This article in the NY Times covers a recent scientific article that concludes that the snail darter, a fish species in the Tennessee River basin that was previously listed for protection under the Endangered Species Act (ESA), is not a species after all. Using a range of genetic analyses, the authors conclude that the snail darter is closely related to another darter species (the Stargazing Darter), and that the genetic "distance" between those two species is much closer than for any other species of darters.

Why is this the topic for a NY Times article? The snail darter is the species that prompted the most famous Endangered Species Act (ESA) case ever, TVA v. Hill, in which the Supreme Court ruled that the ESA prevented the completion of the Tellico Dam because it would otherwise cause the extinction of the snail darter. If the snail darter was never really a species, was TVA v. Hill a waste of time?

The findings of this team of researchers are an example of a broader point in biodiversity protection: In many cases, what counts as a unit that is worthy of protection, whether it is a species, subspecies, or even a population, requires an assessment of how distinctive that unit is from other species, subspecies, or populations. For instance, a similar type of study two decades ago concluded that a subspecies of mouse in Colorado and Wyoming was not really distinctive enough to warrant ESA protection. But that conclusion in turn depends on a range of assumptions about how to measure uncertainty (such as the extent to which your data truly represents the full range of genetic variation in the various subspecies or populations) and how much we value genetic variation and biodiversity. These assumptions are often not made explicit by scientists, and the result can be statistical and inferential errors, as in the paper examining the taxonomic status of the mouse.

The same problem is at issue in the snail darter case. The authors do articulate what kind of cutoff in terms of difference they believe warrants identification of a group of animals as a species, different from other species. They generally rely on comparisons with other, similar, darter species. The implication is that determinations of taxonomic status depend on relative differences in genetics within similar species. But that may, or may not, be the standard we want to use as a society to determine how we spend resources to protect species. For instance, some conservation biologists argue that we should protect even populations of larger species because of the genetic resources those populations might have, even if those populations are not themselves a distinct species. And the authors of the snail darter paper concede that they do not know if the snail darter should (or

should not) be listed for protection under the ESA. That's because even if the snail darter isn't a species, it could be a subspecies of another darter species, or even a distinct population segment (DPS), both of which can warrant protection under the ESA). If so, we would have had the same result as a legal matter under TVA v. Hill.

Thus, while the improved genetic analysis in the snail darter paper is helpful for us in making conservation decisions under the ESA, it is hardly determinative. We are still left with difficult decisions to make as a society about what kinds of species, subspecies, and populations we wish to protect, how much we value biodiversity, and what other social and economic costs we are willing to pay for that protection.

That last point about costs is particularly important. One of the largest costs of protecting the snail darter was preventing completion of the Tellico Dam, which had cost tens of millions of dollars (in the 1970s!) to mostly complete, money that would have gone wasted. And yet, an economic analysis after the case found that, even considering all that wasted money, the economic benefits of the dam were so insignificant that not completing the dam would have been the better economic option. The dam was a classic example of a pork barrel project, designed for political reasons. (And accordingly, Congress did order the completion of the dam.) In that context, the cost of protecting even a subspecies or DPS of a darter species does not seem so high at all.