

THE BUCK DARTER *ETHEOSTOMA NEBRA* AND KENTUCKY TRANSPORTATION CABINET



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In the spring of 2018, the Kentucky Transportation Cabinet (KYTC) began to prepare the environmental documentation for a roadway widening and interchange project along state roads KY-80 and KY-461, east of the city of Somerset. An environmental consultant, HMB Professional Engineers, Inc (HMB), was hired to perform the fieldwork needed for an Ecological Base Study. This study would enumerate the types of ecological resources that would potentially be impacted by the project. These impacts would be compared among four different alternative plans that would be carried forth until a final construction plan was chosen. Once a final plan was chosen, a Biological Assessment (BA) would be performed to address federally listed species (i.e., endangered, threatened, or proposed) in order to comply with the Endangered Species Act (ESA).

During the scouring of resources for information to include in the initial ecological assessment, other personnel within KYTC's environmental analysis group were concomitantly addressing their own sections (archaeology, historic, noise, etc.), and one of them found something pertinent to biology. An archaeologist (dang archaeologist!) brought up a recent thesis (Black 2018) they found published just a few months prior, in January of 2018. The thesis addressed a certain fish, the Buck Darter *Etheostoma nebra* (Figure 1), which lives only in the Buck Creek system of the Upper Cumberland River drainage, in the exact location of the KYTC project. The thesis had summarized the recent history of decline of the Buck Darter in what was already a small range. The only remaining Buck Darter individuals were found in Big Spring Branch and Stewart Branch, with Big Spring Branch estimated to have the larger population. Due to largely unknown factors, the fish had disappeared from a majority of its historical range, and its largest remaining population was about to be directly impacted by the roadway project.

Nathan Click attended Auburn University for both his BS and MS degrees in Wildlife Biology and Forestry (with emphasis in wetlands), respectively. In 2011, he moved to KY to start a job as an endangered species biologist (AKA Environmental Biologist) for the Kentucky Transportation Cabinet. He has state and federal endangered mussel permits and specializes in mussels but must be serviceable in all federally listed species within the state, which includes bats, a few fishes, some plants, and a couple of crustaceans. His job mostly revolves around making sure all KYTC projects are in compliance with the Endangered Species Act. He also writes sci-fi on the side and has published one novel thus far (check it out on Amazon), with more coming.

Fieldwork for the Ecological Base Study progressed. Many nearby caves were found, stream impacts were tallied, and habitat within each roadway alternative was designated. Occurrence records of nearby species that were of concern were attained. This included species outside of the protection of the ESA (including the newly described Buck Darter [Near and Thomas 2015]). KYTC contacted the US Fish and Wildlife Service (USFWS) about the Buck Darter, and USFWS was already well aware of the imperiled fish. Discussions about the fish would remain background and cursory until the project progressed further, and impacts could better be understood. Eventually, the Ecological Base Study was finalized in March of 2019. Afterwards, a final construction alternative was chosen, and the next leg of the journey began.

A BA was to be produced and provided to USFWS for coordination to ensure compliance with the ESA. Four bat species, seven mussel species, and two plant species would be addressed in the BA. But, what about the non-listed Buck Darter? Before surveys for the federally listed species and a final version of the chosen construction alternative were drafted, KYTC met with USFWS and HMB in April of 2019 to discuss the Buck Darter. This newly described fish had no federal protection or status, and thus, would not be included in the BA. So, how would this at-risk species be addressed? KYTC was under no obligation to conserve or protect the fish as it did not have any legal protections; nevertheless, all involved wanted to protect the fish as much as feasibly possible.



Figure 1. Buck Darter. Photo Credit: Eric Smith (HMB)

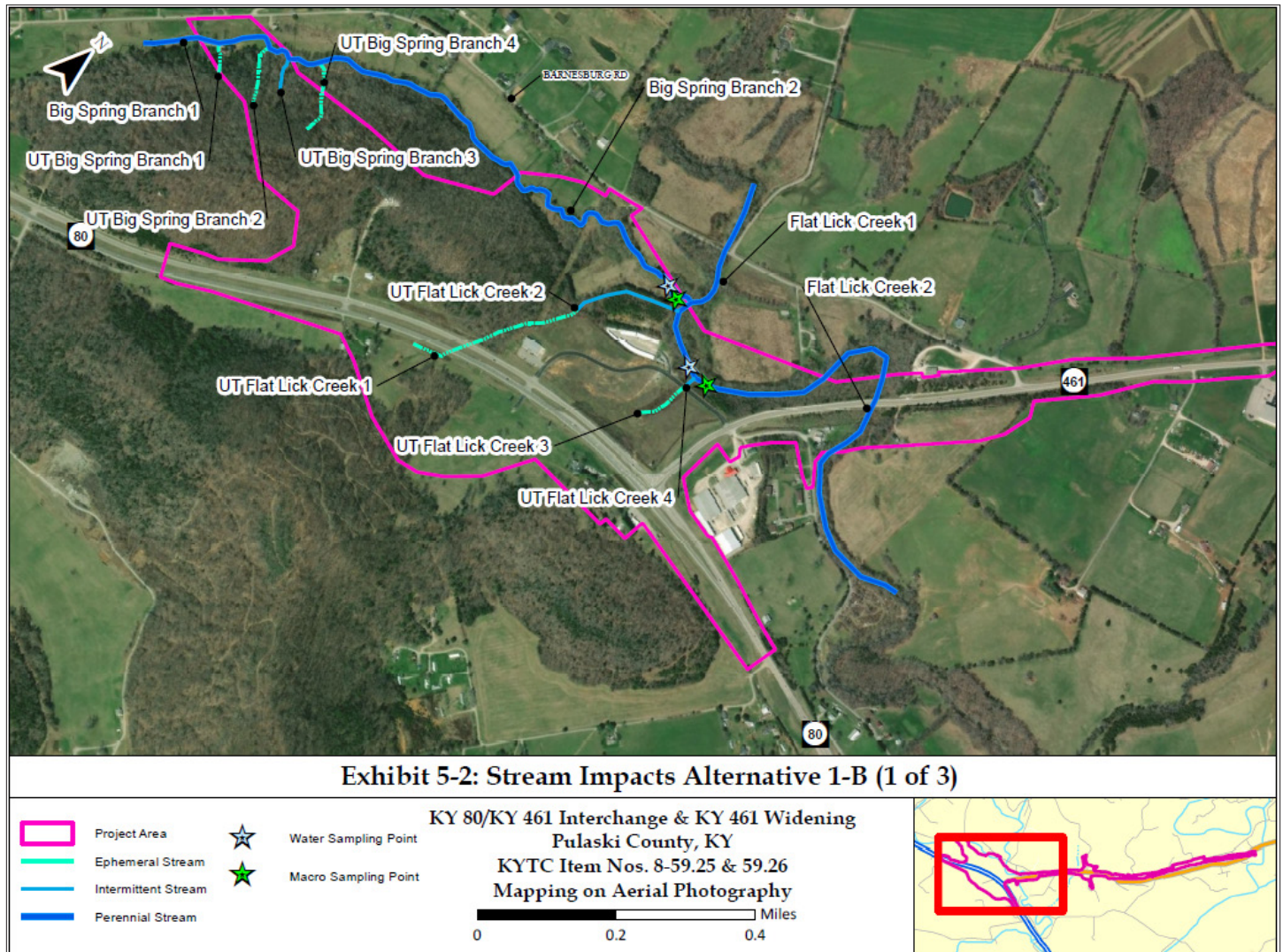


Figure 2. Image of stream impacts for Alternative 1-B (namely to Big Spring Branch) from the Ecological Base Study.

During the April meeting with USFWS, several recommendations for minimizing project impacts to the fish were discussed. Thankfully, the firm who performed the environmental work also had a design team in-house and they would be designing the project, including the channel change that would occur in Big Spring Branch. However, any alterations made to the project to protect the fish could not alter the project cost or schedule; so appropriate cost-neutral measures were incorporated into the details of the final project plans (Figure 2).

Firstly, a perched culvert identified in the 2018 thesis would be replaced to improve fish passage. The existing culvert represented an impassable upstream barrier to the Buck Darter and other fishes; so, by fixing the culvert, fishes in Big Spring Branch would then be able to traverse the stream in its entirety. Secondly, the channel change was designed to incorporate stable, passable fish habitat so that the Buck Darter would be able to utilize the new section of stream after its construction. The new channel's construction would include elements such as radii at a 3:1 ratio at bankfull width, channel slope within stream type requirements, a mixture of riffles and pools, tree and shrub plantings, and a low flow channel to retain water in the stream.

Finally, the fish inhabiting the portion of Big Spring Branch in the project area would be relocated to upstream portions of Big Spring Branch (now connected thanks to the replacement of the perched culvert).

The BA was completed and received USFWS concurrence in May of 2020. Special Notes were included in the plans to the contractor that included environmental concerns such as timing of tree cutting and sediment and erosion control measures. An additional Special Note was included in the contract proposal, which stated that the stream channel relocation work must be the first construction activity performed. This note addressed the Buck Darter. By ensuring that the stream channel change would occur first, the likelihood of other construction activities impacting the fish in the stream was reduced. This schedule also allowed USFWS, KYTC, and HMB personnel time to remove the Buck Darter from the project site and relocate them to other areas outside the construction area before the spawning season.

Project construction began in earnest in January of 2021. The contractor kept KYTC informed of their construction activities and how the stream channel change progressed. On April 7, 2021,



Figure 3. Buck Darters collected during relocation effort.
Photo credit: Mike Armstrong (USFWS)

USFWS and HMB relocated ~100 Buck Darters from the project site just before water was diverted out of the existing stream channel and into the newly constructed channel (Figure 3). The remainder of the project will be under construction for several months.

USFWS, KYTC, and HMB will return to the project site in the fall of 2021 to perform follow-up surveys. The new stream channel of Big Spring Branch will be surveyed to determine if Buck Darters are occupying this “new” section of the stream. It should also be noted that Conservation Fisheries, Inc. is maintaining an ark population of the Buck Darter in their Knoxville, Tennessee, facility, and the USFWS has been coordinating with the group as the KYTC project progressed. With the cooperation of all organizations involved, it is expected that a reproducing population of the Buck Darter will remain in Big Spring Branch, and that one day it can be re-established in other portions of its historical range.

REFERENCES CITED

Black, H.D. 2018. Population size and habitat association of *Etheostoma nebra*, The Buck Darter, using abundance modeling in the Buck Creek System, Cumberland River Drainage, Kentucky. Eastern Kentucky University. *Online Theses and Dissertations*. 512. <https://encompass.eku.edu/etd/512>

Near, T.J., and M.R. Thomas. 2015. A new barcheck darter species from Buck Creek (Cumberland River system), Kentucky (Percidae: Etheostominae: *Catonotus: Oopareia*). *Bulletin of the Peabody Museum of Natural History* v. 56 (no. 2):127–146.

FishMap.org

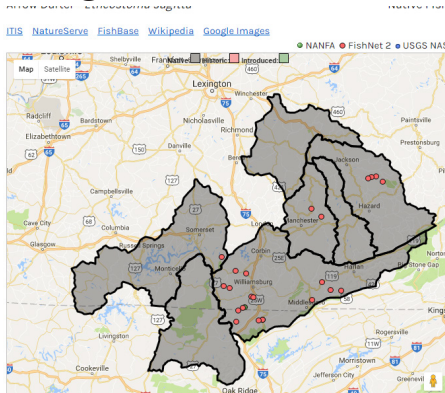


FishMap.org is for anglers, aquarium hobbyists, scientific researchers, or anyone else with a passion for fishes who wants to visually explore species' ranges or learn what species are in their local waters. The site is dedicated to spreading knowledge and respect for all fish species.

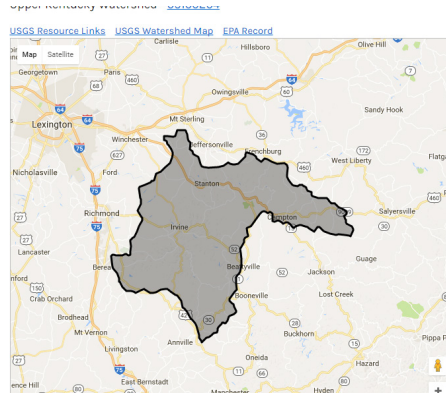
FishMap.org combines numerous data sources to provide a better view and more complete understanding of fish species distribution. It uses data from NatureServe, the National Atlas, the USGS water resources and Nonindigenous Aquatic Species programs, FishNet2, iNaturalist.org, GBIF, and iDigBio.

FishMap.org is sponsored by NANFA. Users can submit their own data to the portal to help map species distribution, so FishMap.org has been working with NANFA members to create an additional database of fish sightings and collections (currently nearly 30,000 records and growing).

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