

Using eDNA to Determine Occupancy of Coeur D'Alene Salamanders

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Coeur d'Alene salamanders (*Plethodon idahoensis*) are found in small, isolated populations in the mountains of Montana, Idaho and British Columbia. Effective conservation of this species hinges upon understanding population distribution and connectivity; however, identifying occupied Coeur d'Alene salamander (CDL) sites is challenging. Surveys in Montana have been haphazard and have involved biologists searching potential sites during rainy nights in the early summer. To evaluate alternative survey methods, we sampled water at known-occupied CDL sites across western Montana to evaluate the efficacy and applicability of using environmental DNA (eDNA) to detect CDLs, as well as covariates that impacted CDL detection. We first developed a species-specific eDNA Taqman® quantitative PCR assay. We then used repeated eDNA sampling to evaluate how different environmental covariates would impact detection probability of CDLs and used these results to recommend a survey protocol. We found that optimal eDNA sampling conditions for CDLs occurred at night, within 50 m of the downstream extent of preferred salamander habitat, and at lower water flow rates. Under these conditions, five, 5-L water samples were required to achieve a detection rate above 79%. The results of this study revealed that eDNA analysis is a viable method to estimate CDL occupancy at potential sites across their range; however, eDNA analysis can be costly, so combining this method with visual searches is advised.