Using Environmental DNA from Filtered Water Samples to Detect Rocky Mountain Tailed Frogs and Idaho Giant Salamanders

David S. Pilliod[1], Robert S. Arkle[1] Lisette P. Waits[2,] Caren S. Goldberg[2]

[1]U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, 970 Lusk St., Boise, ID 83706, USA; dpilliod@usgs.gov, rarkle@usgs.gov

[2]Fish and Wildlife Resources, University of Idaho, Moscow, ID 83844-1136, USA; cgoldberg@vandals.uidaho.edu, lwaits@uidaho.edu

Detection of aquatic vertebrates using environmental DNA (eDNA) in water samples is a promising new method for documenting the presence of native and invasive species. Currently, this method of detecting DNA directly from a water sample has been applied to American bullfrogs (*Lithobates catesbeianus*) in a wetland system and bighead carp (*Hypophthalmichthys nobilis*) and silver carp (*H. molitrix*) in a canal and large river system. Our goal was to evaluate the efficacy of using eDNA techniques for detecting native amphibian species in fast-moving streams. We designed polymerase chain reaction (PCR) primers to amplify a species-specific short DNA fragment for two low-density, lotic amphibian species (Idaho giant salamanders, *Dicamptodon atterimus*; Rocky Mountain tailed frogs, *Ascaphus montanus*) in Idaho. In the field, we filtered stream water and extracted DNA from filter papers. The detection of species was compared with detection rates using traditional methods, such as kick-sampling. We recovered the targeted DNA sequences for the salamander and the frog species from filters with fairly high detectability. We found eDNA methods were more efficient than other field methods, even when considering laboratory time and costs. More work is required to test the limitations of this method; however, eDNA has the potential to be a highly sensitive and cost-efficient tool for the detection and monitoring of both invasive and native aquatic species.