



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
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Memorandum

To: File (S:\T&E\ESA Section 7\IPaC\Determination Keys\ARLES DKey Finals)

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Through: Debra Bills, Field Supervisor, Erik Orsak, Supervisory Fish & Wildlife Biologist, Arlington, Texas

Subject: Sharpnose Shiner and Smalleye Shiner Determination Key

This memo documents the rationale behind the Determination Key for the sharpnose shiner (*Notropis oxyrhynchus*) and smalleye shiner (*N. buccula*) within the Arlington, Texas Ecological Services' area of responsibility. This determination key is a logically structured set of questions to assist a user in determining whether a proposed project qualifies for a predetermined consultation outcome based on USFWS standing analysis. General biology and other information is included to support the standing analysis and key. This key is intended to be delivered through the USFWS' Information for Planning and Consultation (IPaC) web application.

The sharpnose shiner and smalleye shiner were federally listed as endangered (79 FR 45273) with critical habitat (79 FR 45241) on August 4, 2014. Sharpnose shiner was known to historically and naturally inhabit approximately 3,417 km (2,123 mi) of river segments in the Brazos, Red, and Colorado River basins, but is currently restricted to approximately 1,002 km (623 mi) of the upper Brazos River basin, a greater than 70 percent reduction. The smalleye shiner was known to historically and naturally inhabit approximately 2,067 km (1,284 mi) of river segments in the Brazos River basin, but is currently restricted to approximately 1,009 km (627 mi) of the upper Brazos River basin, a greater than 51 percent reduction. Throughout much of their historical range, the decline of the sharpnose and smalleye shiners is attributed primarily to habitat loss and modification due to fragmentation and decreased river flow resulting from major water impoundments, drought, and groundwater withdrawals. Water quality degradation, invasive salt cedar, and other factors may have also contributed to their decline. As a result, sharpnose and smalleye shiners' redundancy, or the ability to withstand catastrophic events, is low because it is limited to a single population within the historical range. In addition, stream flows within their current range are insufficient during some years to support successful recruitment, such as occurred during the drought of 2011. A comprehensive account of the

species' resource needs, threats, current conditions, and projected future conditions can be found in the Species Status Assessment Report for the Sharpnose Shiner (*Notropis oxyrhynchus*) and Smalleye Shiner (*N. buccula*) Version 2 (Service 2018).

The best available science suggests the primary needs of sharpnose shiner populations include greater than 275 km (171 mi) of unobstructed river with water quality sufficient to support reproduction and subsequent recruitment of larval fish to adulthood.

Critical Habitat

Critical habitat was designated for the sharpnose and smalleye shiner on August 4, 2014 (79 FR 45242- 45271), and it includes approximately 623 river miles of the Upper Brazos River upstream of Possum Kingdom Lake (including the Double Mountain Fork) (Figure 1) and the upland areas extending beyond the river channel by 98 feet (ft) on each side. This area was designated as critical habitat because it provides the primary needs of sharpnose and smalleye shiner populations including a minimum, unobstructed, wide, flat, flowing river segment necessary to support development of their life history stages. The 98 ft buffer on each side has also been designated to maintain proper stormwater runoff filtration to support adequate water quality.

Sharpnose Shiner Critical Habitat Physical or Biological Features

The physical or biological features and habitat characteristics required to sustain the sharpnose shiner life-history processes consists of a riverine system with habitat to support all life stages of sharpnose shiner, which includes:

- 1) Unobstructed, sandy-bottomed river segments greater than 171 miles in length
- 2) Flowing water of greater than approximately 92 cubic feet per second (cfs) averaged over the shiner spawning season (April through September).
- 3) Water of sufficient quality to support survival and reproduction, characterized by:
 - (a) Temperatures generally less than 102.6 °F;
 - (b) Dissolved oxygen concentrations generally greater than 2.66 parts per million (ppm);
 - (c) Salinities generally less than 15 parts per thousand¹ (ppt); and
 - (d) Sufficiently low petroleum and other pollutant concentrations such that mortality does not occur.
- 4) Native riparian vegetation capable of maintaining river water quality, providing a terrestrial prey base, and maintaining a healthy riparian ecosystem.

¹ Value is LC50, i.e., concentration when 50% of individual sharpnose shiners in sample perished. No mortality occurred at approximately 12 ppt of sodium chloride. These values were provided through a 48-hour laboratory test. Short-term tests conducted in a laboratory setting provide limited insight into long-term exposures that occur in natural settings. It is common for LC50 values to decrease when exposure times increase or early life stages are tested since short-term exposures to adult fish are generally considered to be less sensitive. Therefore, toxicity information based on acute testing of adults should be viewed with caution and may not be protective of early life stages (i.e., larval fish) or exposure times beyond 48 hours.

Smalleye Shiner Critical Habitat Physical or Biological Features

The physical or biological features and habitat characteristics required to sustain the smalleye shiner life-history processes consists of a riverine system with habitat to support all life-history stages of smalleye shiner, which includes:

- 1) Unobstructed, sandy-bottomed river segments greater than 171 miles in length.
- 2) Flowing water of greater than approximately 227 cfs averaged over the shiner spawning season (April through September).
- 3) Water of sufficient quality to support survival and reproduction, characterized by:
 - (a) Temperatures generally less than 105.1 °F;
 - (b) Dissolved oxygen concentrations generally greater than 2.11 ppm;
 - (c) Salinities less than 18 ppt²; and
 - (d) Sufficiently low petroleum and other pollutant concentrations such that mortality does not occur.
- 4) Native riparian vegetation capable of maintaining river water quality, providing a terrestrial prey base, and maintaining a healthy riparian ecosystem.

Area of Influence in IPaC

The sharpnose and smalleye shiner Area of Influence (AOI) was developed to include a conditional area subject to specific actions. Hydrologic Unit Codes (HUCs) were used to delineate both ranges (Figure 1). The following rationale was used for the ranges:

All HUC12 units that are at least partially within 500 meters of occupied habitat (designated critical habitat) will be included in the section 7 range for sharpnose and smalleye shiners based on the following criteria:

- The maximum distance to maintain a healthy riparian corridor according to Fischer and Fischenich (2000, p. 8) is 500+ meters.

The conditional section 7 range for sharpnose and smalleye shiners will include all HUC12 units that drain into the upper Brazos River basin above Possum Kingdom Lake. The criteria that trigger the conditional section 7 range are:

- All reservoir projects
- In-channel projects capable of reducing the downstream flow of water towards occupied habitat on major tributaries of the Upper Brazos River basin (large scale streams and rivers according to the U.S. National Atlas Water Features Lines GIS data) such as water diversions, impoundments, interbasin-transfers, etc.

² Value is LC50, i.e., concentration when 50% of individual smalleye shiners in sample perished. No mortality occurred at approximately 16 ppt of sodium chloride. These values were provided through a 48-hour laboratory test. Short-term tests conducted in a laboratory setting provide limited insight into long-term exposures that occur in natural settings. It is common for LC50 values to decrease when exposure times increase or early life stages are tested since short-term exposures to adult fish are generally considered to be less sensitive. Therefore, toxicity information based on acute testing of adults should be viewed with caution and may not be protective of early life stages (i.e., larval fish) or exposure times beyond 48 hours.

- Commercial and industrial groundwater well fields. Given several aquifers, including the Ogallala Aquifer, underlie the upper Brazos River basin and section 7 ranges should be more inclusive than exclusive it is reasonable to consult on commercial and industrial groundwater withdrawal well field projects within the upper Brazos River basin that may affect surface water flows of downstream occupied habitat.

Key for evaluating potential impacts to the sharpnose and smalleye shiner within the ARLES area of responsibility.

If the project is found to intersect sharpnose/smalleye shiner Conditional AOI Range [hidden semantic], the Key is as follows:

- A. Is this a reservoir project, interbasin transfer, water diversion, small impoundment, industrial/commercial water well field, or other in-channel project that may reduce flows of major tributaries to the Brazos River?
 - a. Yes..... *go to F*
 - b. No..... *go to B*
- B. Does the project intersect AOI? [hidden semantic]
 - a. Yes..... *Go to C*
 - b. No..... *Go to D*
- C. Is the project within critical habitat? [hidden semantic]
 - a. Yes.....*Go to F*
 - b. No..... *Go to D*
- D. Will the project involve industrial wastewater, treatment of water by reverse osmosis, or the discharge of ≥ 1 million gallons of municipal wastewater per day?
 - a. Yes..... *Go to F*
 - b. No..... *Go to E*
- E. Does the project require a permit be obtained from the Texas Commission on Environmental Quality (TCEQ)?
 - a. Yes.....*Go to F*
 - b. No.....*No effect*
- F. Has a biological evaluation to determine effects to fish and critical habitat been conducted?
 - a. Yes.....*May affect, submit biological evaluation to field office*
 - b. No.....*Conduct biological evaluation and submit to field office*

END KEY

Literature Cited

Fischer R.A. and J.C. Fischenich. 2000. Design recommendations for riparian corridors and vegetated buffer strips. EMRRP Technical Notes Collection (ERDC TN-EMRRP-SR-24), U.S. Army Engineer Research and Development Center, Vicksburg, MS.

U.S. Fish & Wildlife Service (Service). 2018. Species status assessment report for the sharpnose shiner (*Notropis oxyrinchus*) and smalleye shiner (*N. buccula*), Version 2. Unpublished draft report, Arlington Ecological Services Field Office.

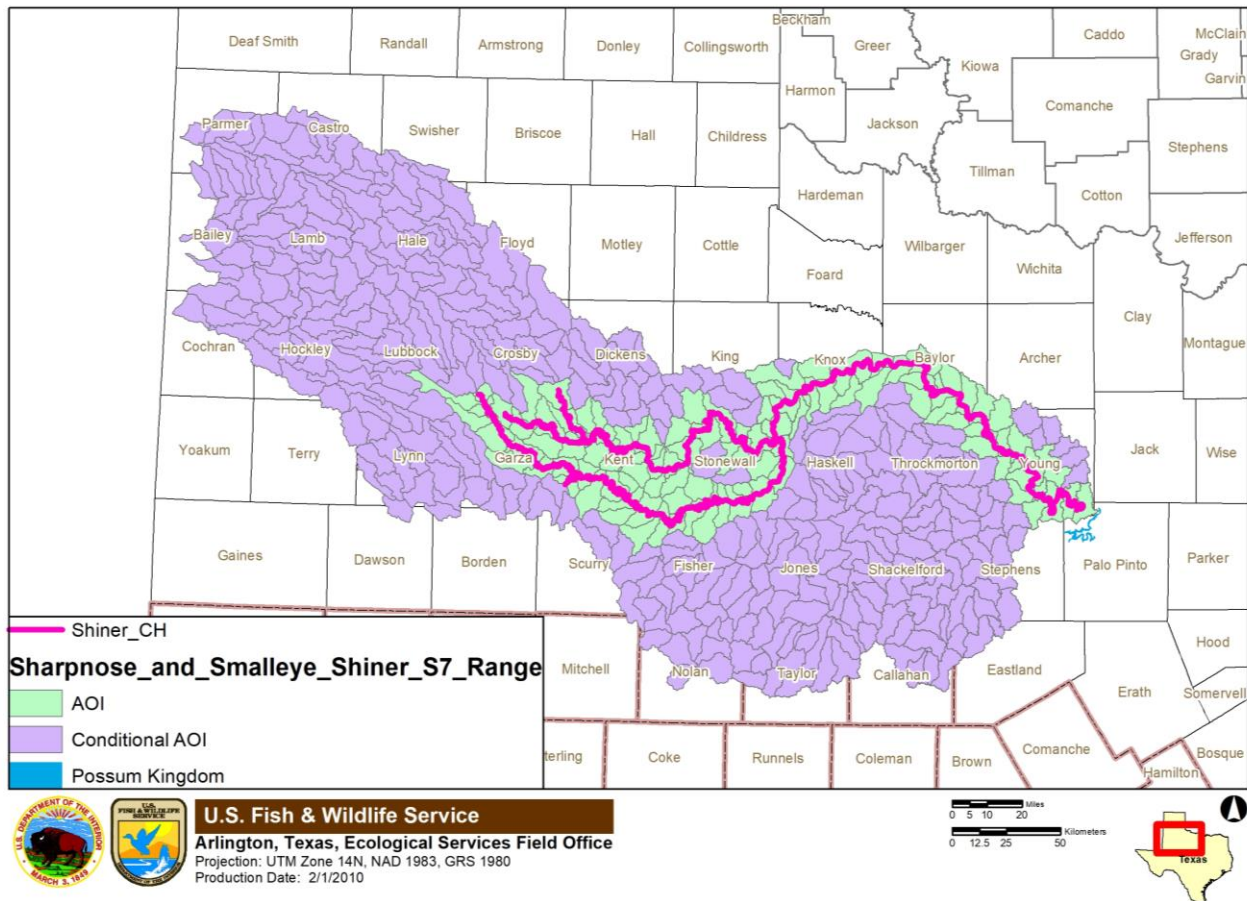


Figure 1. Area of Influence and Critical Habitat for the smalleye and sharpnose shiner.