

**Needlefish (Family Belonidae) Diversity in North Carolina**  
By the [NCFishes.com](https://ncfishes.com) Team

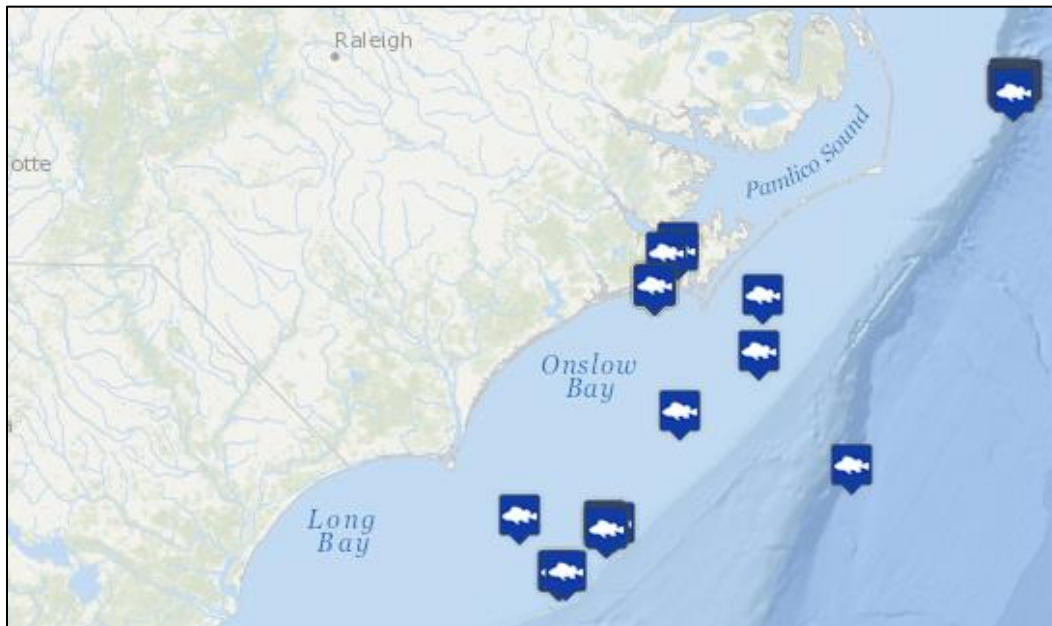
The waters along and off the coast are where you will find all five species within the Family Belonidae known from North Carolina (Table 1). One of the five species, Atlantic Needlefish, is also found upstream in the lower Piedmont (more about that later). Because of their superficial resemblance to the freshwater gar (Family Lepisosteidae, <https://ncfishes.com/freshwater-fishes-of-north-carolina/lepisosteus-osseus/>), one might hear them referred to as gar, Bill-fish, Gar-fish, Green Gar (perhaps because of the green color of the skeleton), or Doctor-fish (perhaps because of their tendency to impale people with their beak when leaping out of the water) (Smith 1907). However, the American Fisheries Society (AFS)-accepted common names provide some logical standardization (Page et al. 2013) and each of their scientific (Latin) name actually means something (please refer to The Meanings of the Scientific Names of Needlefishes, page 8). We are not sure how *Tylosurus crocodilus*, was tagged with the common name, Houndfish, perhaps because being such an aggressive and voracious predator that they “hound” their prey until capture. But, a more appropriate name could have been Crocodile Needlefish. The AFS-accepted common name of *Tylosurus acus* is Atlantic Agujón. In Spanish Agujón translates as “needlefish”. So technically, there are two species with the same common name of Atlantic Needlefish – *Strongylura marina* and *Tylosurus acus*.

**Table 1. Species of needlefishes found in or along the coast of North Carolina.**

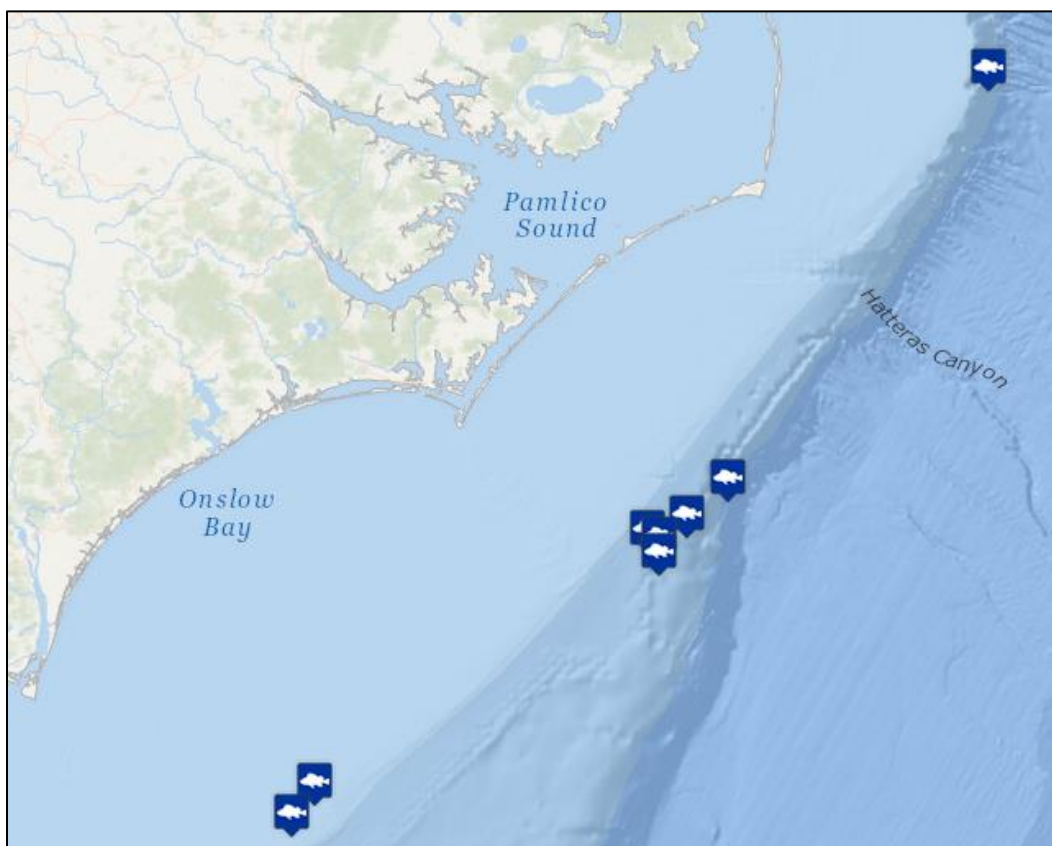
Scientific Name/ American Fisheries Society Accepted Common Name	Scientific Name/ American Fisheries Society Accepted Common Name
<i>Ablennes hians</i> - Flat Needlefish	<i>Tylosurus acus</i> - Atlantic Agujón
<i>Platybelone argalus</i> - Keeltail Needlefish	<i>Tylosurus crocodilus</i> - Houndfish
<i>Strongylura marina</i> - Atlantic Needlefish	

One of their vernacular names, Gar-fish, probably originated because of their superficial resemblance to our Longnose Gar, *Lepisosteus osseus*. However, the two families can easily be told apart. Needlefish has very small cycloid scales, ~ 300 in the lateral line; the dorsal and anal fins are longer than high; the caudal fin is homocercal; and the body is slender. Gar has large ganoid scales, ~ 55 in the lateral line; the dorsal and anal fins are higher than long; the caudal fin is abbreviate heterocercal; and the body is stout (Rohde et al. 2009). Some species of Needlefishes do get as long as gar: Keeltail Needlefish - 380 mm (15 inches), Atlantic Needlefish - 610 mm (2 feet), Atlantic Agujón – 914 mm (3 feet), Flat Needlefish – 1097 mm (3.6 feet), and Houndfish - 1524 mm (5 feet) (Kells and Carpenter 2014; Rohde et al. 2009).

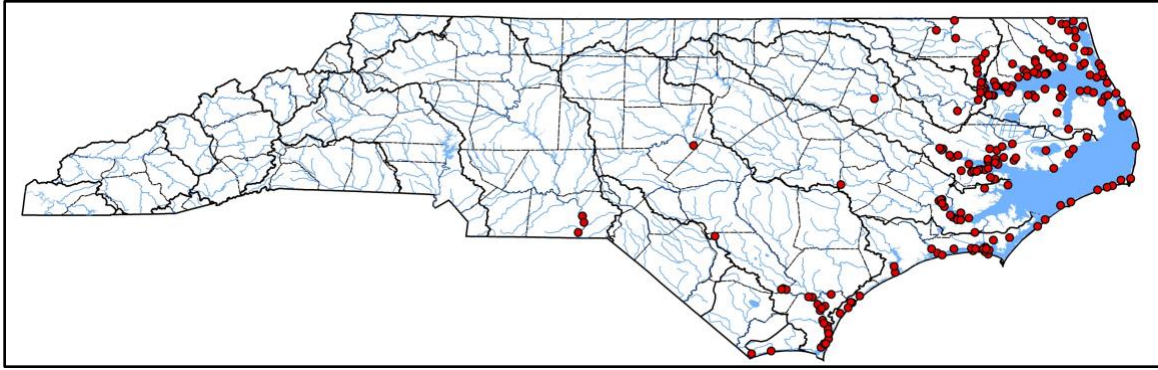
All Needlefishes are schooling species and are to be found inshore and offshore along the coast (Maps 1–5) ([NCFishes.com](https://ncfishes.com); Tracy et al. 2020) [Please note: Tracy et al. (2020) may be downloaded for **free** at: <https://trace.tennessee.edu/sfcproceedings/vol1/iss60/1>.] But unlike the other four species, Atlantic Needlefish migrates readily between fresh and salt water and spawns in fresh water (Rohde et al. 2009). Whether some Atlantic Needlefish spend their entire life in fresh water and/or are permanent residents of far-inland coastal rivers is unknown. Atlantic Needlefish is found seasonally in most Coastal Plain river basins as far upstream as Blewett Falls Dam (more than 200 miles upstream from Winyah Bay and the Atlantic Ocean in South Carolina, Yadkin basin), at Buckhorn Dam (also about 200 miles upstream from the Atlantic Ocean, Cape Fear basin), near La Grange (Neuse basin), near Tarboro (Tar basin), near Murfreesboro on the Meherrin River (Chowan basin), and also in the White Oak and the Albemarle basins (Tracy et al. 2020). [Note: see Supplemental Maps 1-3, page 9, showing North Carolina’s 100 counties, 21 river basins, and 4 physiographic regions.]



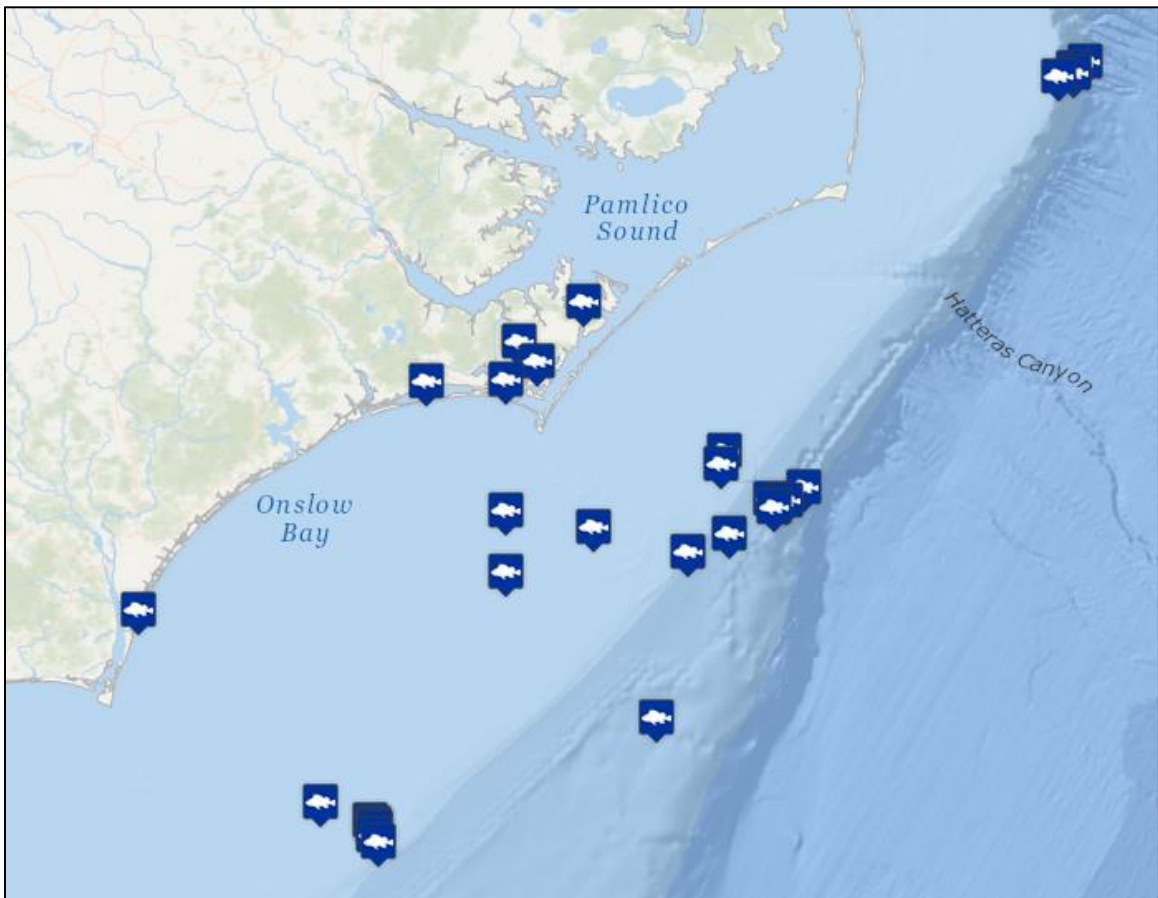
Map 1. Distribution of Flat Needlefish, *Ablennes hians*. Map based upon vouchered specimens at the North Carolina Museum of Natural Sciences; accessed 02/06/2021. Note: many locations are beyond “North Carolina” waters (> 13.8 miles = 22.2 km, and 12 nautical miles).



Map 2. Distribution of Keeltail Needlefish, *Platybelone argalus*. Map based upon vouchered specimens at the North Carolina Museum of Natural Sciences; accessed 02/06/2021. Note: these locations are beyond “North Carolina” waters (> 13.8 miles = 22.2 km, and 12 nautical miles).



Map 3. Distribution of Atlantic Needlefish, *Strongylura marina*. Map originally appeared in Tracy et al. (2020).



Map 4. Distribution of Atlantic Agujón, *Tylosurus acus*. Map based upon vouchered specimens at the North Carolina Museum of Natural Sciences; accessed 02/06/2021. Note: many of these locations are beyond “North Carolina” waters (> 13.8 miles = 22.2 km, and 12 nautical miles).



**Map 5. Distribution of Houndfish, *Tylosurus crocodilus*. Map based upon vouchered specimens at the North Carolina Museum of Natural Sciences; accessed 02/06/2021. Note: two of these locations are beyond “North Carolina” waters (> 13.8 miles = 22.2 km, and 12 nautical miles).**

None of the species are state or federally-listed as imperiled nor is their harvesting (take) regulated.

The identification of Needlefishes is relatively straight-forward, assuming you are able to get a firm grasp of these elongated toothsome fishes. Key characteristics for their proper identification include the cross-sectional shape of the body, the presence or absence of a keel along the caudal peduncle, the number of dorsal and anal fin rays, and the direction the anterior teeth are pointed (good luck at looking at those pearly whites close-up!) (please refer to the Identification Key to the Freshwater and Marine Needlefishes (Family Belontiidae) in North Carolina).

If you have troubles with your identifications, just send us (<https://ncfishes.com/contact/>) an e-mail and include as many quality digital photographs as you can along with all the pertinent locality descriptors so that we will know from where the fish came.



**Identification Key to the Freshwater and Marine Needlefishes (Family Belontiidae)  
in North Carolina**

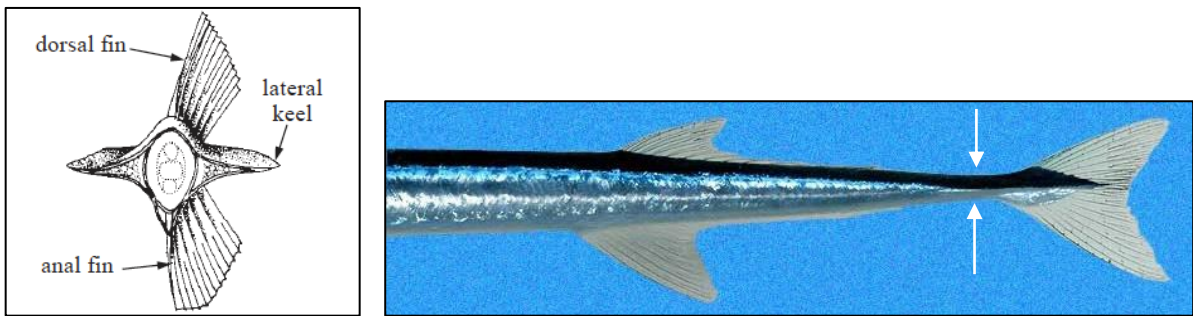
(Please refer to [NCFishes.com](http://NCFishes.com) for pictures and identifying characteristics all species)  
(Identification Key adapted from and illustrations courtesy of Collette (2002))

- 1a. Body strongly laterally compressed and marked with a series of vertical bars (Figure 1). Anal fin rays 24-28.....Flat Needlefish, *Ablennes hians*
- 1b. Body rounded or squarish in cross-section. No vertical bars present. Anal-fin rays 13 to 24 .....2



**Figure 1. Flat Needlefish. Photograph courtesy of the Smithsonian Tropical Research Institute's Shorefishes of the Greater Caribbean online information system, <https://biogeodb.stri.si.edu/caribbean/en/pages/random/532>, accessed February 06, 2021.**

- 2a. Caudal peduncle strongly depressed (flattened dorsoventrally) and with well-developed lateral keels (Figure 2). Least depth of caudal peduncle about half the width (Figure 2). Gill rakers present ..... Keeltail Needlefish, *Platybelone argalus*
- 2b. Caudal peduncle not strongly depressed, a small lateral keel on caudal peduncle or no keel at all. Caudal peduncle deeper than wide. Gill rakers absent .....3



**Figure 2. Keeltail Needlefish. Left – cross section of caudal peduncle. Right – Posterior region with white arrows pointing to the keeled caudal peduncle. Photograph courtesy of the Smithsonian Tropical Research Institute's Shorefishes of the Greater Caribbean online information system, <https://biogeodb.stri.si.edu/caribbean/en/pages/random/10324>, accessed February 06, 2021.**

- 3a. Dorsal-fin rays 12-17. No keels on caudal peduncle. Caudal fin usually emarginate, lower lobe not much longer than upper; occasionally straight. No expanded black posterior dorsal-fin lobe at any size (Figure 3)..... Atlantic Needlefish, *Strongylura marina*
- 3b. Dorsal-fin rays 21-26. A weak, darkly pigmented lateral keel on each side of caudal peduncle (Figure 4). Lower lobe of caudal fin much longer than upper lobe (Figure 4). Juveniles with an expanded black lobe in the posterior part of the dorsal fin .....4

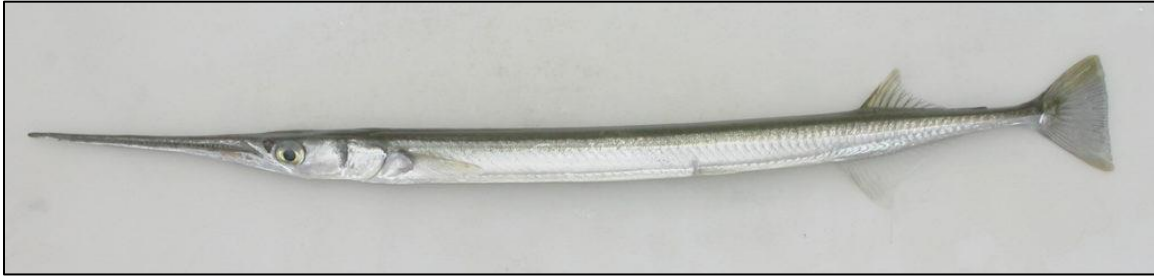


Figure 3. Atlantic Needlefish with a straight caudal fin (usually emarginate).

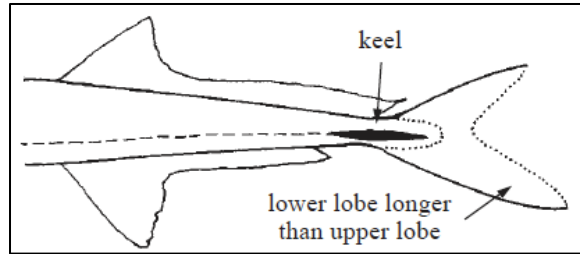


Figure 4. Posterior region of *Tylosurus* spp. showing the pigmented keel and the lower lobe longer than the upper lobe of the caudal fin.

- 4a. Beak about twice the length of rest of the head. Dorsal- and anal-fin lobes relatively low compared to body length (10.1-13.3 and 9.7-11.7 times in body length, respectively). Pectoral and pelvic fins relatively short (8.0-12.4 and 10.0-14.1 times in body length, respectively). Upper and lower jaw teeth straight at all sizes (Figure 5) .....Atlantic Agujón, *Tylosurus acus*
- 4b. Beak about 1.5 times the length of rest of the head. Dorsal- and anal-fin lobes relatively high compared to body length (5.4-10.6 and 5.5-8.0 times in body length, respectively). Pectoral and pelvic fins relatively long (6.6-8.3 and 7.3-10.6 times in body length, respectively). Upper and lower jaw teeth point distinctly anterior in juveniles (Figure 5) .....Houndfish, *Tylosurus crocodilus*



Figure 5. Top - Atlantic Agujón showing straight upper and lower jaw teeth; Bottom – Juvenile Houndfish showing upper and lower jaw teeth pointing distinctly anterior.

## Glossary

(Adapted from Rohde et al. 2009)

Cycloid Scales – Thin, light, flexible scale lacking small, rear-pointing “teeth”

Ganoid Scales – Thick, inflexible scale covered with hard enamel

Homocercal Caudal Fin – A type of tail in which the vertebral column ends at the caudal fin base

Heterocercal Caudal Fin – A type of tail in which the vertebral column extends into the upper lobe of the caudal fin

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## References

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- Page, L.M., H. Espinosa-Pérez, L.T. Findley, C.R. Gilbert, R.N. Lea, N.E. Mandrak, R.L. Mayden, and J.S. Nelson. 2013. Common and scientific names of fishes from the United States, Canada, and Mexico. 7<sup>th</sup> edition. American Fisheries Society, Special Publication 34, Bethesda, MD. 384p.
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- Tracy, B. H., F.C. Rohde, and G.M. Hogue. 2020. An annotated atlas of the freshwater fishes of North Carolina. Southeastern Fishes Council Proceedings No. 60. 198p. (Available at: <https://trace.tennessee.edu/sfcproceedings/vol1/iss60/1>).

## The Meanings of the Scientific Names of Needlefishes

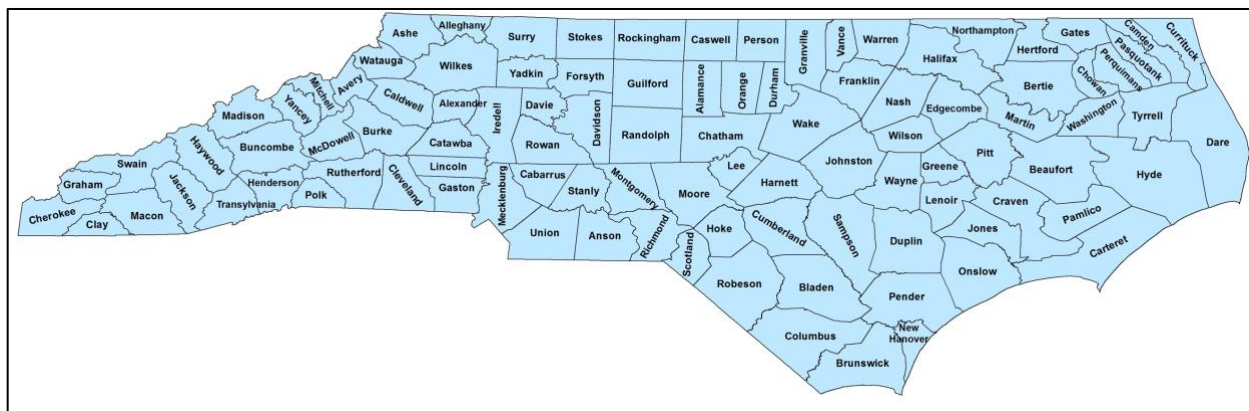
Adopted from the ETYFish Project by Christopher Scharpf and Kenneth J. Lazara, accessed February 06, 2021, <http://www.etyfish.org/>

**Family BELONIDAE** Bonaparte 1835 - *belónē* from Greek, meaning needle (<https://www.merriam-webster.com/dictionary/Belone>) in reference to the long and slender needle-like jaws; Needlefishes

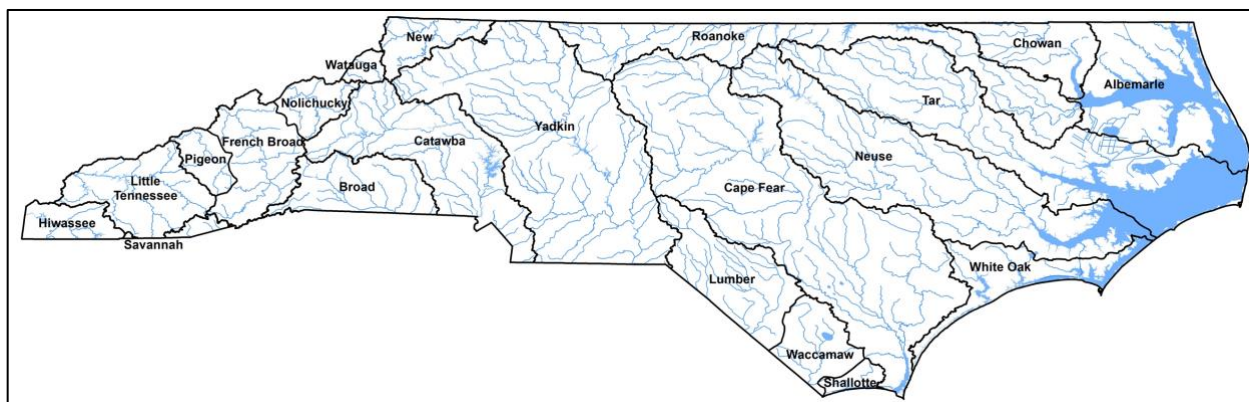
- i. ***Ablennes* Jordan & Fordice 1887** - *Ablennes* (*a-*, without; *blennos*, mucus), per Jordan & Evermann (1896) a name applied by some Medieval authors to *Belone acus* (originally and inadvertently spelled “*Athlennes*,” which Jordan felt obliged to retain, but spelling was formally corrected by ICZN Opinion 41)
  - a. ***Ablennes hians* (Valenciennes 1846)** - gaping, referring to upper jaw strongly arched upward at base so that mouth cannot be closed
- ii. ***Platybelone* Fowler 1919** - proposed as a subgenus of *Belone*, referring to wide or broad (*platy*) caudal peduncle of *P. argalus platyura*, its width greater than its depth
  - a. ***Platybelone argalus* (Lesueur 1821)** - etymology not explained, perhaps from the Greek *argaleos*, troublesome, difficult or vexatious, possibly referring to how “species of this genus [then recognized as *Belone*] are not yet well distinguished, that they resemble each other so much, and present at first view so little difference that they all might apparently be embraced in the same description; that those who had observed them had been deceived by neglecting to obtain drawings, by which it would have been easy to observe their differences in a manner more sensible and more exact”; name could also allude to its association with the dangerous *Tylosurus crocodilus*, its presumed congener at the time and described in the same paper
- iii. ***Strongylura* van Hasselt 1824** - *strongylos*, round; *oura*, tailed, allusion not explained but probably referring to conspicuous round spot on tail of *Belone* (now *Strongylura*) *strongylura* [not strictly a tautonym since van Hasselt 1824 is a French translation of van Hasselt 1823, which is in Dutch; for reasons unexplained, the French version renamed *Belone strongylura* as *Strongylura caudimaculata*]
  - a. ***Strongylura marina* (Walbaum 1792)** - of the sea, at the time presumed to be a marine inhabitant of the pike genus *Esox* (Esociformes: Esocidae)
- iii. ***Tylosurus* Cocco 1833** - *tylos*, callus; *oura*, tail, referring to lateral keels on caudal peduncle
  - a. ***Tylosurus acus* (Lacepède 1803)** - Latin for needle, being an ancient name for a needlefish (originally referring to the Greater Pipefish, *Syngnathus acus*)
  - b. ***Tylosurus crocodilus* (Péron & Lesueur 1821)** - like a crocodile, the “armature of its jaws renders it dangerous and deservedly feared by those who swim or bathe in the places which it frequents” [note: there are many contemporary accounts of this species stabbing people with its beak when it leaps from the water]



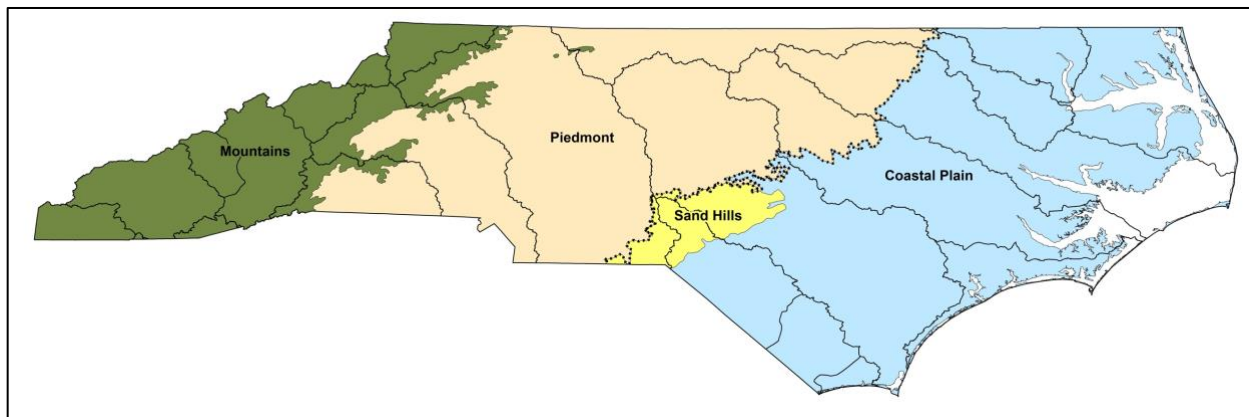
## Supplemental Maps



Map No. 1. North Carolina's 100 counties. Map originally appeared in Tracy et al. (2020).



Map No. 2. North Carolina's 21 river basins. Map originally appeared in Tracy et al. (2020).



Map No. 3. North Carolina's four physiographic regions. Map originally appeared in Tracy et al. (2020).