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ENDANGERED SPECIES PROGRAM

TELEPHONIC INTERVIEW Time (7:43)

PURPLE BEAN (HOST – SARAH LEON WITH SHANE HANLON)

This transcript was produced from audio provided by FWS Endangered Species Program

P R O C E E D I N G S

(Music plays.)

MS. LEON: Hello, there. This is Sarah Leon with the Fish and Wildlife Service and I'm on the phone today with Shane Hanlon, the Endangered Species Recovery Biologist at the Southwestern Virginia Ecological Services Office. Hi, Shane, how are you today?

MR. HANLON: I'm doing good.

MS. LEON: All right. And I was hoping that you could spend a little time talking to us about the Purple Bean today.

MR. HANLON: Sure.

MS. LEON: Would you mind starting by just telling us a little bit about this species?

MR. HANLON: Sure. The freshwater mussel belongs to the genus *Villosa* and it's a taxonomic group of mussels that are relatively small animals and they probably live to about 20 years or so.

This particular species' scientific name, *Villosa perpurpurea* was inspired by -- because of the beautiful purple (Inaudible) on the inside of the shell. And then the Purple Bean, the bean part of the name is apparent in the shape of the animal. It looks just like that, a bean.

The entire range that this species occurs in is restricted to the Tennessee River Basin in northeast Tennessee and the extreme southwestern portion of Virginia. And unfortunately, the species has been extirpated from much of its (Inaudible) localities with only three main populations left. Only one of those populations has any longer term viability at this point.

Now what's unique about freshwater mussels is that they require a host, in this case a fish, to complete its lifecycle. As larvae, freshwater mussels are parasites on fish and this does two major things. One is that a mussel needs to produce many, many offspring in order to just get a few to survive to adulthood. There's a lot of mortality associated with the early life stages.

The offspring producing mussel is simply not able to care and nurture that many little babies. So, adult males have no offspring responsibilities apparently, other than supplying sperm. And so the mama must pass the buck and she -- and apparently fish are more energetically fit to nurture. So the other thing that this does, this funny lifecycle is mussels are relatively sessile. They don't move around much. So in order to disperse, they essentially hitch a ride on a fish, particularly when they want to move upstream and disperse upstream. They need to disperse on something that can get up there.

Now this process, this lifecycle is very species specific so certain mussels need very specific species of fish to complete that lifecycle. And for the Purple Bean that comes down to just a handful of species which are small darters and sculpin. And this, in part, has to do with their -- their decline has to do with this lifecycle because there's so much -- they're so vulnerable during this lifecycle. And this species, in particular, is in decline. This species is a spotlight species because it co-occurs with numerous other listed and nonlisted aquatic species that share similar fate. The decline of these species is alerting us to a significant and real deterioration of water quality (Inaudible) function in southern Appalachia and even a much larger geographic area.
And ultimately, this is a direct --is directly related to those functions that support human life as well as our quality of life.

MS. LEON: All right, and what's interesting about freshwater mussels is that it's perhaps the most imperiled final group in North America with an estimated 70 percent already extinct, endangered, or of special concern. And there's several factors that have led to this sort of decline, but if you had to pick one factor that has had the greatest influence on this particular species, what would it be?

MR. HANLON: Well, that's a hard question, but clearly there are a multitude of sources, anthropogenic and naturally occurring impacts that are driving the species down. However, there are a few prominent human activities that are likely contributing quite a bit to the downward spiral of the species. Perhaps the more ubiquitous threat is incompatible agricultural practices, particularly unrestricted livestock and pesticide use on row crops. The other prevalent activity that is probably impacting certain populations of the Purple Bean is fossil fuel extraction processes, coal mining in particular. Sedimentation and elevated conductivity levels and these sources are particular

stressors that are problematic to mussels in general. Adult mussels are pretty hardy and they probably can tolerate some relatively high level of adverse conditions, but their ability to reproduce successfully is the weak link in this equation. So not only are the adults compromised in their reproductive capacity, but also the juveniles simply cannot survive deteriorating stream conditions caused by sediment and water quality degradation.

MS. LEON: So what's it going to take to recover this species and what's the toughest part in working to do so?

MR. HANLON: This is another tough question. They seem easy questions to answer, but they're not. We're dealing with deterioration of an entire system that is affecting many species. It's a huge undertaking that requires an enormous effort, not only us, but many partners. Many of the partners who work with us in this conservation effort include the Nature Conservancy, the Virginia Department of Conservation and Recreation, the Forest Service. They do a lot of land acquisition and holding easements. USGS and universities like Virginia Tech, North Carolina State and Tennessee Tech, among other universities also deal with research end of things. USDA which is U.S. Department of Agriculture, and so water conservation districts are working on implementing best management practices on agricultural lands. The Department of Game and Inland Fisheries in Virginia and Tennessee Wildlife Resources Agency are working on management aspects and then there's the regulatory aspects which are all under the other state and federal authorities like Department of Mines, Minerals, and Energy, Office of Surface Mining, Department of Environmental Quality, Corps of Engineers, EPA. And then there are also nonprofit organizations like Canaan Valley Institute or Tennessee Valley Authority and other watershed groups like the Upper Tennessee River Roundtable who are working on outreach, stream restoration and other aspects, then intertwined with all the agencies. That's a long-winded list of the people that are involved, but I think it is fair to mention them.

Despite the incredible conservation community that we have created, the challenges we face to recover the Purple Bean and other aquatic species is purely daunting. On the agricultural side of things, for example, there have been many farmers who have embraced and endorsed cost share programs where we actually help them put up fences to exclude livestock from streams. The hope is that this will spread to other landowners and they will eventually have a measurable change in the water quality that we can show. However, the jury is still out on the adequacy of voluntary cost share programs to deal with the magnitude of this problem. Some of the answers to correct the agricultural problem are not popular or widely accepted. For example, currently agricultural practices are largely unregulated. It will take a large shift in the way we behave as people and how we conduct business that I think only enforcing regulations will accomplish. Major strides, for example, major strides in nation-wide water quality were made after the passage of the Clean Water Act. Not only do those regulations force change, but they also set a new level of social consciousness of what is acceptable and what is not acceptable.

So similarly, I think the coal mining end of things, and other forms of resource extraction can be compatible with conservation if they follow tight regulations that protect aquatic species. This is certainly not the case prior to the passage of mining laws, surface mining control, and reclamation acts passed in 1977. Although mining laws have no doubt less than the impact of mining activities, there's much debate about if current practices go far enough to protect aquatic species.

MS. LEON: All right, and for many people, you know, if it's out of sight, then it's out of mind. And for freshwater mussels, specifically, they're so deserving of attention because they're so important to our lakes and streams. So real quick, can you just paint a picture for our listeners on how our nation's waterways might look in the absence of the Purple Bean and other freshwater mussel species and how ecosystems might be changed?

MR. HANLON: Sure. Well, realistically, we may be faced with that reality of losing some of these species. In fact, most biologists and ecologists foresee that half the world's species will go extinct by the end of the century which is rather gloomy.
This is primarily due to human population growth and our associated consumption. Decline of the Purple Bean, in part, is just part of the story. However, of the many species we see disappearing, the Purple Bean does have a chance. But it is just that. It's a chance. We have seen other freshwater mussels rebound. In fact, some species that share the same habitat – this tells us that we are teetering on some kind of balance with what drives the species to recovery or extirpation.

If we can tip the balance a bit toward the direction of recovery, then the Purple Bean may have a chance. How to do this is a big gray area. Much of the declining factors are up to the human behaviors. If human behaviors continue the way they're going, then it's an easy answer. There's no chance. How might our nation's waterways look in the absence of the species is the other part of this question. Well, we would lose another piece of the ecosystem that supports its function to support human life. It's part of a greater picture of mussels. Their direct function, mussels improve the clarity of water. They serve as a food source for many vertebrate species. They cycle nutrients for other macro vertebrates to feed on. Much like earthworms, improve soil. Freshwater mussels can define the quality of the stream bottom for other organisms.

In a nutshell, the more diverse a stream system is, the more diverse and healthy is the terrestrial community that depends on it. This is, you know, basic food web 101. That said, I'm not too concerned about the loss of just one species, but we are actually talking about the loss of an entire ecological community and how that is tied to the functional loss of an entire ecosystem. I think that is the essence behind spotlight species concept.

MS. LEON: Well, thank you so much, Shane, for your time today.

MR. HANLON: You're welcome. My pleasure.

MS. LEON: It's always really great getting to highlight the sorts of activities and efforts that go into helping these imperiled species. So thank you so much for that.

MR. HANLON: Thank you.

MS. LEON: This is Sarah Leon for U.S. Fish and Wildlife Service. Thanks for listening.

(Music plays.)