

# Environmental DNA (eDNA) Protocols as a Survey Tool



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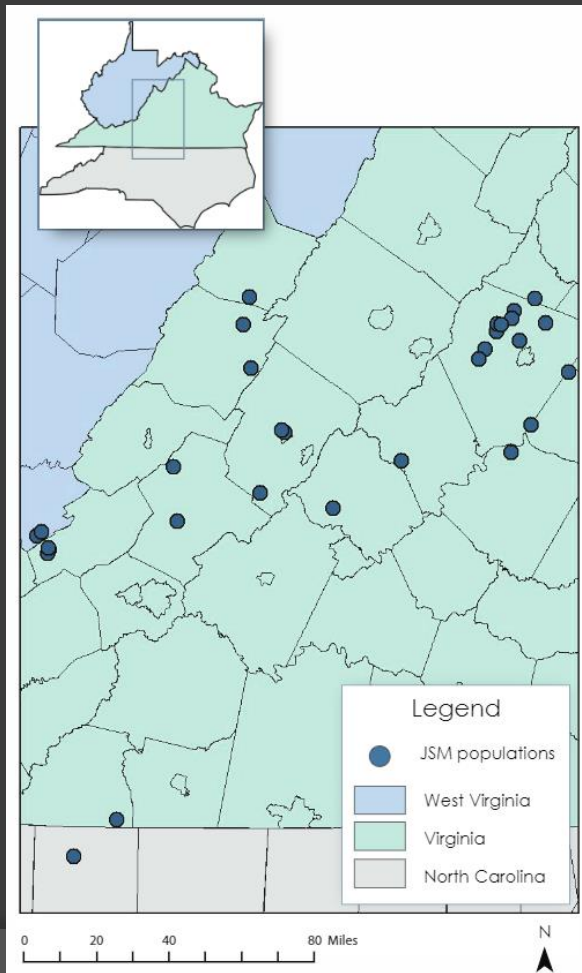
Assistant Environmental Division Director



# James Spiny mussel (JSM)

Endangered freshwater mussel endemic to non-tidal streams of the James River basin in Virginia

VDOT is required to survey for these mussels prior to work that may affect its habitat



# Aquatic Surveys

## Standard Surveys



Current detection probabilities for JSM range from 12% to 20%

eDNA : A non invasive means of detecting a species by isolating discrete pieces of DNA from the environment



DNA is available in the environment from gametes, sloughed cells, or decaying individuals

Can we use this method as a survey tool?

# Phase I study (2016-2017)

Develop and field test the eDNA approach to detect the presence and absence of the James Spiny mussel

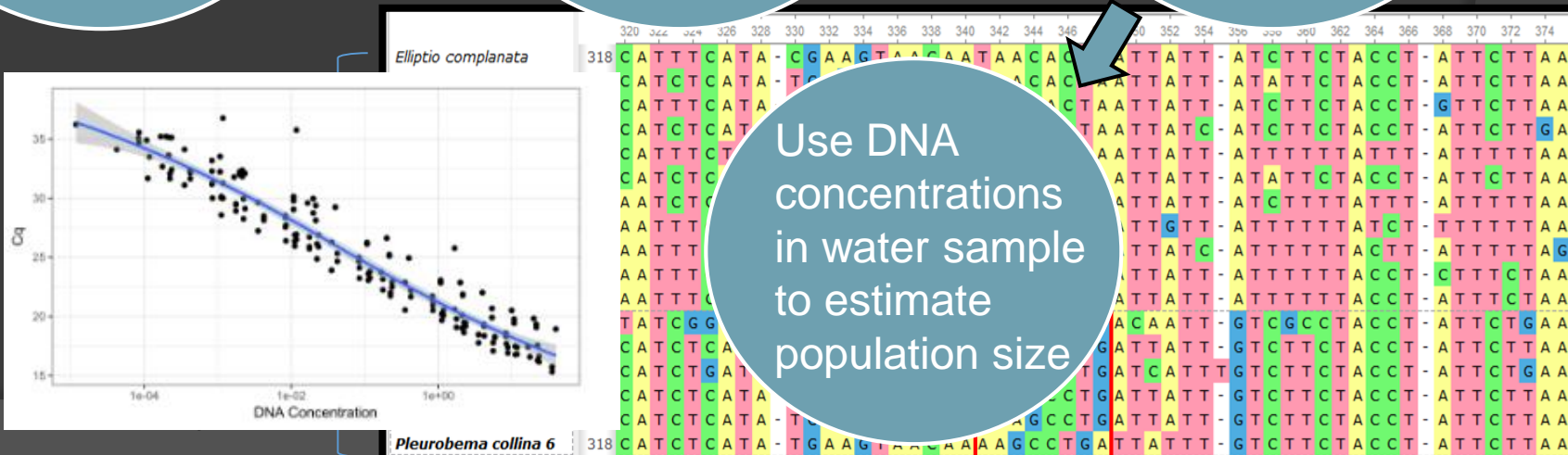
Rodney Dyer and Bonnie Roderique  
Center for Environmental Studies  
Virginia Commonwealth University



Collect and filter water samples (6 sites)

Extract DNA from JSM tissue

Develop genetic markers (unique sequence of DNA) for JSM



# Phase I

Successfully developed molecular protocols for JSM eDNA detection and local population estimation

- Detection probability: 50%
- Inhibitors (organic compounds in the water) affected the reaction efficiency of qPCR
- eDNA method was not able to specify the distance upstream JSM tissue was being released relative to the sampling location

# Phase II

Further refine the eDNA approach to better detect the presence and absence of the JSM

- Increase the detection probability to a degree acceptable to the regulatory agencies
- Develop a protocol to overcome the inhibition challenges
- Create a means to estimate downstream detectability of JSM



# Goal

Use the eDNA method as a survey tool for JSM...and other species?

