

# The Upland Dusky Shiner, *Notropis cummingsae collis* Hubbs & Raney 1951:

## A Mistaken Collection Locality, A Subspecies Extirpated from Its Type Locality, or Something Else?



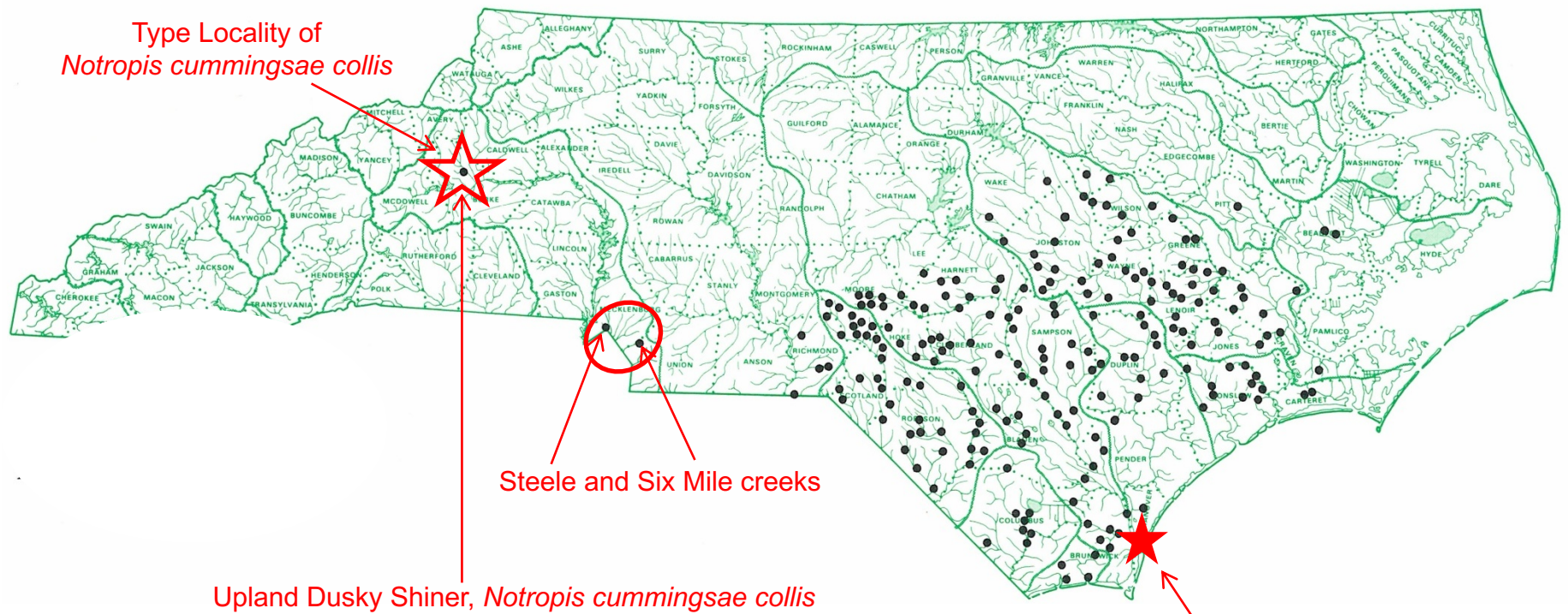
Holotype, adult ♀, 34 mm SL, collected 09/06/1946  
(Hubbs and Raney 1951)

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25<sup>th</sup> Annual Meeting  
North Carolina Chapter of the American Fisheries Society  
Durham, NC  
February 19, 2014  
(amended June 2020)

# *Notropis cummingsae* Myers 1925

(map adapted from Menhinick (1991))



1cm

Holotype, photographed Oct. 2013

## Purposes

- To investigate the type locality of the Upland Dusky Shiner.
- To determine if the population is extant.
- To unravel some peculiarities regarding the distribution of the Dusky Shiner and Highfin Shiner in the Catawba River basin (Santee River system) in North Carolina.
- To convince you that we can tell the two species apart, whereas others before us could not.



# Background on *Notropis cummingsae collis* (from Hubbs and Raney (1951))

- “*collis*” – meaning of the high ground; referring to living in the Piedmont.
- Specimens (n = 34)
  - Holotype, Roses Creek, Burke County, NC, (n = 1), 1946
  - Paratypes
    - Roses Creek (n = 2), 1946
    - Roses Creek (n = 3), 1946
    - Unknown tributary, York County, SC, (n = 18), 1931
    - Steele Creek, York County, SC, (n = 1), 1931
      - Same date and the holotype locality for *Notropis altipinnis wrighti* (UMMZ 94551) (Hubbs & Raney 1948).
    - South Fork (Fishing) Creek (Chester County, SC) (n = 9), 1946
      - Same date and the paratype locality for *Notropis altipinnis wrighti* (CUMV 10577) (Hubbs & Raney 1948).
- “*Notropis cummingsae collis* is known only from the Piedmont and Mountain streams of the Santee River system in South Carolina and North Carolina”.
- “It is probably of wide occurrence throughout these waters, but there is no evidence of its living in any other stream system.”

# Background on *Notropis cummingsae* (from Hubbs & Raney (1951))

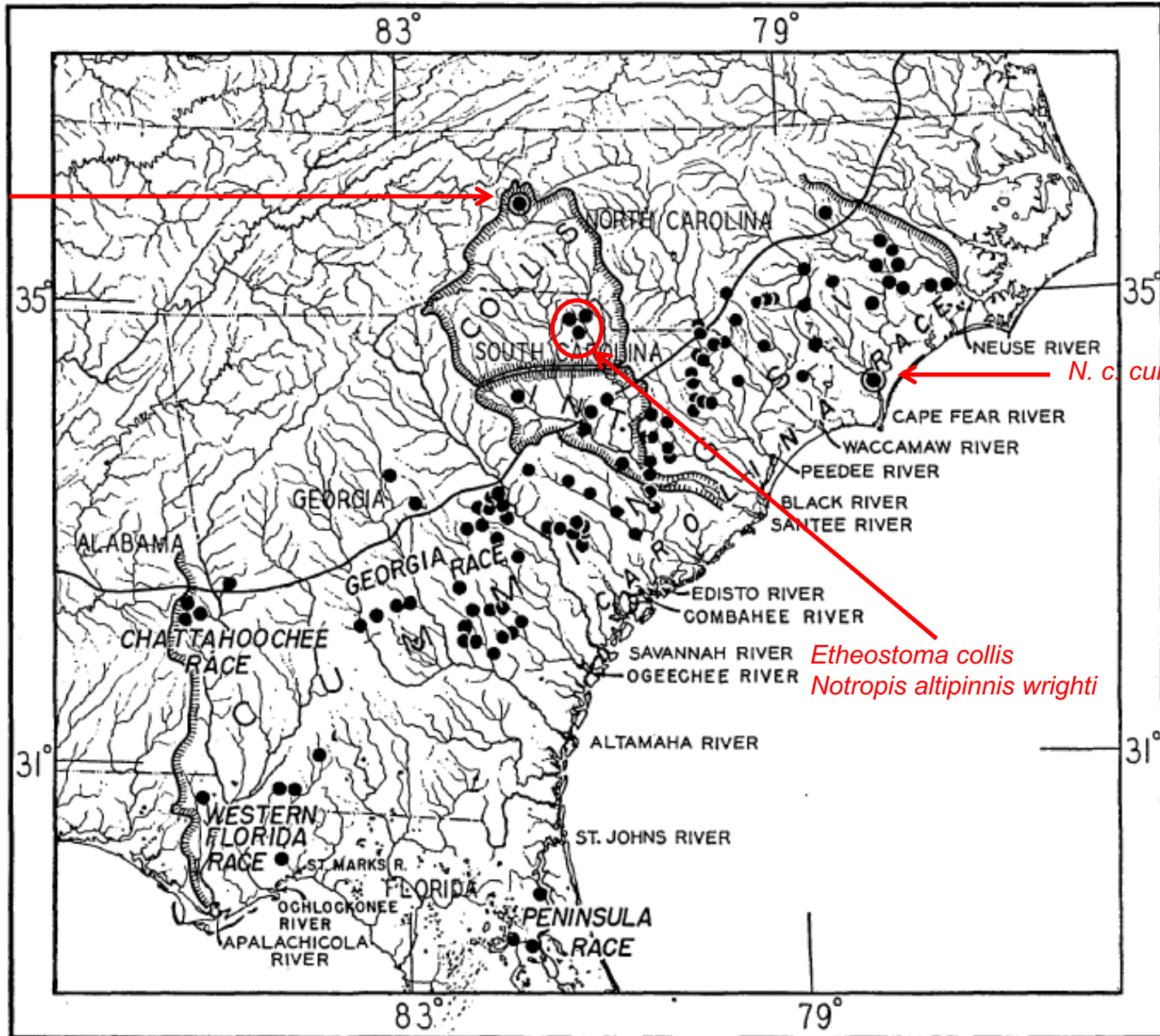


*Notropis cummingsae*  
Neuse River Basin, Craven County  
Photograph by Scott A. Smith

- Two subspecies of *Notropis cummingsae*
  - Lowland Dusky Shiner, *Notropis cummingsae cummingsae* Myers 1925
  - Upland Dusky Shiner, *Notropis cummingsae collis* Hubbs and Raney 1951
- Five races of *Notropis cummingsae*
  - Carolina Race
  - Georgia Race
  - Peninsular Race
  - Western Florida Race
  - Chattahoochee Race
- Neither the subspecies or the races have been adopted by other ichthyologists (Gilbert 1978; Gilbert & Burgess 1980).

*Notropis cummingsae* (from Hubbs & Raney (1951))

*N. c. collis*

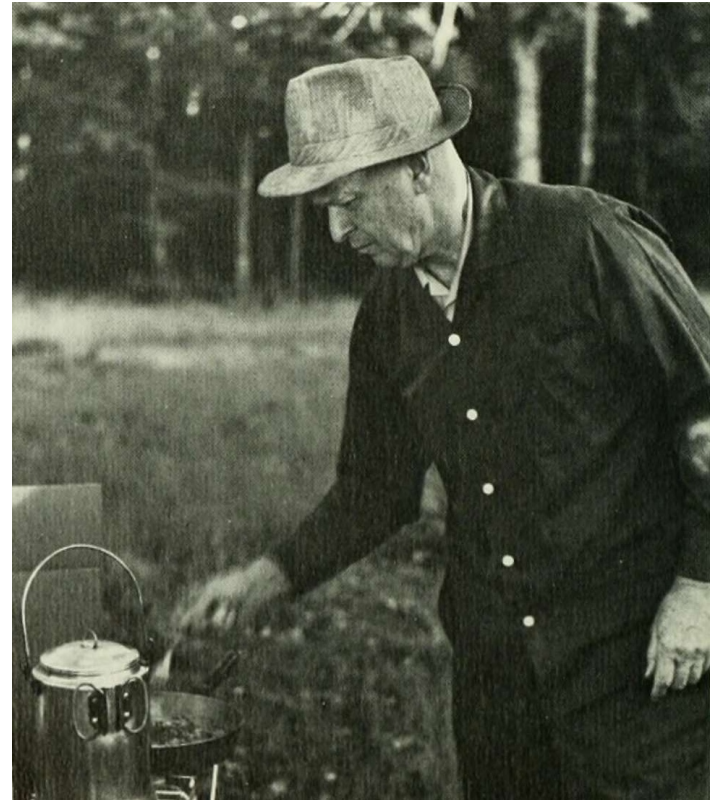


*N. c. cummingsae*

*Etheostoma collis*  
*Notropis altipinnis wrighti*

# Who was Dr. Elmer E. Brown?

Herpetologist and Professor of Biology at Davidson College

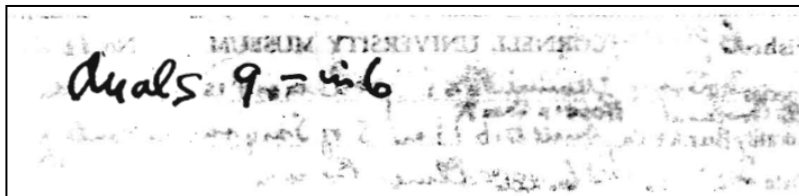
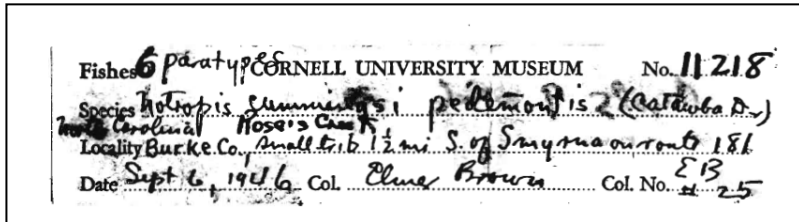


# Elmer E. Brown's Fish Collections at Cornell University

- Was a classmate of Edward C. Raney under Professor Albert H. Wright
- September 06, 1946
  - Small stream, 1 ½ mi south of Smyrna on Route 181, Burke Co., Rose's Creek
- November 30, 1947
  - Rose's Creek, 1 ½ mi south of Smyrna on Route 181, Burke Co., (1.6 mi S of "Clearwater Beach" on Route 181)

Sorted and identified by E.C. Raney in 1951

Label reads: *Notropis cummingsae piedmontis*  
(a nomen nudum)



Survey Z.C. note same locality as coll E.B. #51

Drainage Catawba Coll. No. EB 25

Locality Small stream 1 1/2 mi South of Smyrna on route 181  
Rose's Creek

County Burke Co. Quadrangle \_\_\_\_\_ Elevation \_\_\_\_\_

Water \_\_\_\_\_ Flow \_\_\_\_\_ Width \_\_\_\_\_

Vegetation \_\_\_\_\_

Bottom \_\_\_\_\_ Current \_\_\_\_\_

Shore \_\_\_\_\_ Distance from shore \_\_\_\_\_

Temperature: Air \_\_\_\_\_ Water \_\_\_\_\_ Time \_\_\_\_\_ Weather \_\_\_\_\_

Depth of Capture \_\_\_\_\_ Depth of Water \_\_\_\_\_

Method of Capture \_\_\_\_\_ Date Sept 6 1946

Collected by Elmer Brown

Orig. preserv. \_\_\_\_\_ Time \_\_\_\_\_

General notes:

Notropis cummingsae piedmontis 6 paratypes <sup>analyses</sup> 9

Notropis septicus 1 ad

Notropis lutipinnis m. juv - ad most common fish

Notropis pyrrhomelas 13 juv - ad

Clinostomus vandoisulus 1 ad

Notemis leptocephalus 14 yq - juv

Moxostoma valenciennesi 149 <sup>11 dorsal rays</sup>

Boleosoma maculiceps 3 ad

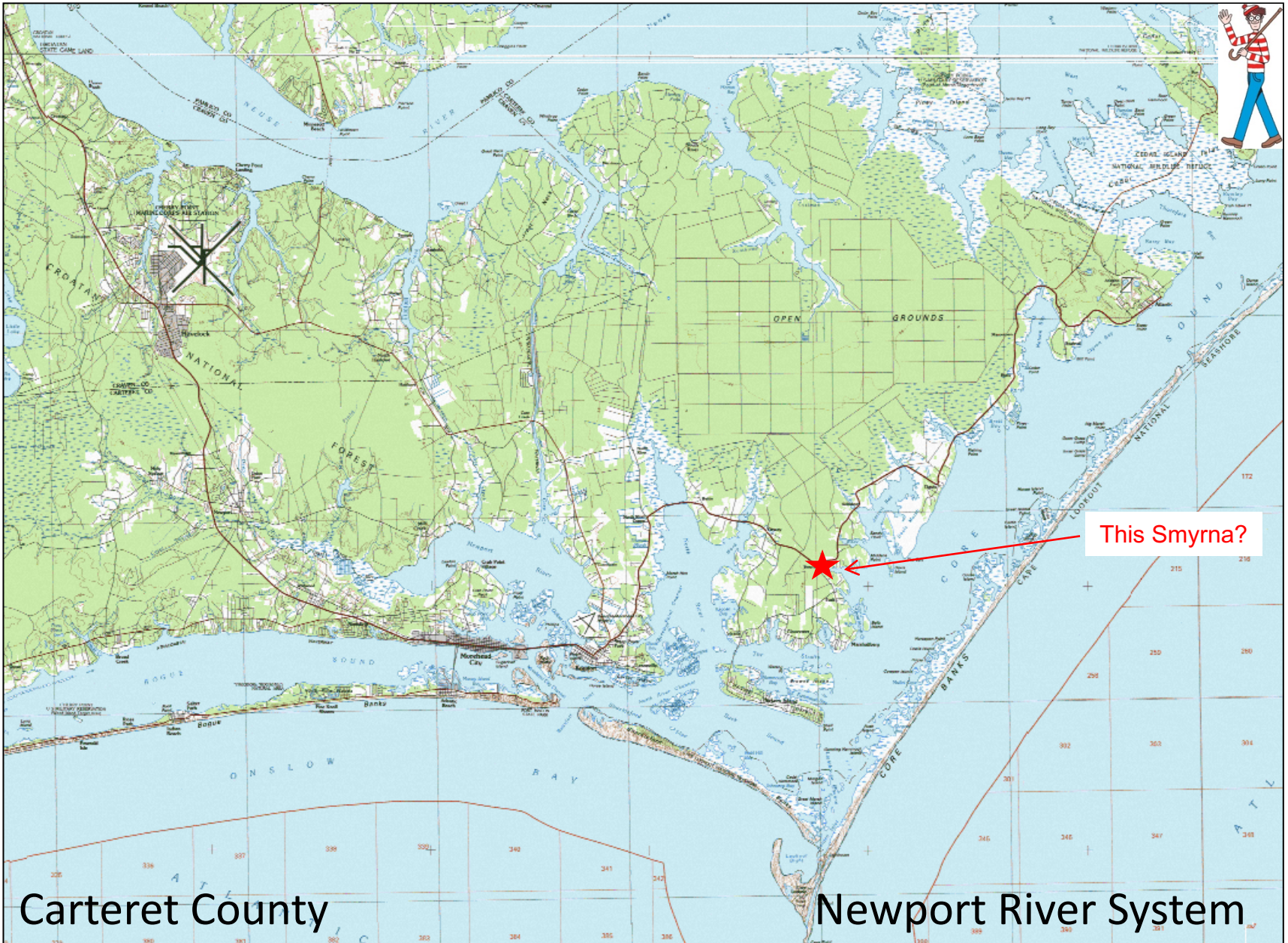
Poeciliichthys flabellaris brevispinis 15 yq - ad

Poeciliichthys thalassinum 2 ad

Schilbeodes m. marginatus 1 juv



# Where's Smyrna, North Carolina?

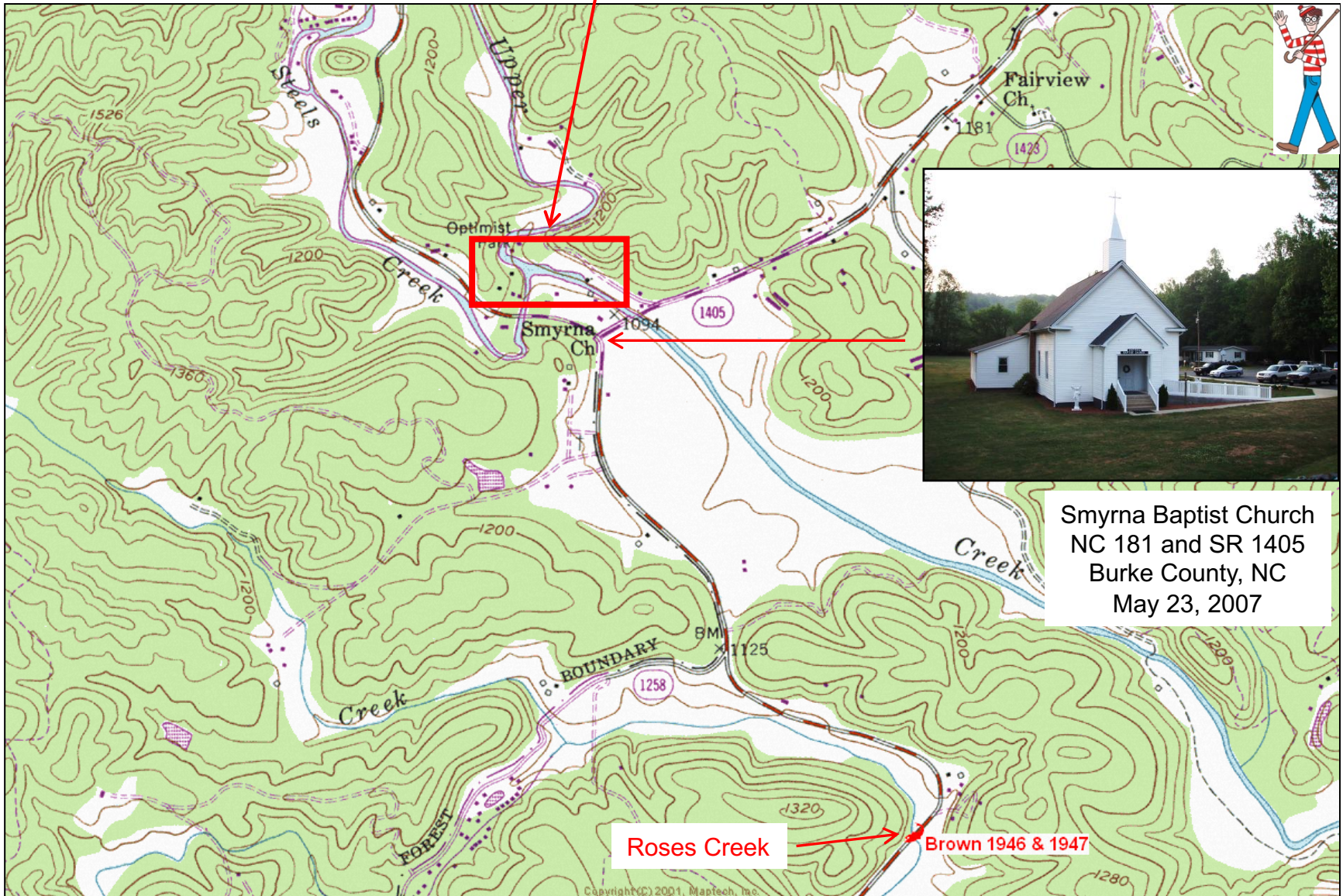


This Smyrna?

Carteret County

Newport River System

# Where's "Clearwater Beach"?



Smyrna Baptist Church  
NC 181 and SR 1405  
Burke County, NC  
May 23, 2007

# Roses Creek

- Tributary to Irish Creek to Warrior Creek and ultimately to the Catawba River in Burke County, NC
- US EPA Level IV Ecoregions
  - Southern Crystalline Ridges & Mtns.
  - Northern Inner Piedmont
- Elevation – from 3,940 ft. down to 1,040 ft.
- Classified as trout waters
- Clear, not tannin stained
- Eroding and sloughing banks
- Shallow, sandy and silty pools; gravel riffles
- Nursery watershed with nonpoint source runoff

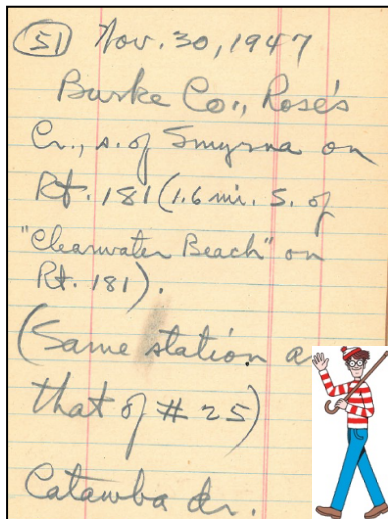
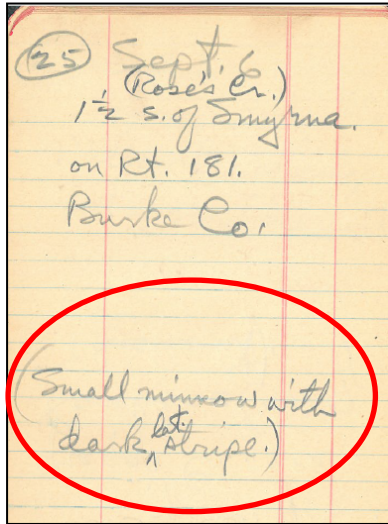


Roses Creek at NC 181, Burke County.

# Possible Scenarios

- Was there a jar label mix-up?
  - But co-occurring species were those you would find in a Foothills stream (e.g., Fieryblack Shiner, Greenhead Shiner, Seagreen Darter, etc.).
- Did the specimens come from another stream that was collected by E. E. Brown in 1946 or 1947?
  - No other collections were made by E. E. Brown from tributaries to the Catawba River in North Carolina that would have had *Notropis cummingsae* in them.
  - Three collections were made from tributaries to the Cape Fear and Lumber rivers and locality data of one site are incorrect (road or stream name).
- Did the specimens come from another creek, but mistakenly placed in the Roses Creek jar?
  - They perhaps came from the collection from South Fork (Fishing) Creek, Chester County, South Carolina in 1946, also with 9 paratypes.

# Where is/was Elmer E. Brown's Field Notebook?



- Discovered in 2010 – three years after our investigation began in a filing cabinet in the Ichthyology Collection at the North Carolina Museum of Natural Sciences, Raleigh, NC.
- Whose actual handwriting it belonged to was only figured out in September 2013.
- Fish collections were made by Elmer E. Brown for Edward C. Raney in 1946 and 1947.

“It is probably of wide occurrence throughout these waters, but there is no evidence of its living in any other stream system” (Hubbs and Raney 1951).

## SO, WHAT HAPPENED?

- *Notropis cummingsae collis* has not been collected from the Roses Creek watershed since 1946.
  - Not by Brown in 1947, or by Louder in 1964, or by Tracy in October 2008 and August 2009
- There has been impoundment & habitat fragmentation by six hydroelectric dams along the Catawba River system with no avenues for re-colonization.
- There have been introductions of nonindigenous species and nonindigenous piscivorous species.
  - Warpaint Shiner, Rainbow Trout, Green Sunfish, Rock Bass, Smallmouth Bass, Yellow Perch
- Have local plant nurseries had an impact resulting in water quality declines?
  - Loss of intolerant species (e.g., Seagreen Darter and Fieryblack Shiner)
  - Dominance by herbivorous Central Stoneroller
- There have been changing landuse practices and urbanization in the lower part of the system.

# Problems with Collections of *Notropis cummingsae collis*

- There are no vouchered specimens of *Notropis cummingsae* from North Carolina's Catawba River basin at the North Carolina Museum of Natural Sciences.
- All historical collections from North Carolina's Catawba River basin have been reidentified by us as *Notropis altipinnis*:
  - Randall (1955), from Mecklenburg County, 1955
    - Four Mile Creek, USNM 238364
    - Long Creek, USNM 238376
    - Coffey Creek, no vouchered material
    - McMullen Creek, NCSM 92594
  - Louder (1964), from Lincoln, Mecklenburg, and Union counties, 1963
    - Six Mile Creek (NCSM 2358), Four Mile Creek (NCSM 2238), McMullen Creek (NCSM discarded), Cane Creek (NCSM 53805) – vouchered material
    - Indian Creek, Irvins Creek, East Fork Twelvemile Creek, West Fork Twelvemile Creek – non-vouchered material
  - Ohio State University Museum, from Mecklenburg County, 1968
    - Irwin Creek, OSUM 42468
  - Cloutman and Olmsted (1978), Duke Energy, from Mecklenburg County, 1975-1978
    - Steele Creek, DPC 385
    - Six Mile Creek, DPC 386
    - Six Mile Creek, DPC 387
- All present-day collections from North Carolina's Catawba River basin have been identified as *Notropis altipinnis*, Highfin Shiner.

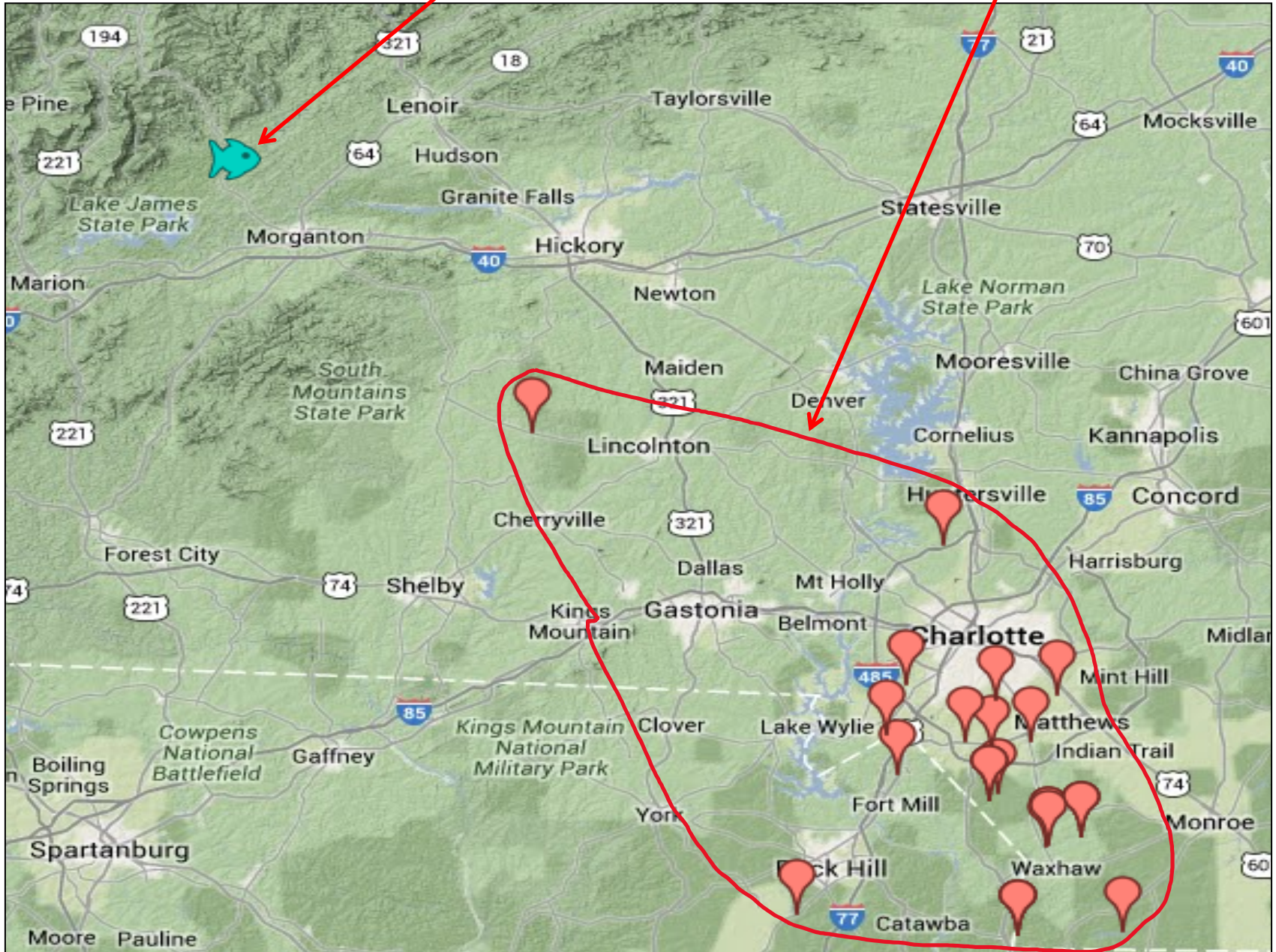
Cloutman and Olmsted's 1976 Material –  
Reidentified as *Notropis altipinnis*



Steele Creek, photographed Aug. 2013

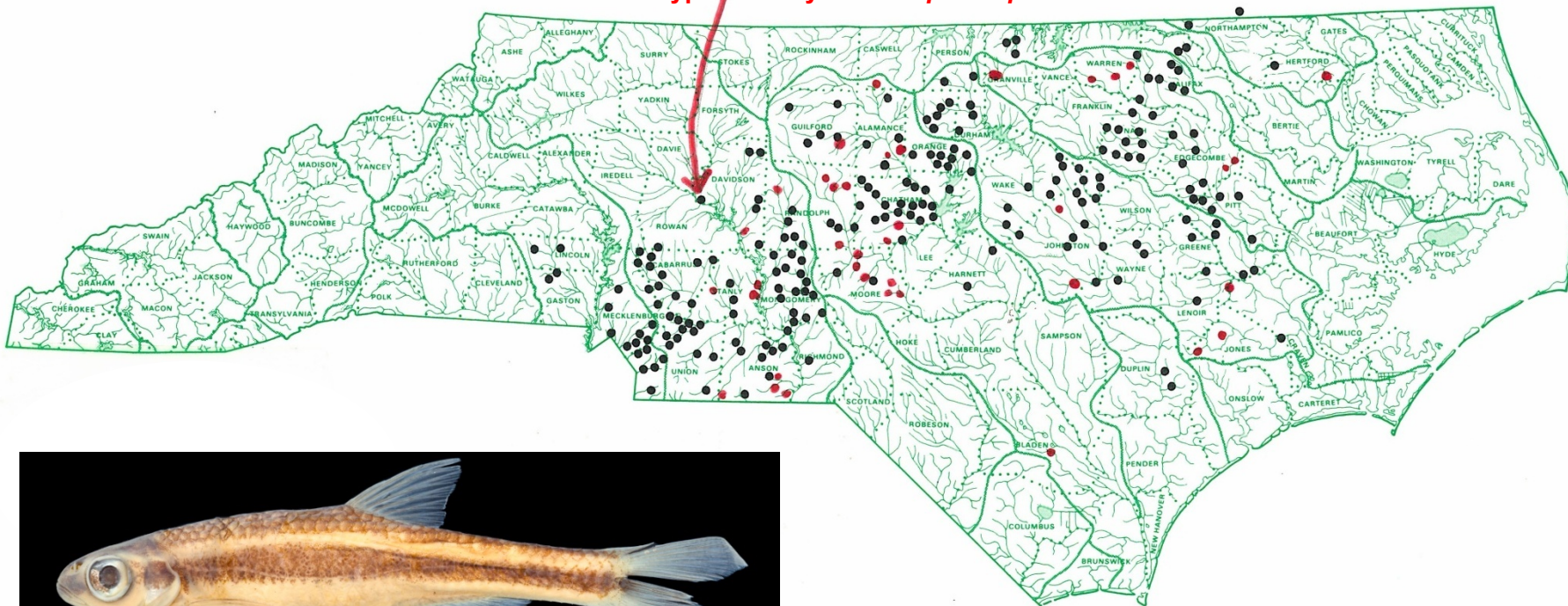


# Specimens of *Notropis cummingsae* and *Notropis altipinnis*



# *Notropis altipinnis* (Cope 1870)

Type Locality of *Notropis altipinnis*



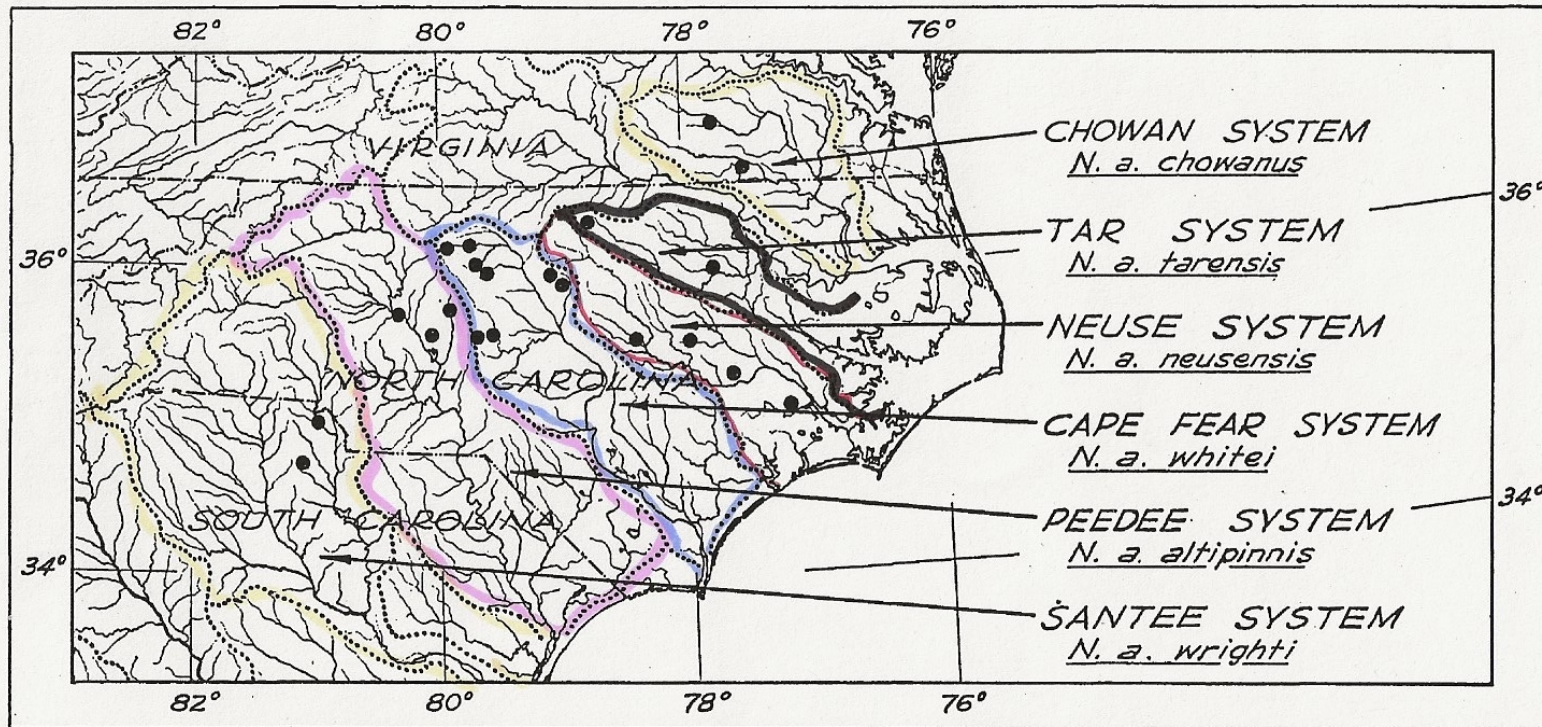
# *Notropis altipinnis* (Cope 1870)

(from Hubbs and Raney 1948)



*Notropis altipinnis*  
Yadkin River Basin, Montgomery County  
Photograph by Scott A. Smith

One species, five subspecies – “taxonomic carpet bombing”



Map 1. Distribution of the subspecies of *Notropis altipinnis*.

Three localities for *N. a. wrighti* were not plotted (see p. 13).

No. 506

Subspecies of *Notropis altipinnis*

# Identification of Highfin Shiner, *Notropis altipinnis*, vs. Dusky Shiner, *Notropis cummingsae*.



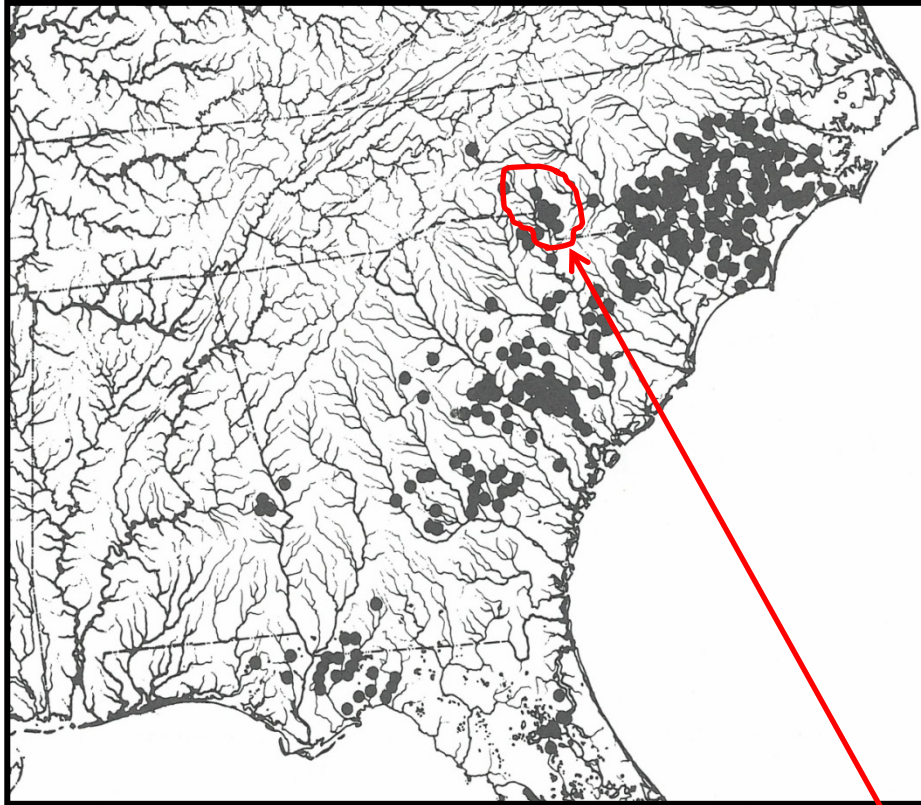
Character	<i>Notropis altipinnis</i>	<i>Notropis cummingsae</i>
Maximum size	Perhaps 65-70 mm TL (Piedmont forms much smaller than Coastal Plain)	Perhaps 80 mm TL
Pharyngeal teeth	Usually 2-4-4-2	Usually 1-4-4-1
Snout length/eye diameter	Snout shorter at comparable TL; much less than eye diameter, ~50-90% (longest in Coastal Plain form)	Relatively longer at comparable TL; 85-100% of eye diameter
Mouth angle	Very oblique, about 30-45° from vertical (but to ~50+° in lower Neuse, etc.)	Less oblique, about 55-70° from vertical
Internasal pigment crescent	Usually but not always well developed	Weak/absent
Anterior extension of dark lateral stripe on gill area (good character but difficult in small juveniles)	Confined to ~ upper 60% of opercular bone; ventral margin horizontal	Covers majority of opercular bone, often to near subopercle joint; ventral margin slopes antero-ventrally
Basicaudal spot relationship to lateral stripe	Connection usually somewhat constricted, spot usually trapezoidal to subtriangular	Usually more confluent, spot generally quadrate and extending well into caudal rays
Pigment in anal area	Absent to poorly developed around anus	Usually well-developed lateral to anus, occasionally sparse
Standard length/body depth	Deeper body, BD usually 3.5-3.6 in SL	Somewhat slimmer, SL/BD 3.6-4.6 in non-gravid specimens
Body depth (dorsal fin origin to pelvic fin origin)/max width of lateral stripe (so-so character)	Generally, lateral stripe width goes more than 3 times in D-P2 distance	Generally, lateral stripe width goes ~ 3 times in D-P2 distance in non-gravid specimens
Lateral line/lateral stripe relationship (fairly consistent character)	Lateral line generally at ventral margin of stripe in region above pelvic fin	Lateral line generally 1/2 scale row within (above) ventral margin of stripe in region above pelvic fin
Light zone dorsal above dark lateral stripe	Usually continuous to head	Usually slightly obscured anteriorly behind head by dark pigment edging scales, etc.
Lateral stripe extending on to caudal fin	Less than half-way	More than half-way

*Notropis cummingsae collis* = *Notropis altipinnis wrighti*?

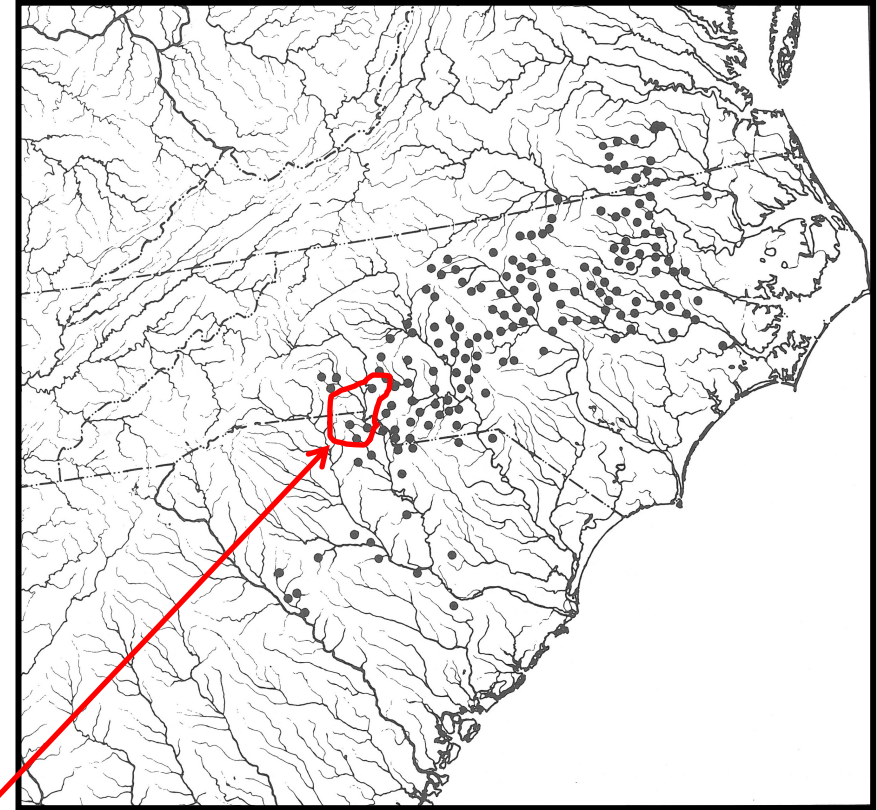
or

*Notropis cummingsae collis* = *N. cummingsae* X *N. altipinnis*?

*Notropis cummingsae*



*Notropis altipinnis*



Both *Notropis cummingsae* and *Notropis altipinnis* were collected from the same localities at the same time:  
at Steele Creek, York County, SC, in 11/11/1931 by Donald Ameel  
at South Fork (Fishing) Creek, Chester County, SC, in 08/13/1946 by Elmer E. Brown

Maps from Gilbert and Burgess (1980a, 1980b)

*Notropis cummingsae collis* = *Notropis altipinnis wrighti*?  
Steele Creek, 1931

*Notropis cummingsae collis*, paratype



1 cm

29 mm SL, photographed Feb. 2014

*Notropis altipinnis wrighti*, holotype



1 cm

29.7 mm SL, photographed Feb. 2014

# Conclusions?

- Were the specimens from Roses Creek collected from somewhere else?
- Has the Upland Dusky Shiner been extirpated from its type locality and the Catawba River basin?
- Is the Upland Dusky Shiner a possible hybrid of *Notropis cummingsae* X *Notropis altipinnis*?
- A taxonomic study is needed using genetic and fresh formalin material of *Notropis altipinnis* and *Notropis cummingsae* across their entire geographical ranges.

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