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Whatever Happened to the Silvery Minnow **(Hybognathus nuchalis)** *In the Tennessee River?*

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During the winters of 1977 and 1978 we, accompanied by TVA biologists Charles Saylor, Gary Hickman, and Joe Feeman; and University of Tennessee graduate students Noel Burkhead, John Harris, and Dave Nieland, had the opportunity to spend two weeks in the University of Michigan Museum of Zoology for the purpose of sorting fish collections from the Tennessee River system. Samples had been collected by TVA field crews during 1937-43, and then sent to Michigan for identification and deposition in accordance with an agreement between TVA and Dr. Carl L. Hubbs. Although a large number of these samples had already been sorted and catalogued by UMMZ staff, an inventory of 256 unsorted samples comprising over 49,000 specimens remained. We thank TVA for defraying travel expenses, and Ms. Ellie Baker and Drs. R. M. Bailey and R. R. Miller for cooperating with us at UMMZ.

A large amount of our time was spent counting small purple stonerollers and warpaint shiners, and separating large mixed series of the very similar *Notropis volucellus, N. stramineus,* and sawfin shiner (*Notropis* sp.). We did uncover a number of unexpected and extremely interesting records, several of which are reported here. A limited number of xerox copies of the collection summaries are still available from the authors.

Hybopsis cahni, the slender chub, always considered as endemic to the Clinch and Powell rivers in Tennessee, is now represented by a single adult specimen from Holston River at "island above Three Springs", Hamblen Co., Tenn., 14 Sept. 1941. This locality, at Holston River Mile 87.2, is now under Cherokee Reservoir, which was impounded in December, 1941.

Hemitremia flammea, the flame chub, is currently restricted to four known localities in the upper Tennessee River system. The TVA collections indicated that it formerly occurred in nine additional sites in Blount, Loudon, Rhea, and Roane counties, Tenn.

Notropis ariommus, the popeye shiner, was previously represented from the Holson River system by a single specimen collected in 1888 in Watauga River, Carter Co., Tenn. (Gilbert, 1969). The TVA collections revealed its former presence in both Robinson and Poor Valley creeks, tributaries to the lower Holston River (Cherokee Reservoir) in Hawkins Co., Tenn.

Percina maculata, the blackside darter, an extremely rare species in the upper Tennessee River system, was represented by one specimen from Poplar Creek, tributary to the lower Clinch River, Roane Co., Tenn.

Percina macrocephala, the longhead darter, previously known from a single 1967 specimen from the Little Pigeon River (French Broad River System) was represented by an additional specimen from Walden Creek, tributary to West Fork Little Pigeon River at Pigeon Forge, Sevier Co., Tenn.

Percina copelandi, the channel darter, was previously represented in the main channel of the Tennessee River by a single 1893 collection of seven specimens (USNM 70686) from the Tennessee River five miles west of Knoxville, Knox Co., Tenn. (R. D. Suttkus, in Lit.). Other Tennessee River system records were restricted to the Clinch-Powell system of the upper Tennessee. It was represented by a specimen from the lower Tennessee River at the upper end of Blood Island, Calloway Co., Ky., 22 Oct. 1942. Kentucky Reservoir, impounded in 1944, now covers this area.

Hiodon alosoides, the goldeye, not recently collected from the entire Tennessee River system but possibly persistent in the extreme lower portion of the river, was represented by specimens from Kentucky Dam site, and from the mouth of Pond Creek in the upper Tennessee River in Loudon Co., Tenn.

A trammel net sample from the main channel of the Tennessee River near Decatur, Alabama, contained only 58 specimens and 11 species, dominated by *Ictiobus bubalus* (23) and *Ictalurus punctatus* (12). Of the remaining 23 specimens, 5 were *Acipenser fulvescens,* 3 were *Scaphirhynchus platorynchus,* and 1 was *Cycleptus elongatus.* All of these are currently extremely rare or extirpated from the Tennessee River system.

Notropis stramineus, the sand shiner, is currently of spotty occurrence in the upper Tennessee River system only in the lower Little Pigeon and Little rivers. It was formerly much more widespread, occurring in 28 of the TVA samples from

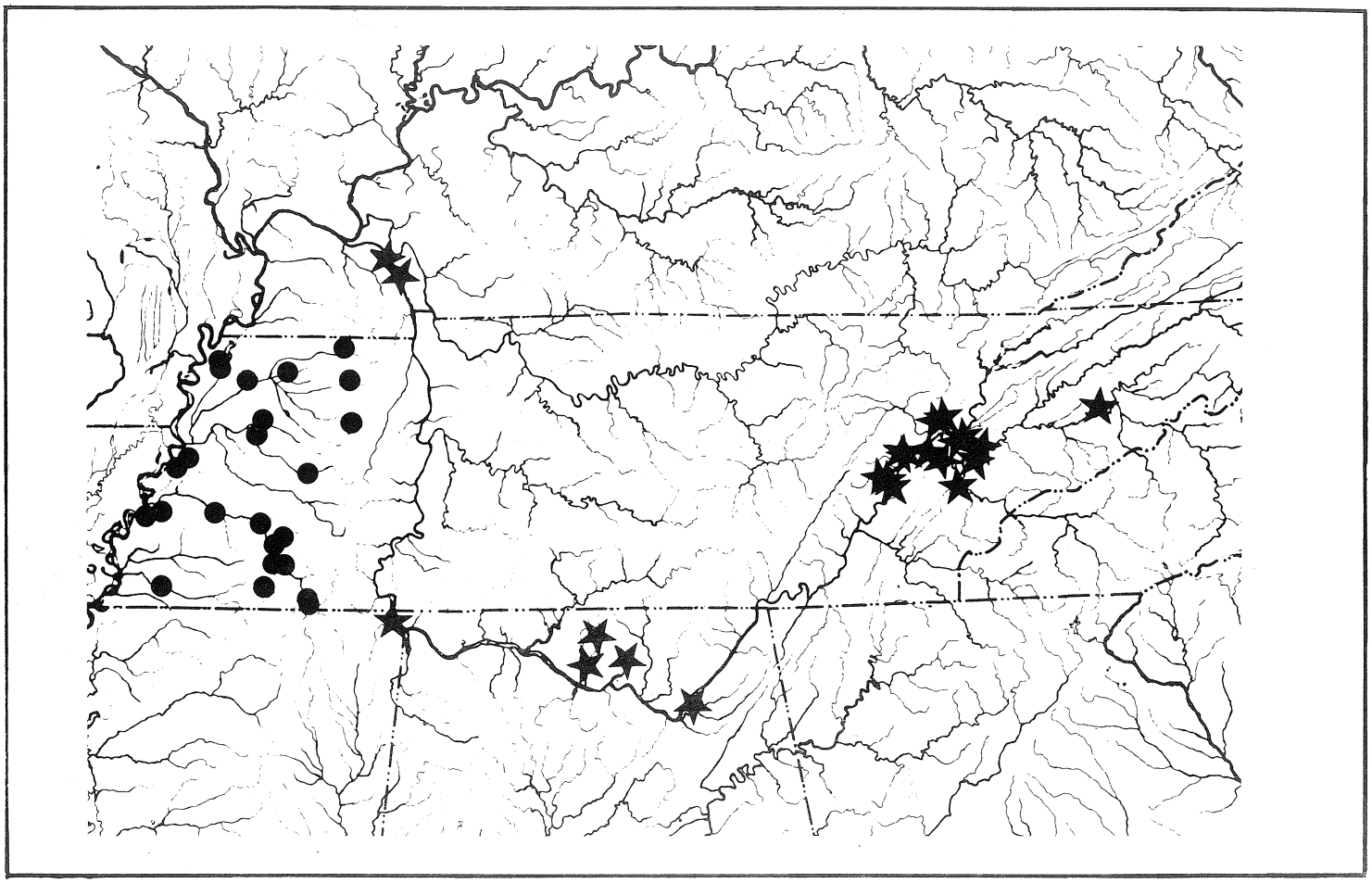

Figure 1. Distribution of *Hybognathus nuchalis*. Stars represent its distribution in the Tennessee River prior to impoundment. Dots represent the present day distribution of *H. nuchalis* in Tennessee.

tributaries to the Tennessee and lower Clinch rivers in Roane County, and upstream through Tennessee, Holston, and French Broad river tributaries in Blount, Knox, Loudon, Hamblen, Hawkins, Grainger, Jefferson, and Cocke counties.

It is obvious from these records that many changes have occurred in the Tennessee River fish fauna coincident with mainchannel impoundments (Wilson Reservoir, 1924; Wheeler, 1936; Pickwick, 1938; Guntersville, 1939; Chickamauga, 1940; Watts Bar, 1942; Loudon, 1943; Kentucky, 1944), and major tributary impoundments (Norris Reservoir, 1936, Clinch River; Cherokee, 1941, Holston River; Douglas, 1943, French Broad River; Fontana, 1944, Little Tennessee River). It is not surprising to note the disappearance of many of the above species in response to drastic alteration of the Tennessee River system. The decrease in range of the supposedly tolerant *Notropis stramineus* is difficult to explain, but it may be related to this shiner's finding suitable habitats only in and near mouths of small tributaries to the Tennessee River and its larger tributaries. Our lack of knowledge concerning the ecology of this species is apparent.

Even more surprising, and finally justifying the title of this paper, is the apparent complete disappearance of *Hybognathus nuchalis,* the silvery minnow, from the entire Tennessee River system since the early 1940's. It was common in pre-impoundment small stream samples (Fig. 1), and was often the dominant species in both numbers and biomass. The explanation for this sudden demise is lacking, but we suspect that *H. nuchalis* depended on an unimpounded Tennessee River for certain aspects of its life history. The apparent isolation of the former upper Tennessee River population (Fig. 1) is probably a collection artifact, since pre-impoundment samples between Rhea Co., Tenn., and Marshall Co., Ala., are lacking or virtually lacking. The same paucity of pre-impoundment collections prevails from areas near or in the Tennessee River between Pickwick Dam and the Kentucky border, and *H. nuchalis* was likely present in that area.

Species composition of the samples suggest that, even though rotenone was often used, little attempt was made to adequately sample riffle communities. Pool-inhabiting cyprinids, catostomids, and centrarchids dominate the samples, and unfortunately, only occasional specimens of *Phenacobius, Erimystax* chubs, and riffle darters were encountered. More to be regretted is the almost complete lack of collections of small fishes from the main channel of the Tennessee River. Apparently there was little appreciation of the possibility that there may have been strictly riverine small fishes that never or only rarely ventured into tributary streams. It seems highly likely that the Tennessee River was inhabited by one or more such species that are now extinct and were never seen.

There is ample evidence provided by changing fish and mussel faunas to indicate that the Tennessee no longer exists as a river. The foremost aquatic biologists of the late 1930's could not have predicted the effects of impoundment on species such as *Hybognathus nuchalis, Notropis stramineus,* and *Hiodon alosoides.* The loss of the Tennessee River is an environmental tragedy of immense proportions, but equally tragic is our failure to be sufficiently impressed by the historical lessons to be learned. It is obvious that we are still unable to accurately assess the effects of habitat alteration on the faunas involved, and that any habitat alteration involving complex faunas is almost certain to adversely affect one or more of the involved species. The overwhelming lesson is that habitat alteration will, often in ways we can not guess, result in continued species decimation. Although our knowledge of the biota is incomplete, we are sufficiently informed to say unequivocally that the environmental effects of any major water project will never be "insignificant".

Literature Cited

Gilbert, C. R. 1969. Systematics and distribution of the American cyprinid fishes *Notropis ariommus* and *Notropis telescopus.* Copeia 1969 (3):474-92.

News Notes . . .

RESOLUTION ON COLUMBIA DAM

At the annual meeting in Tuscaloosa SFC unanimously supported a resolution in opposition to Columbia Dam on the Duck River in Tennessee. Three points were stipulated in the resolution as follows:

1. A public hearing should be held to air all sides of the Columbia Dam issue prior to granting a 404 permit.
2. The hearing should be held outside the immediate project area (Columbia), preferably at Nashville.
3. The SFC goes on record as being directly opposed to completion of the Columbia Dam Project.

The Columbia Dam Project is economically infeasible. The TVA projected benefit-cost ratio below unity should have rendered the project legally non-fundable under pertinent laws governing appropriations. We ask that the Army Corps of Engineers employ its discretion most effectively by not condoning an economically wasteful project by another federal agency.

The Duck River contains one of the three most diverse riverine fish faunas in North America as well as remnants of a diverse freshwater mollusk fauna. Several threatened fish species are involved as well as threatened and/or endangered mollusks. Drastic alteration of the Duck River ecosystem by impoundment would constitute one of the greatest negative impacts possible to a large and important element of our native fish and mollusk faunas.

NO ON GRASS CARP

The following letter was sent to the Directors of the game and fish agencies in all southeastern states:

At its fourth annual meeting held in Tuscaloosa, Alabama, the Southeastern Fishes Council (SFC) unanimously supported a resolution recommending that the various state game and fish agencies intensively review projects involving introductions of non-native fishes into the waters of southeastern United States. The SFC generally opposes introduction of exotic species, including further introductions of the grass carp, *Ctenopharyngodon idella,* in states where it is not yet established. Critical evaluation of possible consequences of exotic fish introductions and their impact on native fish species should be conducted before any further stockings are approved. The proven detrimental effect of non-native fish introductions on the southwestern U. S. fish fauna should be a lesson to us here in the southeast. The marginal to nonexistent benefits of introductions are hardly worth the risks of severe impacts on our native species.

The SFC greatly appreciates your time and consideration. Through its many experts and technical committees, we are eager to consult with you on the matter of exotic fish introductions or any other appropriate topic.

MS GOVERNOR SUPPORTS PROTECTION OF OKATOMA CREEK

Okatoma Creek, a tributary of the Pascagoula River in southeastern Mississippi, was earmarked for destruction by a Soil Conservation Service project which would construct 14 dams in the headwaters and channelize 53.7 miles of the main stream. The project was approved and funded ($13 million) during the closing days of Congress. Because of the biological, scenic, and recreational assets of Okatoma Creek, the Mississippi Air and Water Pollution Control Commission and the state Game and Fish Commission officially opposed the planned project. In a strong letter to the SCS in November Governor Finch voiced his opposition to the plan as not being in the best overall interest of the citizens of Mississippi.

A bill has been introduced into the Mississippi Legislature to protect Okatoma Creek, Bogue Chitto River, Strong River, and Black Creek from channelization projects.

UNANIMOUS - NO EXEMPTION FOR TELLICO

The review committee on endangered species conflicts voted 7-0 to bar completion of Tellico Dam on 23 January. Secretary Andrus called the project, "ill-conceived and uneconomic in the first place."

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WHAT GOOD IS TELLICO DAM?

How may times during the past few months have you been asked, "What good is a little three-inch snail darter?" Headlines, editorials, and countless articles illustrated with the fish and an ever-present paper clip have flooded the media since the 6-3 majority decision by the Supreme Court to uphold the ruling to stop work on Tellico Dam. The little fish vs. big dam stories rarely mentioned the economic weaknesses of the project. In a report to the Congress the General Accounting Office found that "neither the current project nor alternatives are supported by current benefit-cost analyses." The report further recommended that the Congress "should not act on the proposed legislation to exempt the project from the Endangered Species Act until more current information is received."

Because the 1973 Endangered Species Act was expiring on 30 September, open season was declared on darters. Never mind the studies that showed that Tellico would flood 16,000 acres of prime farm land, displace 200 families, and inundate the last free-flowing 30 miles of the Little Tennessee River. Never mind the exaggerated claims of flood control and power production. Newly appointed Director of TVA, David Freeman, acknowledged that, "The real waste of the taxpayers' money may be in flooding the land". The mood in Washington was aptly described by journalist Ward Sinclair as "Pork Panic". In the closing hour of the 95th Congress the Endangered Species Act was extended for 18 months, but it was also amended with several new and important items.

On November 10th President Carter signed the act which included a provision to establish a cabinet-level review committee which had the authority to make special exemptions from the protective measures established in the 1973 legislation. The President urged that exemptions should be exercised "only in grave circumstances posing a clear and immediate threat to national security." He added, "Destruction of the life of an endangered or threatened species should never be undertaken lightly, no matter how insignificant the species may appear today."

The new act also specifically called for an exemption for Tellico Dam unless the newly formed committee ruled otherwise within a 90 day period. The new committee consists of seven members: the Secretary of the Interior, Secretary of Agriculture, Secretary of the Army, Chairman of the Council of Economic Advisors, Administrator of the Environmental Protection Agency, Administrator of the National Oceanic and Atmospheric Administration, and a representative of the State affected by the project. An exemption may be granted with a majority vote of five of the members. The deadline on Tellico is February 8.

While the Endangered Species Act is still basicly intact following the congressional flurry over dams and darters, the weakening amendments will certainly slow down the listing process and open up loopholes for emotional conflicts. We trust that if exemptions are allowed that they are only granted in "grave circumstances" and not for a pet project of dubious merit. We should be certain that the answer is clear - what good is Tellico Dam?

REMEMBER

SFC will meet in Chattanooga, TN in conjunction with the ASB meetings 25-28 April. The details on time and place will be announced later.

Next Issue: New records of fishes from northern Georgia. Please send your news items and announcements.

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