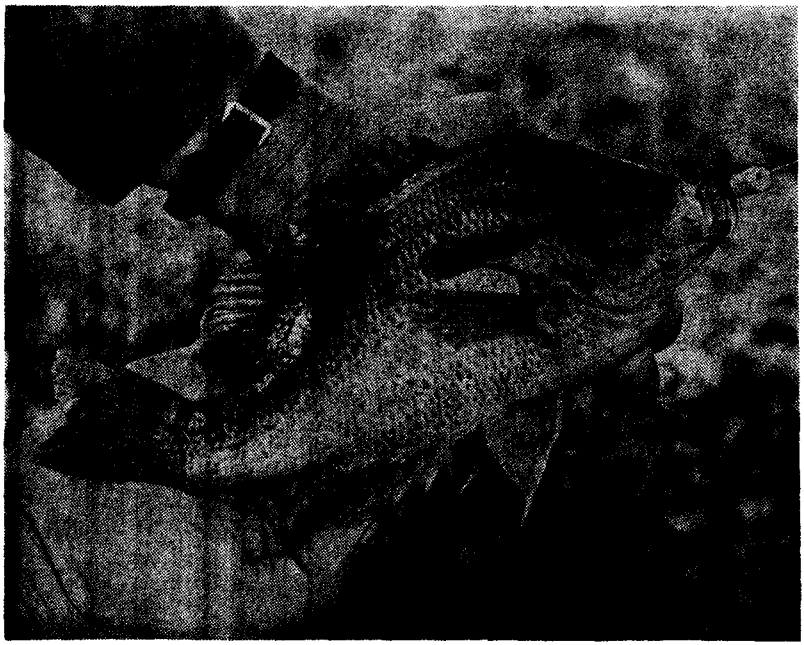
GEOGRAPHICAL DISTRIBUTION AND HABITAT REQUIREMENTS OF THE REDBREAST SUNFISH *Lepomis auritus* IN NORTH CAROLINA[1]



EUGENE H. SHANNON

Division of Inland Fisheries

North Carolina Wildlife Resources Commission
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ABSTRACT

In order to determine the distribution and habitat requirements of the redbreast sunfish *Lepomis auritus* (Linnaeus) in the streams and reservoirs of North Carolina, a more detailed analysis of the data were extrapolated from previous watershed and reservoir survey reports made by personnel of the Wildlife Resources Commission from 1956 to 1966.

It was concluded from the study that: (1) Redbreast sunfish inhabit 23 of the 26 major watersheds within the State; (2) Redbreast sunfish inhabit (a) waters reaching elevations up to 3,500 feet, (b) waters having up to eight percent sea-water equivalency, and (c) a pH range between 4.8 and 8.4; and (3) The game-fish species most frequently associated with the redbreast sunfish in the Mountain, Piedmont, and Northeastern watersheds was the bluegill, whereas warmouth, redfin pickerel and/or largemouth bass were most frequently associated in the Southeastern Coastal watersheds.

INTRODUCTION

From information obtained through State-wide lentic and lotic water surveys made between 1956 and 1965 it became apparent that the red-

[1] Contribution from Federal Aid to Fish Restoration Funds under Dingle-Johnson Project F-16-R, State of North Carolina.

breast sunfish *Lepomis auritus* (Linnaeus) was one of the more widely distributed sunfish of sport-fishery significance in North Carolina. Its geographic range within North Carolina extends throughout the gamut between the coastal waters, having up to 10 percent sea-water equivalency and the Mountains at elevations exceeding 2,500 feet. The redbreast sunfish is a very important, and in some areas, virtually the only, game fish. In spite of its popularity, little was known about its habitat requirements. To determine the distribution and ecological relationship requirements of this species a more detailed analysis of previous findings was made.

PROCEDURES

Habitat and distribution data, pertinent to the redbreast sunfish, were compiled from previously completed survey and classification reports on all North Carolina streams of fishery significance and from reservoir reports. The specific data obtained from the reports included pH, dissolved oxygen, total alkalinity, salinity, and elevation. From these data the range of each factor was determined. In addition, the most frequently associated game fishes, non-game fishes, and fish-food organisms were determined.

RESULTS AND DISCUSSION

The redbreast sunfish was found in 23 of the 26 major watersheds in North Carolina being absent only from the Watauga, Alligator and North River watersheds (Figure 1). It was found in 53 percent of the major large impoundments within the State (Table 1).

TABLE 1. LIST OF NORTH CAROLINA LAKES AND RESERVOIRS, BY GEOGRAPHICAL AREAS, SHOWING THE PRESENCE (P) AND ABSENCE (A) OF REDBREAST SUNFISH POPULATIONS.

Coastal Plain Lakes of Southeastern N. C.	Coastal Plain Lakes of Northeastern N. C.	Roanoke River Reservoirs
Black Lake (A)	Fresh Water Lake (A)	Roanoke River Reservoir (A)
Jones Lake (A)	Merchants Mill Pond (A)	Kerr Reservoir (A)
Salters Lake (A)	Lake Phelps (A)	Gaston Reservoir (A)
Singletary Lake (A)	Mattamuskeet Lake (A)	
White Lake (P)	Whites Mill Pond (A)	
Lake Waccamaw (P)		

Yadkin River Reservoirs	Catawba River Reservoirs	Mountain Reservoirs
Blewett Falls Reservoir (P)	Catawba Reservoir (P)	Lake Lure (P)
Tillery Reservoir (P)	Mountain Island Reservoir (P)	Santeetlah Reservoir (A)
Falls Reservoir (P)	Lake Norman (P)	Fontana Reservoir (P)
Badin Reservoir (P)	Lookout Shoals Reservoir (P)	Glenville Reservoir (P)
High Rock Reservoir (P)	Lake Rhodhiss (P)	Chatuge Reservoir (P)
W. Kerr Scott Reservoir (P)	Lake Hickory (P)	Summit Reservoir (P)
Salem Lake (P)	Lake James (P)	Hiwassee Reservoir (A)
Roaring Gap Lake (P)		Lake Adger (P)
Winston Lake (A)		Skyland Reservoir (P)
		Cheoah Reservoir (A)
		Sequoyah Reservoir (P)
		Apalachia Reservoir (A)
		Cedar Cliff Reservoir (A)
		Tennessee Creek Reservoir (A)
		Nantahala Reservoir (P)

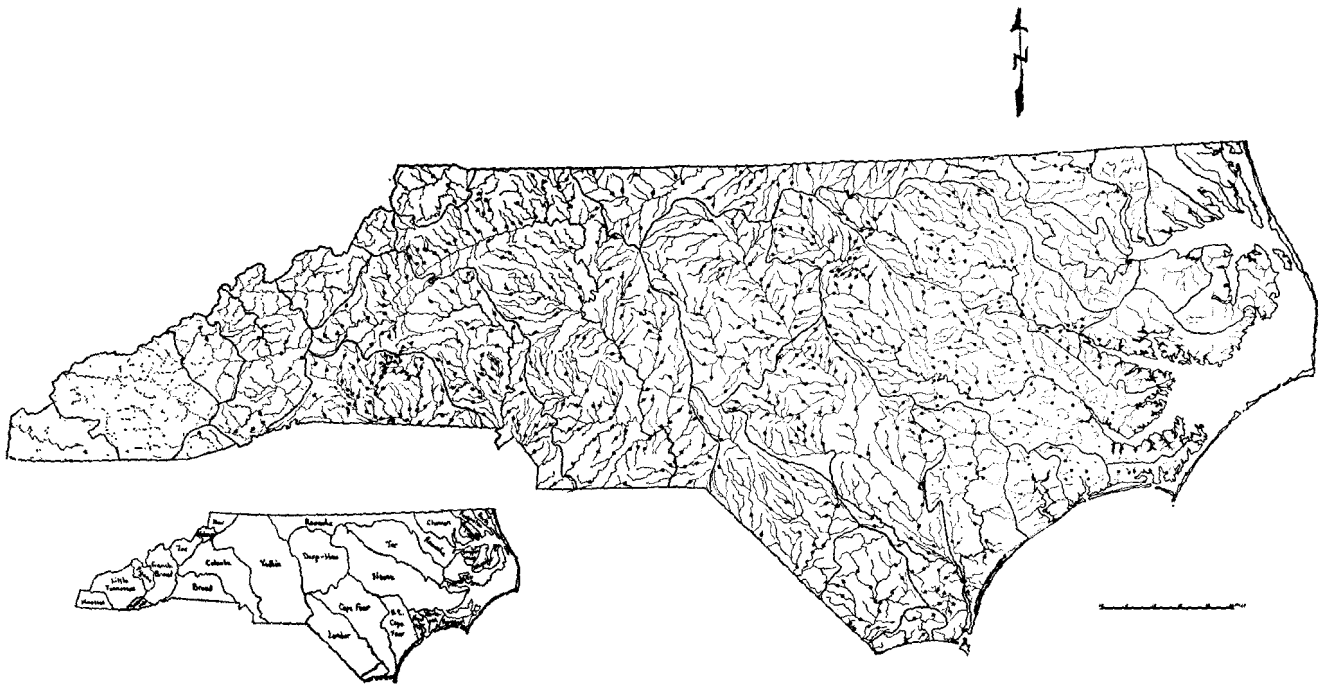

Figure 1. **Stream Distribution of Redbreast Sunfish** *Lepomis auritus* (Linnaeus), by Watersheds, in **North Carolina.**

Thirteen watersheds having redbreast sunfish present at twelve or more percent of the stations sampled were selected for more intensive analysis. Chemical differences between streams having, and not having, redbreast sunfish populations were insignificant except where salinities exceeded eight percent sea-water equivalency. It was found that redbreast sunfish inhabited waters having a pH range between 4.8 and 8.4, total alkalinity between 0.0 and 196.0 ppm; and dissolved oxygen concentrations between 0.1 and 11.8 ppm. The low dissolved oxygen readings were attributed to undetermined interferences with the azide modification of the Winkler method in the black coastal waters.

The bluegill *Lepomis macrochirus* Rafinesque was the most frequently associated with the redbreast sunfish in the Mountains, Piedmont and northeastern watersheds (Figure 1). In the upper and lower Coastal Plain watersheds the warmouth *Chaenobryttus gulosus* (Cuvier), redfin pickerel *Esox americanus americanus* Gmelin, and/or the largemouth bass *Micropterous salmoides* Lacepede replaced the bluegill as the more frequently associated game fish.

In the stations sampled in the mountains containing no redbreast sunfish, rainbow trout *Salmo gairdneri* Richardson, brook trout *Salmo fontinalis* (Mitchill) and brown trout *Salmo trutta* Linnaeus occurred frequently; in the Piedmont and northeastern regions, bluegill, green sunfish *Lepomis cyanellus* Rafinesque, and redfin pickerel were the most frequent and in the upper and lower Coastal Plain, redfin pickerel and warmouth occurred most frequently when redbreast were not present.

The non-game fishes most frequently associated with the redbreast sunfish in the Mountain and Piedmont were bluehead chub *Hybopsis leptocephala* (Girard), margined madtom *Noturus insignis* (Richardson), johnny darter *Etheostoma nigrum* Rafinesque, and *Moxostoma sp.* In the upper and lower Coastal Plain region the pirate perch *Aphredoderus sayanus* (Gilliams), lake chubsucker *Erimyzon sucetta* (Lacepede), johnny darter, American eel *Anguilla rostrata* (LeSueur), mosquitofish *Gambusia affinis* (Baird and Girard), and margined madtom *Noturus insignis* (Richardson) were the most frequently associated species. The more frequent non-game fishes present in the Mountain and Piedmont streams from which redbreast sunfish were absent were blacknose dace *Rhinichthys atratulus* (Hermann), bluehead chub, fantail darter *Etheostoma fusiforme* (Girard), margined madtom, creek chub *Semotilus atromaculatus* (Mitchill), and johnny darter. In the upper and lower Coastal Plain watersheds, pirate perch, johnny darter, bluespotted sunfish *Enneacanthus gloriosus* (Holbrook), banded sunfish *Enneacanthus obesus* (Girard), American eel, and yellow bullhead *Ictalurus natalis* (LeSueur) were the species present when the redbreast sunfish was absent.

The principal fish-food organisms found in the Mountain and foothill streams were Ephemeroptera and Diptera. Eastward from the foothills to the coast the Diptera replaced the Ephemeroptera as the principal bottom organisms and the Trichoptera made a significant appearance. In the Coastal Plain, the Diptera and Oligochaeta were most abundant. From the data examined it appears that the same insect orders were dominant in waters having and not having redbreast sunfish populations.

Elevation did not appear to be a limiting factor below 3,500 feet. Redbreast sunfish were found to inhabit Nantahala Reservoir at an elevation of 3,000 feet and Glenville Reservoir at an elevation of 3,492 feet. They were also found to frequent trout waters at higher elevations.

CONCLUSIONS

1. Redbreast sunfish inhabit 23 of the 26 major watersheds within the State.
2. Redbreast sunfish inhabit (a) waters reaching elevations up to 3,500 feet, (b) waters having up to eight percent sea-water equivalency, and (c) a pH range between 4.8 and 8.4.

3. The game species most frequently associated with the redbreast sunfish in the Mountain, Piedmont, and northeastern watersheds was the bluegill, whereas warmouth, redfin pickerel and/or largemouth bass were more frequently associated in the Southeastern Coastal watersheds.

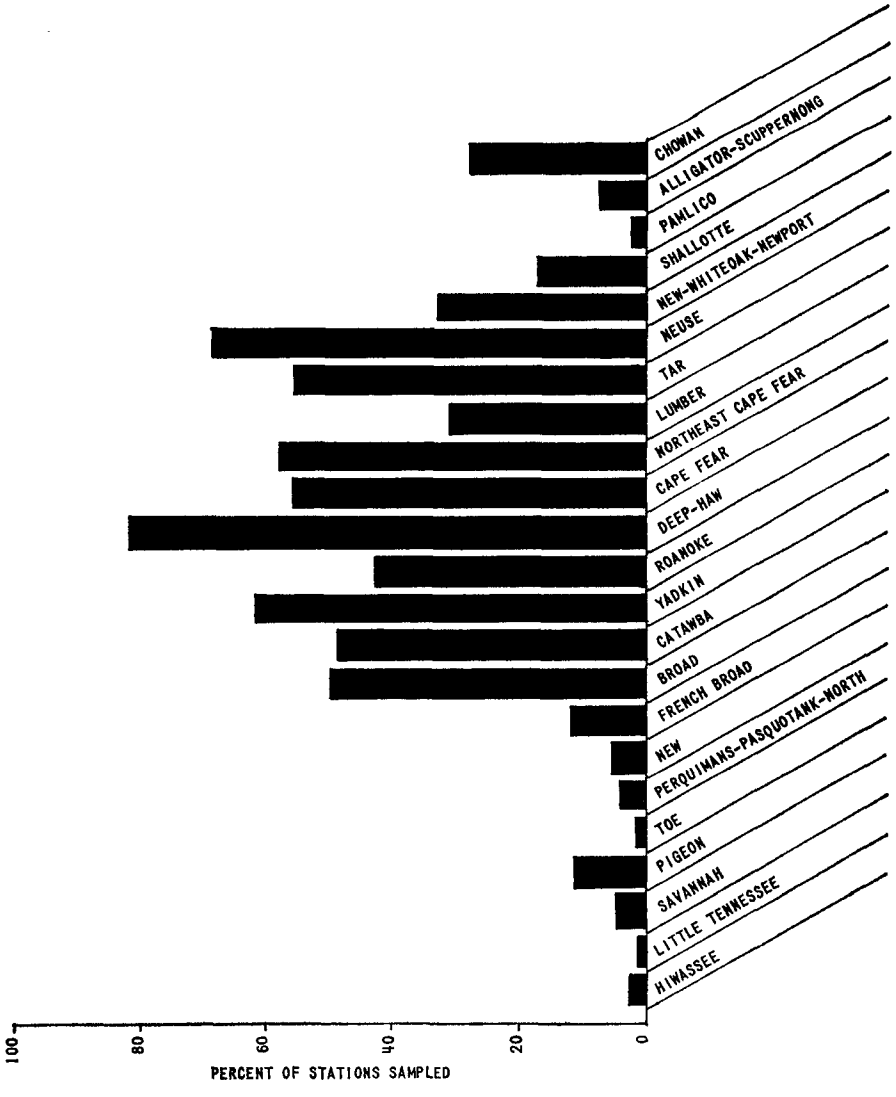

FIGURE 2. Percentage of sample stations, by watersheds, containing redbreast sunfish.