

A Summary of the Freshwater Fishes of North Carolina
By the NCFishes.com Team

This is the last blog in the series focusing on the freshwater fishes of North Carolina, which was launched on June 17, 2020 (<https://ncfishes.com/identification-of-north-carolina-freshwater-fishes/>). In some respects, this last blog should have been the first, but learning about fishes is never along a straight stream, unless it is in a channelized stream. Our last identification key to all the families of freshwater fishes found in North Carolina can be found at the end of this summary (please refer to An Identification Key to the Freshwater Families in North Carolina).

These 26 blogs, with their narratives and species identification keys, serve as a companion to “*An Annotated Atlas of the Freshwater Fishes of North Carolina*” by Tracy et al. (2020). [Please note: Tracy et al. (2020) may be downloaded for **free** at: <https://trace.tennessee.edu/sfcproceedings/vol1/iss60/1.>] Along with Tracy et al. (2020), our main webpage, NCFishes.com, and our freshwater-focused webpages (<https://ncfishes.com/freshwater-fishes-of-north-carolina/>), we have provided much needed revisions and updates to the “*The Freshwater Fishes of North Carolina*” by Menhinick (1991).

From the little community of Liberty in Cherokee County to the small Outer Banks town of Buxton in Dare County (about 620 miles as the wolf runs), North Carolina’s waters are home to 39 families of “freshwater” fishes (Table 1). This list includes 30 families whose species are primarily freshwater, 5 families whose species are primarily marine and estuarine, and 4 families whose species are more or less evenly split between fresh water and marine (Table 1). The list of families also include five families that are not indigenous (native) to North Carolina - Cyprinidae, Xenocyprididae, Cobitidae, Loricariidae, and Cichlidae.

Table 1. North Carolina’s freshwater fish fauna. For each family the number of described and undescribed freshwater species and the number of marine/estuarine species are listed.

Family	American Fisheries Society Accepted Common Name	No. of Described & Undescribed Freshwater Species	No. of Additional Marine/ Estuarine Species in North Carolina
Petromyzontidae	Lampreys	5	0
Acipenseridae	Sturgeons	3	0
Polyodontidae*	Paddlefish	1	0
Lepisosteidae	Gars	1	0
Amiidae	Bowfins	1	0
Hiodontidae	Mooneyes	1	0
Anguillidae	American Eels	1	0
Engraulidae	Anchovies	1	5
Clupeidae	Herrings	7	6
Cyprinidae	Barbs and Carps	2	0
Xenocyprididae	Asian Carps	1	0
Leuciscidae	Minnnows	68	0
Catostomidae	Suckers	29	0
Cobitidae	Loaches	1	0
Ictaluridae	North American Catfishes	18	0
Loricariidae	Suckermouth Armored Catfishes	1	0
Esocidae	Pikes	3	0
Umbridae	Mudminnows	1	0
Salmonidae	Trouts and Salmons	4	0
Aphredoderidae	Pirate Perches	1	0
Amblyopsidae	Cavefishes	1	0
Mugilidae	Mulletts	2	1
Atherinopsidae	New World Silversides	4	2
Belonidae	Needlefishes	1	4
Fundulidae	Topminnows	10	2
Poeciliidae	Livebearers	4	0
Cyprinodontidae	Pupfishes	1	0
Gasterosteidae	Sticklebacks	1	0
Cottidae	Sculpins	3	0
Moronidae	Temperate Basses	3**	0

Table 1 (continued).

Family	American Fisheries Society Accepted Common Name	No. of Described & Undescribed Freshwater Species	No. of Additional Marine & Estuarine Species in North Carolina
Centrarchidae	Sunfishes	23	0
Percidae	Perches	40***	0
Sciaenidae	Drums and Croakers	2	17
Elassomatidae	Pygmy Sunfishes	3	0
Cichlidae	Cichlids	2	0
Eleotridae	Sleepers	2	1
Gobiidae	Gobies	3	23
Paralichthyidae	Sand Flounders	1	19
Achiridae	American Soles	1	2

*Currently extirpated from the state with future reintroduction possible.

**A hybrid species is also widely stocked.

***Number does not include two extirpated species.

These 39 families include 242 described species (including three extirpated species) and 15 undescribed species (Table 3 in Tracy et al. 2020; Table 2 below). Our two most speciose families are Leuciscidae (minnows, 68 species) and Percidae (darters and perches, 40 species). There are 17 families that have only one freshwater species found in North Carolina (Table 1). Our known undescribed species can be identified using the identification keys developed for each family. There may be additional undescribed or currently unrecognized species presently “hiding” within Fantail Darter, *Etheostoma flabellare*, Mimic Shiner, *Notropis volucellus*, and Bluehead Chub, *Nocomis leptocephalus* (Tracy et al. 2020).

Table 2. Undescribed species (i.e., species awaiting formal scientific descriptions) found in North Carolina.

Family, Genus, Common Name*	Family, Genus, Common Name*
Leuciscidae	Ictaluridae
<i>Clinostomus</i> sp. “Smoky” Dace	<i>Noturus</i> sp. “Lake Waccamaw Broadtail” Madtom
<i>Clinostomus</i> sp. “Hiwassee” Dace	<i>Noturus</i> sp. “Pee Dee River Broadtail” Madtom
<i>Cyprinella</i> sp. “Thinlip” Chub	<i>Noturus</i> sp. “Cape Fear River Broadtail” Madtom
<i>Notropis</i> sp. “Piedmont” Shiner	Fundulidae
<i>Notropis</i> sp. “Kanawha” Rosyface Shiner	<i>Fundulus</i> sp. “Lake Phelps” Killifish
Catostomidae	Centrarchidae
<i>Carpionodes</i> sp. “Atlantic” Highfin Carpsucker	<i>Micropterus</i> sp. “Bartram’s” Bass
<i>Carpionodes</i> sp. “Carolina” Quillback	
<i>Moxostoma</i> sp. “Brassy” Jumprock	
<i>Moxostoma</i> sp. “Carolina” Redhorse	
<i>Moxostoma</i> sp. “Sicklefin” Redhorse	

*Common Names are used strictly for convenience and may or may not be the accepted common name once the species is scientifically described.

Since the first North Carolina-specific checklist was provided by John Lawson in 1709 (Lawson 1709, pages 152-160), three species have been extirpated from our waters: Paddlefish, *Polyodon spathula*, Blueside Darter, *Etheostoma jessiae*, and Sickle Darter, *Percina williamsi*. To our knowledge, Paddlefish is known anecdotally and historically (in 1869, 1873, and 1874) only from the French Broad River near Asheville and Brevard (Cope 1870; Anon. 1873; Anon. 1874; Luke Etchison, North Carolina Wildlife Resources Commission, pers. comm.). Sickle Darter has not been encountered since 1940 and Blueside Darter since 1949 and 1950 (Tracy et al. 2020).

Species that we believed to have been extirpated, have been re-discovered or reintroduced: Bridle Shiner, *Notropis bifrenatus*, (Neuse, Chowan), Rustyside Sucker, *Thoburnia hamiltoni*, (Roanoke), Robust Redhorse, *Moxostoma robustum*, (Yadkin), Mountain Madtom, *Noturus eleutherus*, (French Broad), Banded Sculpin, *Cottus carolinae*, (Pigeon, French Broad), Snubnose Darter, *Etheostoma simoterum*, (French Broad, Nolichucky), and Lake Sturgeon, *Acipenser fulvescens*, (French Broad) (Tracy et al. 2020). [Note: see Supplemental Maps 1-3, page 19, showing North Carolina’s 100 counties, 21 river basins, and 4 physiographic regions.]

With our continually updated website, blog postings, photographic library, and identification keys it is our hope that we will encourage additional interest in and conservation of our rich freshwater fish fauna and their aquatic habitats by citizens, students, and researchers alike. If you have any questions about any of the material we have posted on our webpages or encounter any errors which we have made, please do not hesitate to contact us (<https://ncfishes.com/contact/>).

An Identification Key to the Freshwater Families in North Carolina

(Please refer to NCFishes.com for pictures and identifying characteristics all families and species)
 (Identification Key adapted from Menhinick [1991] and Rohde et al. [2009])

- 1a. Body elongate and snake-like. Dorsal fin long.....2
- 1b. Body not elongate and snake-like. Dorsal fin variable.3
- 2a. Jaws absent; mouth a disk-shaped funnel. Seven pairs of gill openings. Pectoral fins absent (Figure 1)..... Lampreys, [Petromyzontidae](#)
- 2b. Jaws present. One pair of gill openings. Pectoral fin present (Figure 2)..... Freshwater Eels, [Anguillidae](#)



Figure 1. Least Brook Lamprey, *Lampetra aepyptera*, Family Petromyzontidae.



Figure 2. American Eel, *Anguilla rostrata*, Family Anguillidae.

- 3a. Caudal fin strongly heterocercal, lobed behind, vertebral column enters upper lobe that is larger than lower lobe. Snout long; teeth absent or very small. Body covered with five rows or bony plates or else almost scaleless4
- 3b. Caudal fin not strongly heterocercal, not lobed as in Couplet 3a. If snout is long, then teeth are well developed. Body usually scaled, but without bony plates.....5
- 4a. Body well scaled with five rows of bony plates. Snout flat and triangular (Figure 3)..... Sturgeons, [Acipenseridae](#)
- 4b. Body almost scaleless with no plates. Snout long and shaped like a canoe paddle (Figure 4) Paddlefishes, [Polyodontidae](#)

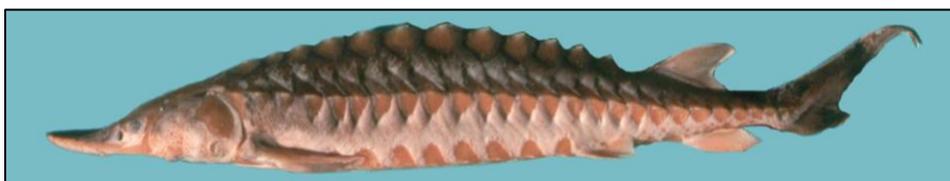


Figure 3. Atlantic Sturgeon, *Acipenser oxyrinchus*, Family Acipenseridae.



Figure 4. Paddlefish, *Polyodon spathula*, Family Polyodontidae. Photograph courtesy of the U.S. Fish & Wildlife Service.

- 5a. Dorsal fin long, more than one-half the total body length. Body round. Large, hard bony plate (gular plate) found on the chin between the two jaws (Figure 5) Bowfins, [Amiidae](#)
- 5b. Dorsal fin short, less than one-half the total body length (except in flat fishes, Family Achiridae and Paralichthyidae). No large, hard bony plate (gular plate) found on the chin between the two jaws.....6



Figure 5. Bowfin, *Amia calva*, Family Amiidae.

- 6a. Jaws elongate and slender. Dorsal fin origin located near the caudal fin.....7
- 6b. Jaws not elongate and slender. Dorsal fin origin usually located near the center of the body.....8
- 7a. Scales large. Lateral line scale series about 55. Scales rhomboid. Dorsal and anal fins higher than long. Caudal fin abbreviate heterocercal (Figure 6)..... Gars, [Lepisosteidae](#)
- 7b. Scales very small. Lateral line scale series about 300. Scales cycloid (smooth edged). Dorsal and anal fins longer than high, falcate. Caudal fin homocercal (Figure 7)Needlefishes, [Belonidae](#)

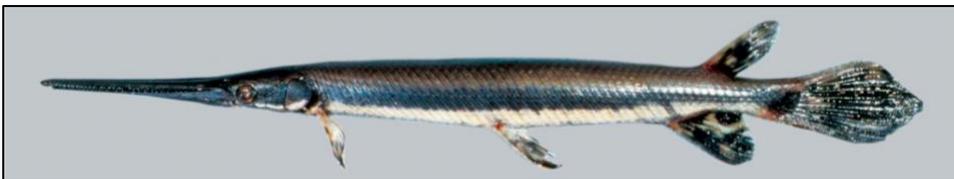


Figure 6. Longnose Gar, *Lepisosteus osseus*, Family Lepisosteidae.



Figure 7. Atlantic Needlefish, *Strongylura marina*, Family Belonidae.

- 8a. Both eyes on same side of head; eyed side with most pigment. Dorsal and anal fins long, extending from head to near caudal fin.....9
- 8b. Eyes position “normal”; both sides of body equally pigmented. Dorsal and anal fins shorter, not extending from head to caudal fin 10
- 9a. Eyes on right side of head. Pectoral fins absent. Mouth small and inconspicuous. Eyed side of body usually with eight narrow bars (Figure 8)American Soles, [Achiridae](#)
- 9b. Eyes on left side of head. Pectoral fins well developed. Mouth prominent. Eyed side of body often spotted, without dark bars (Figure 9) Sand Flounders, [Paralichthyidae](#)



Figure 8. Hogchoker, *Trinectes maculatus*, Family Achiridae.

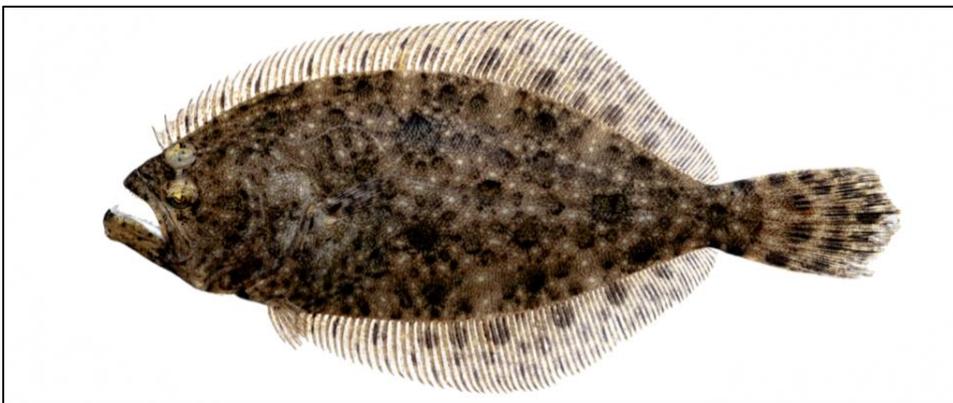


Figure 9. Southern Flounder, *Paralichthys lethostigma*, Family Paralichthyidae.

- 10a. Anus in throat region between the gills. Caudal fin rounded 11
- 10b. Anus in “normal” position, anterior to anal fin. Caudal fin shape variable 12
- 11a. Pelvic fins present. Dorsal and anal fins with spines. Body thick, not elongate, with brownish coloration. Scales visible. Eyes clear (Figure 10) Pirate Perches, [Aphredoderidae](#)
- 11b. Pelvic fins absent. Dorsal and anal fin spines absent. Body elongate, dark brown above, whitish below. Scales embedded, not visible. Eyes covered with translucent skin (Figure 11)
.....Cavefishes, [Amblyopsidae](#)



Figure 10. Pirate Perch, *Aphredoderus sayanus*, Family Aphredoderidae.



Figure 11. Swampfish, *Chologaster cornuta*, Family Amblyopsidae.

- 12a. One dorsal fin, with 0 or 1 spine 13
- 12b. One dorsal fin, with 3 or more spines, or dorsal fin separated into two parts 28
- 13a. Adipose fin present 14
- 13b. Adipose fin absent..... 16
- 14a. No scales on body. Eight large barbels present on head near mouth (Figure 12).....
North American Catfishes, [Ictaluridae](#)
- 14b. Scales present on body. If barbels present, only one pair..... 15



Figure 12. Snail Bullhead, *Ameiurus brunneus*, Family Ictaluridae.

- 15a. Body covered with flexible bony plates. One pair of barbels on a large, subterminal mouth; papillose sucking lips. Spine anterior to adipose fin. Dorsal fin with one spine and 10-14 rays (Figure 13).....
Suckermouth Armored Catfishes, [Loricariidae](#)
- 15b. Body covered with very small scales. No barbels around mouth. No spines in the fins (Figure 14)
 Trouts and Salmons, [Salmonidae](#)



Figure 13. Amazon Sailfin Catfish, *Pterygoplichthys pardalis*, Family Loricaridae.



Figure 14. Brown Trout, *Salmo trutta*, Family Salmonidae.

- 16a. Caudal fin rounded. Lateral line present. Subterminal mouth surrounded by 10-12 barbels (Figure 15) Loaches, [Cobitidae](#)
- 16b. Caudal fin rounded or forked. Lateral line present or absent. No barbels surrounding the mouth 17



Figure 15. Oriental Weatherfish, *Misgurnus anguillicaudatus*, Family Cobitidae. Photograph courtesy of the North American Native Fishes Association.

- 17a. Caudal fin rounded. Lateral line absent. Scales present on top of head 18
- 17b. Caudal fin forked. Lateral line variable. Scales absent on top of head 21
- 18a. Mouth terminal; mouth not protractile, upper jaw broadly bound to snout by a wide bridge of tissue (frenum) (Figure 16) Mudminnows, [Umbridae](#)
- 18b. Mouth superior; upper jaw not bound to snout. Mouth protractile 19



Figure 16. Eastern Mudminnow, *Umbra pygmaea*, Family Umbridae.

- 19a. Third anal fin ray branched. Anal fin rounded 20
- 19b. Third anal fin ray unbranched. Anal fin of male slender and rod-like (Figure 17)
 Livebearers, [Poeciliidae](#)



Figure 16. Eastern Mosquitofish, *Gambusia holbrooki*, Family Poeciliidae.

- 20a. Body slender. Teeth in jaws small and conical (Figure 17) Topminnows, [Fundulidae](#)
- 20b. Body deep. Teeth in jaws incisor-like (Figure 18) Pupfishes, [Cyprinodontidae](#)



Figure 17. Speckled Killifish, *Fundulus rathbuni*, Family Fundulidae.



Figure 18. Sheepshead Minnow, *Cyprinodon variegatus*, Family Cyprinodontidae.

- 21a. Jaws very long, extend far behind eye; mouth strongly inferior (Figure 19)..... Anchovies, [Engraulidae](#)
- 21b. Jaws normal length, do not extend far behind eye. Mouth position variable..... 22



Figure 19. Bay Anchovy, *Anchoa mitchilli*, Family Engraulidae.

- 22a. Belly with a saw-like keel. Adipose eyelids present..... 23
- 22b. Belly rounded. Adipose eyelids absent..... 24
- 23a. Lateral line absent. Midline of breast with a sawtooth line of scales. Tongue with no teeth (Figure 20) Herrings, [Clupeidae](#)
- 23b. Lateral line present. Breast without a sawtooth margin. Tongue with sharp teeth (Figure 21) Mooneyes, [Hiodontidae](#)

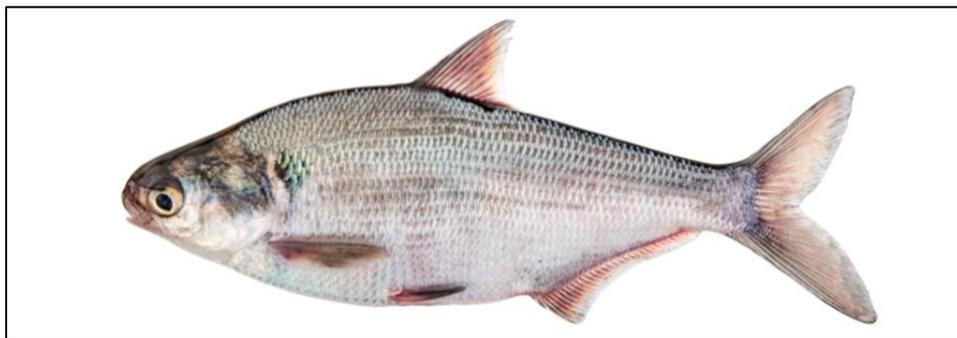


Figure 20. Gizzard Shad, *Dorosoma cepedianum*, Family Clupeidae.



Figure 21. Mooneye, *Hiodon tergisus*, Family Hiodontidae. Photograph courtesy of the North American Native Fishes Association.

- 24a. Jaws elongate and wide, forming a duck-like snout (Figure 22)..... Pikes, [Esocidae](#)
- 24b. Jaws not elongate, not forming a duck-like beak..... 25



Figure 22. Redfin Pickerel, *Esox americanus*, Family Esocidae.

- 25a. Lips thick and fleshy with plicae or papillae. Dorsal fin with 10 or more rays (Figure 23)
..... Suckers, [Catostomidae](#)
- 25b. Lips usually thin and smooth. Dorsal fin with 8 or 9 rays, or if more, a thick spine also present ... 26



Figure 23. Northern Hog Sucker, *Hypentelium nigricans*, Family Catostomidae.

- 26a. Dorsal fin long with a stout, saw-toothed spine-like ray anteriorly, followed by 13 or more branched rays. Anal fin preceded by a stout, spine-like ray (Figure 24) Barbs and Carps, [Cyprinidae](#)
- 26b. Dorsal fin long without a stout, saw-toothed spine-like ray anteriorly, followed by 12 or fewer branched rays. Anal fin without a stout, spine-like ray 27



Figure 24. Goldfish, *Carassius auratus*, Family Cyprinidae.

- 27a. Distance from anal fin origin to tip of snout 3 or more times as long as the distance from the anal fin origin to the caudal fin base (Figure 25) Asian Carps, [Xenocypridae](#)
- 27b. Distance from anal fin origin to tip of snout less than 3 times as long as the distance from the anal fin origin to the caudal fin base (Figure 26) Minnows, [Leuciscidae](#)

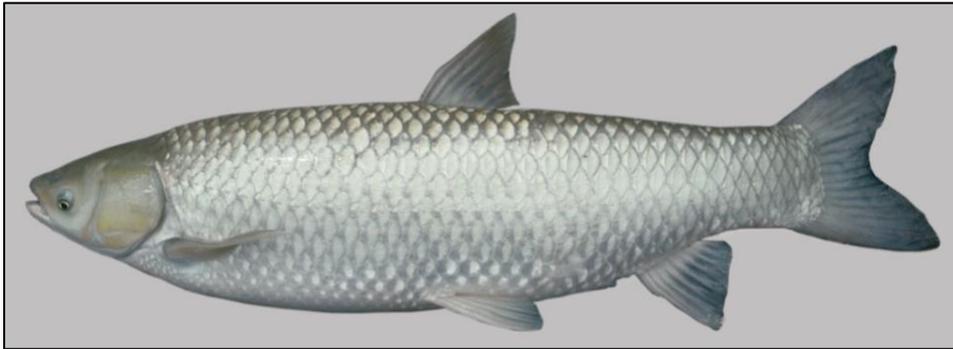


Figure 25. Grass Carp, *Ctenopharyngodon idella*, Family Xenocypridae.



Figure 26. Saffron Shiner, *Notropis rubricroceus*, Family Leuciscidae.

- 28a. Body without scale or scales reduced to minute prickles 29
- 28b. Body with scales 30

- 29a. Scaleless body. Four spines of first dorsal fin angled alternately left to right. Caudal peduncle extremely narrowed (Figure 27).....Sticklebacks, [Gasterosteidae](#)
- 29b. Scales reduced to tiny prickles. 6 to 9 dorsal fin spines not angled left to right. Caudal peduncle not extremely narrowed (Figure 28).....Sculpins, [Cottidae](#)



Figure 27. Fourspine Stickleback, *Apeltes quadracus*, Family Gasterosteidae. Photograph courtesy of David Neely.



Figure 28. Mottled Sculpin, *Cottus bairdii*, Family Cottidae.

- 30a. Pelvic fins abdominal. Dorsal fins widely separated..... 31
- 30b. Pelvic fins thoracic. Dorsal fins joined or slightly separated 32
- 31a. Body “normal”, not usually elongate. Adipose eyelids usually present. Anal fin spines 2 or 3. First dorsal fin with four stiff spines (Figure 29)Mulletts, [Mugilidae](#)
- 31b. Body elongate, thin, delicate. Adipose eyelids absent. Anal fin spines 1, weak. Dorsal fin spines 5 or 6, weak (Figure 30) New World Silversides, [Atherinopsidae](#)



Figure 29. Striped Mullet, *Mugil cephalus*, Family Mugilidae.



Figure 30. Waccamaw Silverside, *Menidia extensa*, Family Atherinopsidae.

- 32a. Anal fin with 2 spines. Dorsal fin entire, single (Figure 31)..... Drums and Croakers, [Sciaenidae](#)
- 32b. Anal fin with 1 or 2 spines and dorsal fin divided into two fins or anal fin with 3 or more spines and dorsal fin usually single 33



Figure 31. Freshwater Drum, *Aplodinotus grunniens*, Family Sciaenidae. Photograph courtesy of the North American Native Fishes Association.

- 33a. Anal fin with 1 or 2 spines. Dorsal fin divided into two fins 34
- 33b. Anal fin with 3 or more spines. Dorsal fin usually single 36
- 34a. Anal fin spine stiff, prominent. Caudal fin usually emarginate or truncate. Dorsal fin spines stiff. Lateral line present, sometime incomplete (Figure 32)Perches and Darters, [Percidae](#)
- 34b. Anal fin spine flexible, not prominent. Caudal fin rounded. Dorsal fin spines flexible. Lateral line absent..... 35



Figure 32. Turquoise Darter, *Etheostoma inscriptum*, Family Percidae.

- 35a. Pelvic fins united, forming a sucking disc (Figure 33) Gobies, [Gobiidae](#)
- 35b. Pelvic fins separate, not united into a disk (Figure 34).....Sleepers, [Eleotridae](#)



Figure 33. Freshwater Goby, *Ctenogobius shufeldti*, Family Gobiidae.



Figure 34. Fat Sleeper, *Dormitator maculatus*, Family Eleotridae.

- 36a. Lateral line absent (Figure 35) Pygmy Sunfishes, [Elassomatidae](#)
- 36b. Lateral line present, maybe interrupted 37



Figure 35. Carolina Pygmy Sunfish, *Elassoma boehlkei*, Family Elassomatidae.

- 37a. Lateral line interrupted under soft dorsal fin. Anterior series of pored scales higher than posterior series. Each nostril with a single opening (Figure 36)Cichlids, [Cichlidae](#)
- 37b. Lateral line if present normally complete (if interrupted, the anterior and posterior series are at the same height). Two nostril openings in each side of head..... 38



Figure 36. Blue Tilapia, *Oreochromis aureus*, Family Cichlidae. Photograph courtesy of Howard Jelks, U.S. Geological Survey

- 38a. Dorsal fins (spinous and soft) separate, or connected slightly. Sharp spine on rear of opercle (gill cover). Posterior edge of preopercle strongly serrated (Figure 37)...Temperate Basses, [Moronidae](#)
- 38b. Dorsal fins (spinous and soft) well connected, a notch may be present. No spine on rear of opercle (gill cover). Posterior edge of preopercle strongly smooth (Figure 38) Sunfishes, [Centrarchidae](#)



Figure 37. Striped Bass, *Morone saxatilis*, Family Moronidae.



Figure 38. Mud Sunfish, *Acantharchus pomotis*, Family Centrarchidae.

Glossary

(Adapted from Jenkins and Burkhead (1994) and Rhode et al. 2009))

Abbreviate Heterocercal Caudal Fin – A caudal fin type in which the posterior end of the vertebral column is distinctly upturned, but short

Adipose Eyelids – Fatty translucent tissue that totally or partially covers the eye in some fishes

Adipose Fin – Fleshy, small fin that lacks rays and spines and is located on the dorsum, just before the caudal fin

Cycloid Scale – Thin, light, flexible scale lacking small rear-pointing “teeth” on the outer edge

Frenum – Fleshy bridge or connection between the snout and the upper lip

Gular Plate – Large, hard bony plate found on the chin of a Bowfin

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

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

Opercle – The largest bone of the gill cover, sometimes a synonym for “gill cover”

Papillae (Papillose Lips) – Small, fleshy protuberance, usually found on the lips

Plicae (Plicate Lips) – Tightly folded (parallel ridges and grooves) skin on the lips

Protractile Mouth (Protrusile Jaw) – An upper jaw able to protract from the snout tip when the mouth is opened

Rhomboid Scale – A bony, diamond-shaped, interlocking scale found in Longnose Gar

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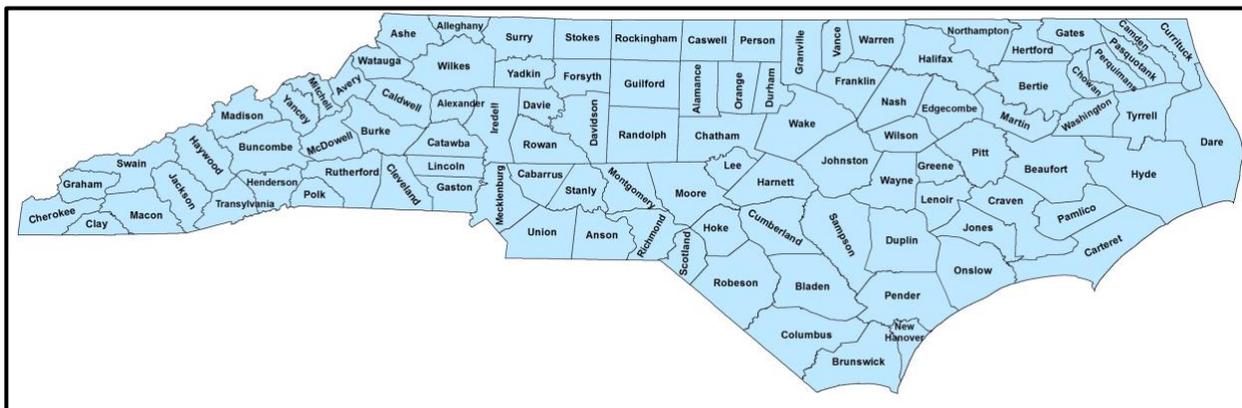
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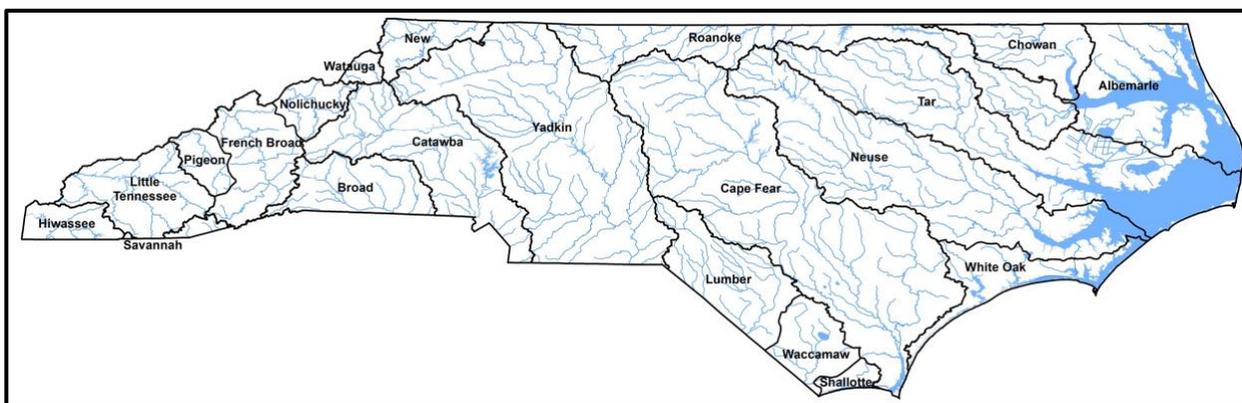
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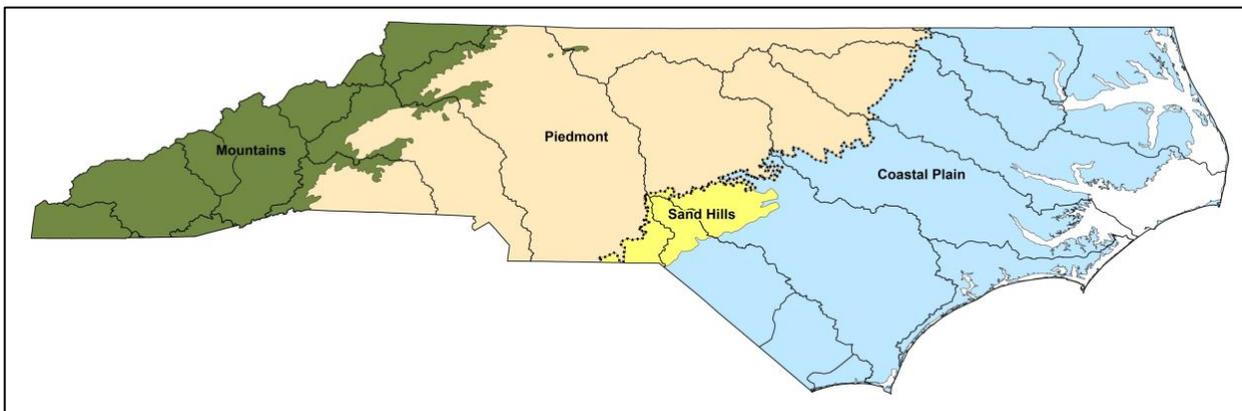
Supplemental Maps



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).