



Propagation and Culture of Species at Risk Atlantic Pigtoe

Project # 10-450

Background:

Freshwater mussels have become the nation's most endangered group of animals. The Atlantic Pigtoe is currently in precipitous decline and is considered ripe for federal protection under the Endangered Species Act. One of the few remaining stable populations occurs in the Nottoway River on Fort Pickett Maneuver Training Center in Virginia.



Mature Atlantic pigtoe mussel with identification tag attached just before release.

The remarkable life cycle of freshwater mussels depends on a parasitic stage where larvae must survive by attaching themselves to specific host fish, but knowledge is incomplete as to which fish species is best suited as a host for the Atlantic Pigtoe. They have also proven to be difficult to maintain in a laboratory setting.

Supporting active propagation of this Species at Risk is the best way to prevent the species from federal listing and subsequent encroachment of the training mission, but propagation of the Atlantic Pigtoe has proven problematic. More information about their complex life history is required before the species can be successfully raised in captivity.

Objective:

Successful host fish trials will allow propagation and growth of juveniles that can then be released back in to the river. In this manner the population on Fort Pickett could serve to support overall population levels in the State, as well as other suitable areas throughout its original range. Identification of host fish species is critical to this process, and will form the foundation

upon which all subsequent recovery work can be based.

Mortality rates have been high for captive Atlantic Pigtoe larva (called glochidia) and so more must be learned about the conditions required to hold, feed, and cultivate them in the lab until they are large enough to release.

This project represents a uniquely cost-effective and time-sensitive opportunity to support existing populations and proactively avoid federal listing and subsequent encroachment of the training mission, while simultaneously building a working relationship with partners that will allow this same technique to be applied on many additional Department of Defense (DoD) lands with mussel species at risk.



This is a model of a living stream, used to hold mature mussels until release. Water is pumped in from one end and drained out the other to emulate stream flow.

Summary of Approach:

For propagation, mussels carrying developing young and potential host fish species are collected and kept in specialized holding facilities where larvae are introduced into aerated containers to allow them to attach to the gills of the fish. Infested fish are then held until juveniles fall off their host, and the success of each potential host fish species can be assessed.

A "robust host" will consistently produce a large number of juvenile mussels while a "marginal host" will produce inconsistent or low numbers of juveniles. Juveniles can then be cultured, tagged, and released to the original



collection site along with the adult mussels so as to assure no detrimental impacts to the original population.

Viability of Atlantic Pigtoe glochidia in captivity has been historically poor so current propagation and culture techniques must be evaluated and refined to increase survival rates.



Snorkelers systematically search the sand and gravel substrate of stream bottoms to find and identify freshwater mussels (Photos courtesy of Virginia Tech Conservation Management Institute).

Benefit:

Training demands on military installation are currently increasing at the same time that freshwater mussel populations are declining dramatically, and Atlantic Pigtoe (and many other mussel species) are very sensitive to the potential impacts. Supporting active propagation of this Species at Risk now is the best way to support the remaining population and keep the species from federal listing and subsequent encroachment of the training mission.

But the reach and benefit of this project are greater still. The Army SAR List currently contains 10 freshwater mussel species found on 11 DoD properties in 8 states, and with many more mussel species on the decline across North America, the potential for negative impacts to the military mission from additional listings is growing rapidly. This strategy, and the cooperative interagency relationships formed in this project, can be used for any number of mussel Species at Risk on DoD lands.

Accomplishments:

The results of this study have provided new information and valuable additional insight into a critical component of the life history of the Atlantic Pigtoe by refining emerging understanding of the relationship with its host fish species, and the

conditions required to maintain juvenile mussels in captivity.

We propagated and collected a total of 1,098 juvenile Atlantic Pigtoe during the course of this project. We found the Longnose Dace and Creek Chub to be the best hosts for the Atlantic Pigtoe of the fish species we tested, with vastly better success rates than for other host fish species reported in the literature to date. We produced a greater total number of excysted juveniles, higher numbers of juveniles produced per fish, and longer survival rates than previously recorded. We also had much lower mortality rates and longer survival of individuals than accomplished elsewhere.

These successes will support our ongoing efforts in the next year with the hopes of generating a viable cohort of Atlantic Pigtoe for release.

This project has also strengthened interagency cooperation and is solidifying a lasting partnership, between the DoD, Virginia Tech, the Virginia Wildlife Action Plan, and the U.S. Fish and Wildlife Service to fill in vital information gaps that are currently inhibiting efforts to support rapidly declining freshwater mussel populations.

Building upon the information and relationships generated in this study we will make it possible to not only directly support populations of Atlantic pigtoe in Virginia, but throughout its range, as well as build a proven model for supporting other mussel species in jeopardy found on many DoD lands.

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