately 57% of the Orange Creek Basin altered for agriculture products (FDEP 2014). Additionally, many impediments to flow exist in this area such as U.S. Highway 301 and adjacent railroad, a diked and channelized portion from an abandoned muck farm at the Orange Lake outflow, as well as a notched concrete weir all combine to have a cumulative impact to the natural flow regime of Orange Creek (Warr et al. 1999).

The known locations within the Ocklawaha River Basin, such as Orange creek, Little Orange Creek, Davenport Landing and Eaton Creek are fragmented and may limit gene flow between populations. The extent of suitable habitat is unknown. Some of the areas may not be currently inhabitable and may also contain species that out-compete the southern tessellated darter. There may be more connections that are unknown due to limited survey information.

Potential to Significantly Impair Essential Behavioral Patterns

Due to the limitations in the range, lifespan, and dispersal capability of this fish, there are a number of activities that could potentially prevent breeding, feeding, or sheltering of the southern tessellated darter.

Changes in land use adjacent to occupied streams could impact both water quantity and quality. Increased runoff can bring harmful pollutants as well as excess sediments that can reduce reproductive success and potential for this species. Water withdrawals from aquifers that interact with surface waters also result in changes in frequency, magnitude, and duration of the natural flow regime and potentially limit the connectivity between stream segments (Annear et al. 2004). Dredging could result in significant structural changes in the available habitat as well as changes in flow regime resulting in loss of suitable varieties of habitats needed to allow for seasonal selection. Additionally, impoundments could lead to further fragmentation and destruction of suitable instream habitats.

Distribution and Survey Methodology

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

Counties: Alachua, Putnam and Marion.

Recommended Survey Methodology

Surveys can be used to determine if southern tessellated darters are present in an area. Surveys should be conducted during project planning by applicants that have a scientific collection permit (see below).

- Surveys for southern tessellated darters are best accomplished using a combination of small mesh seines along with backpack electrofishing equipment, while surveyors employ a “kick-seining” technique. Kick-seining consists of the seine being held by two individuals downstream, while another individual operates a backpack electrofisher and another one or two individuals approach the seine from upstream, thrashing and kicking the water towards the seine as electrical current is applied. This method enhances the stream flow and aids in moving stunned fish into the seine. Low flow associated with known occupied areas of this species necessitates the addition of the “kick-seine” technique. Numbers of kick-seines required to adequately sample a site varies by stream width and site complexity.
- Surveys should occur within 300 m (984 ft) upstream and downstream from potential impact area.



Recommended Conservation Practices

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

- Avoid causing changes that could degrade aquatic habitats inhabited by southern tessellated darters. Specifically, avoid creating artificial impoundments, dredging channels in rivers and streams, and creating dredge spoils within rivers, streams, and creeks.

- Avoid the removal of complex rocky materials within the Ocklawaha watersheds occupied by southern tessellated darters, since this species requires these materials as it is a crevice spawner.
- Avoid activities that would degrade or alter streamside zones adjacent to areas inhabited by southern tessellated darters. Maintaining a minimum buffer of 50 m (164 ft) between the river or stream and upland activities would benefit the species, and a buffer of 100–200 m (328–656 ft) would likely prevent impacts to most other listed species that occur in inhabited waterways (U.S. Fish and Wildlife Service [USFWS] 2001).
- Minimize sedimentation through implementation of BMP's.
- Restore natural hydrology and benthic structure of altered riverine habitats in the historic and occupied watersheds within the Ocklawaha basin.
- Provide adequate buffers (75 to 100 meters) between septic systems and riparian habitat.
- Locate stormwater management systems to provide the maximum treatment for any potential input into riparian habitat in the Escambia watershed.

Measures to Avoid Take

Avoidance Measures that Eliminate the Need for FWC Take Permitting

This section describes all measures that would avoid the need for an applicant to apply for a FWC take permit.

- Bridge or culvert work that follows standard road construction best management practices and does not have a major instream impact
- Upland activities that have no connection to waterbodies and do not cause runoff, or riparian conversion.
- Avoid activities that degrade riparian zones.

Examples of Activities Not Expected to Cause Take

This list is not an exhaustive list of exempt actions. Please contact the FWC if you are concerned that you could potentially cause take.

- Activities that occur on impacted land not adjacent to southern tessellated darter habitat
- Silvicultural activities that follow the Agricultural and Silvicultural Best Management Practices (BMP's) for streamside management zones (SMZ).

Florida Forestry Wildlife BMP's and Florida Agricultural Wildlife BMP's

- Agriculture, as defined in Section 570.02, F.S., conducted in accordance with Chapter 5I-8, F.A.C., and the wildlife best management practices (BMPs) adopted in Rule 5I-8.001 and 5M-18.001, F.A.C., by the Department of Agriculture and Consumer Service pursuant to Section 570.94, F.S., is authorized and does not require a permit authorizing incidental take despite any other provision of Rule 68A-27.007 or 68A-27.005, F.A.C.
- Participation in the [Florida Forestry Wildlife BMP's](#) and [Florida Agricultural Wildlife BMP's](#) program and implementation of these BMP's provides a presumption of compliance for incidental take of southern tessellated darters.
- Florida Department of Agriculture Consumer Services Florida Forestry Wildlife Best Management Practices apply to this species through the application of Streamside Management Zones.

Other authorizations for Take

- As described in Rule 68A-27.007(2)(c), F.A.C., land management activities (e.g., wetland restoration, prescribed fire, mechanical removal of invasive species; and herbicide application) that benefit wildlife and are not inconsistent with FWC Management Plans are authorized and do not require a permit authorizing incidental take.

- In cases where there is an immediate danger to the public's health and/or safety, including imminent or existing power outages that threaten public safety, or in direct response to an official declaration of a state of emergency by the Governor of Florida or a local governmental entity, power restoration activities and non-routine removal or trimming of vegetation within linear right of way in accordance with vegetation management plan that meets applicable federal and state standards does not require an incidental take permit from FWC.
- Emergency water management activities for human health and safety, such as flood control.

Coordination with Other State and Federal Agencies

The FWC participates in other state and federal regulatory programs as a review agency. During review, FWC identifies and recommends measures to address fish and wildlife resources to be incorporated into other agencies' regulatory processes. FWC provides recommendations for addressing potential impacts to state listed species in permits issued by other agencies. If permits issued by other agencies adequately address all the requirements for issuing a State-Threatened species take permit, the FWC will consider these regulatory processes to fulfill the requirements of Chapter 68A-27, F.A.C., with a minimal application process. This may be accomplished by issuing a concurrent take permit from the FWC, by a memorandum of understanding with the cooperating agency, or by a programmatic permit issued to another agency. These permits would be issued based on the understanding that implementation of project commitments will satisfy the requirements of Rule 68A-27.007, F.A.C.

Review of Land and Water Conversion projects with State-Listed Species Conditions for Avoidance, Minimization and Mitigation of Take

- FWC staff, in coordination with other state agencies, provide comments to federal agencies (e.g., the Army Corps of Engineers) on federal actions, such as projects initiated by a federal agency or permits being approved by a federal agency.
- FWC staff works with landowners, local jurisdictions, and state agencies such as the Department of Economic Opportunity on large-scale land use decisions, including long-term planning projects like sector plans, projects in Areas of Critical State Concern, and large-scale comprehensive plan amendments.
- FWC staff coordinates with state agencies such as the Department of Environmental Protection and the five Water Management Districts on the Environmental Resource Permitting (ERP) program, which regulates activities such as dredging and filling in wetlands, flood protection, stormwater management, site grading, building dams and reservoirs, waste facilities, power plant development, power and natural gas transmission projects, oil and natural gas drilling projects, port facility expansion projects, some navigational dredging projects, some docking facilities, and single-family developments such as for homes, boat ramps, and artificial reefs.
- Sector plans, developments of regional impacts, and county comprehensive plans are all reviewed currently and FWC provides conditions that would be beneficial to southern tessellated darters.
- In areas with federally listed species, following the USFWS requirements is sufficient to protect southern tessellated darter. In sector planning, a percentage of property must be set aside as conservation – focusing on riparian habitat will benefit the southern tessellated darter.

FWC Permitting: Incidental Take

As defined in Rule 68A-27.001, F.A.C., incidental take is take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Activities that result in impacts to southern tessellated darters can require an Incidental Take Permit from the FWC (see above for actions that do not require a permit). Permits may be issued when there is a scientific or conservation benefit to the species and only upon showing by the

applicant that the permitted activity will not have a negative impact on the survival potential of the species. Scientific benefit, conservation benefit, and negative impacts are evaluated by considering the factors listed in Rule 68A-27.007(2)(b), F.A.C. These conditions are usually accomplished through a combination of avoiding take when practicable, minimizing take that will occur, and mitigating for the permitted take. This section describes the minimization measures and mitigation options available as part of the Incidental Take Permit process for take of this species. This list is not an exhaustive list of options.

Minimization Measure Options

The options below are intended to address the evaluation factors required for consideration when issuing an incidental take permit. These options can lessen the impact of activities, and ultimately may reduce what is needed to achieve a conservation or scientific benefit.

Seasonal, Temporal, and Buffer Measures

- Upland activities that have the potential to disturb riparian zones should follow Best Management Practices and minimize activities within a minimum distance of 15.2 m (50 ft) from the waterways (DEP 2011, Wegner 1999).

Design Modification

- Avoid or minimize activities that would increase sediment discharge into waterways, alter hydrology or remove rocky substrates.
- Site roads further from streams.
- Site stormwater requirements outside of the buffer zone, but situated so that any potential stormwater input is treated by the stormwater management system.
- Minimize the amount of sedimentation and erosion to waterways by using turbidity and sediment screens and by following guidelines described within the [Silviculture BMP Manual](#) (FDACS 2008).
- Use bridge class culverts with open bottoms.
- Avoid underground storage tanks within 15.2 m (50 feet) of the riparian buffer.

Method Modification

- Use sediment screens, bales, or other methods to limit sedimentation from upland site activity.
- Use turbidity screens instream to limit sedimentation within the river or waterbody.
- When creating waterway crossings, top down bridge construction can minimize impacts to southern tessellated darters and other aquatic species. Specific project guidance can be obtained by contacting the [Florida Department of Transportation](#).

Mitigation Options

Mitigation is scalable depending on the impact, with mitigation options for significant impairment or disruption of essential behavioral patterns constituting take. Potential options for mitigation are described below.

Scientific Benefit

This section describes research and monitoring activities that provide scientific benefit, per Rule 68A-27.007, F.A.C. Conducting or funding these activities can be the sole form of mitigation for a project.

- Projects to fill data gaps related to information on species discussed in the Species Action Plan for the southern tessellated darter. Contact FWC for additional information on appropriate methodology or permits relating to scientific collection of these species.
- Sharing sightings data (live and dead observations) with FWC, including latitude and longitude and photographs when available.
- Following established survey methods, projects that fill information data gaps for this species.

- Scientific studies can help address life history questions. These projects should be conducted with input from FWC.

Habitat

- Habitat acquisition may be a mitigation option.
- Acquisition efforts should target riparian zones in the lower Ocklawaha River basin, especially in the Orange Creek region and other occupied waterbodies.
- Targeting in-holdings would be beneficial.

Funding

- No funding option has been identified at this time. However, funding options as part of the mitigation will be considered on a case by case basis.

Information

- All data (negative and positive) from surveys should be provided by contacting FWC as specified in an incidental or intentional take permit and can provide a benefit in addition to minimization options.

Programmatic Options

- No programmatic options are available for this species

Multispecies Options

- Other species with overlap include the Black creek crayfish and bluenose shiner. Activities that benefit these species are likely to also benefit the southern tessellated darter.

FWC Permitting: Intentional Take

Intentional take is not incidental to otherwise lawful activities. Per Rule 68A-27, F.A.C., intentional take is prohibited and requires a permit. For state-Threatened species, intentional take permits may only be considered for scientific or conservation purposes (defined as activities that further the conservation or survival of the species taken). Permits are issued for state-Threatened species following guidance in Rule 68A-27.007(2)(a), F.A.C.

Risks to Property or People

Intentional take for human safety

- There are no circumstances for which southern tessellated darter may be taken for human safety.
- Permits will be issued only under limited and specific circumstances, in cases where there is an immediate danger to the public's health and/or safety, including imminent or existing power outages that threaten public safety, or in direct response to an official declaration of a state of emergency by the Governor of Florida or a local governmental entity. Applications submitted for this permit must include all information that is required from any other applicant seeking a permit, along with a copy of the official declaration of a state of emergency, if any. An intentional take permit may be issued for such purposes.

Aversive Conditioning

- Not applicable for the southern tessellated darter.

Permits Issued for Harassment

- Not applicable for the southern tessellated darter.

Scientific Collecting and Conservation Permits

Scientific collecting permits may be issued for the southern tessellated darter using guidance found in Rule

68A-27.007(2)(a), F.A.C. Activities requiring a permit include any research that involves capturing, handling, or marking wildlife; conducting biological sampling; or other research that may cause take. A Scientific Collecting permit is needed to use southern tessellated darter for education and outreach.

Considerations for Issuing a Scientific Collecting Permit

- 1) Is the purpose adequate to justify removing the species (if the project requires this)?
 - Permits will be issued if the identified project is consistent with the goal of the [Species Action Plan for the Southern Tessellated Darter](#) (i.e., improvement in status that leads to removal from Florida's Endangered and Threatened Species List), or addresses an identified data gap important for the conservation of the species.
- 2) Is there a direct or indirect effect of issuing the permit on the wild population?
- 3) Will the permit conflict with program intended to enhance survival of species?
- 4) Will purpose of permit reduce likelihood of extinction?
 - Projects consistent with the goal of the Species Action Plan for the Southern Tessellated Darter or that fill identified data gaps in species life history or management may reduce the likelihood of extinction. Applications should clearly explain how the proposed research will provide a scientific or conservation purpose for the species.
- 5) Have the opinions or views of other scientists or other persons or organizations having expertise concerning the species been sought?
- 6) Is applicant expertise sufficient?
 - Applicants must have prior documented experience with this or similar species, have met all conditions of previously issued permits, and have a letter of reference that supports their ability to handle the species.

Relevant to all Scientific Collecting for Southern Tessellated Darters

- No more than 5 whole specimens shall be provided to FWC's Fish and Wildlife Research Institute, 3 for genetic analysis and the remainder to be sent to the Florida Museum of Natural History.
- Format of data needed to be provided to FWC should include at a minimum, GPS coordinates (DD), habitat, date, time of day, substrate type, number collected, and disposition of specimens. Spreadsheet and electronic submission is allowed.
- Any mortality should be reported immediately to the FWC at the contact information below. The FWC will provide guidance on proper disposition of specimens.
- Geographical or visual data gathered must be provided to FWC in the specified format.
- A final report should be provided to the FWC in the format specified in the permit conditions.

Additional information

Information on Economic Assessment of this set of guidelines can be found at

<http://myfwc.com/wildlifehabitats/imperiled/management-plans/>

Contact

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

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