

FINAL PERFORMANCE REPORT
South Carolina State Wildlife Grant [T-20]

Status and management plan development for three rare burrowing crayfish, *Distocambarus youngineri*, *D. hunteri*, and *Cambarus reflexus*
October 1, 2006 – September 30, 2007

GRANT OBJECTIVES

The purpose of this study was to create habitat models for *D. youngineri*, *D. hunteri*, and *C. reflexus* at multiple scales. These habitat models were used to make habitat management recommendations that will benefit the species and identify sites for future restoration projects.

ACTIVITY OVERVIEW

Activities associated with the grant are described below, according to the original tasks and subtasks in the Project Statement for this grant.

Tasks

Create habitat models for *D. youngineri*, *D. hunteri*, and *C. reflexus* and make habitat management recommendations that will benefit the species and identify sites for future restoration projects

Activity

The GIS based predictive models of occurrence developed for *D. crockeri* and *D. youngineri* by Welch and Eversole in 2002 and 2006 were modified and applied to new data for Newberry and Saluda Counties, South Carolina. The counties encompassed the known ranges of *D. youngineri* and *D. hunteri*, and the GIS model was modified to incorporate new soils data from the Soil Survey Geographic Database (SSURGO) that was not available during the 2002 study pertaining to *D. youngineri*. The SSURGO soils data and ArcGIS were used to select 26 random sites predicted to have *Distocambarus* species present, and 30 random sites where *Distocambarus* species were predicted to be absent.

Distocambarus hunteri was not collected during the survey. A large portion of the South Carolina Piedmont experienced drought conditions during the time this study was conducted. *Distocambarus hunteri* likely exhibits distinct seasonal shifts in activities that coincide with the presence of seasonal perched water tables. Thus, a lack of precipitation and the subsequent lack of burrowing crayfish surface activity reduced our ability to detect crayfish burrows and increased the possibility that crayfish were present at sites but not detected. This may explain our inability to collect *D. hunteri*. This species has a very limited range and future studies should use genetic techniques to identify species of *Distocambarus* near the type locality of *D. hunteri*. The species current global status of “critically imperiled” is appropriate.

Distocambarus youngineri were recorded at 10 locations, 8 of which were correctly predicted; five of the locations appear to be previously undocumented populations. Even though the model was applied to areas outside the species range, logistic regression analysis indicated that the model was a significant predictor of the *D. youngineri* occurrence. Odds ratios indicated that sites where *Distocambarus* species were predicted to be present were 6.7 times more likely to have *D. youngineri* than sites where *Distocambarus* species were predicted to be absent. Paired

logistic regression analyses indicated a significant positive association with *D. youngineri* and prairie structured habitat as compared to forested habitat. Averaged odds ratios indicated that *D. youngineri* was 12 times more likely to occur in prairie-structured habitat than forested.

Both the GIS based predictive model of occurrence and the paired logistic regression analyses of *D. youngineri* habitat suggest the species is very similar to *D. crockeri* and was historically associated with Piedmont prairies. Based on these similarities it seems likely that the species rarity and imperilment is partially due to the loss of prairie habitat. Further, the distribution of remnant *D. youngineri* populations may provide information about the historical locations and extent of Piedmont prairies within the species range. The species is limited to upland portions of Newberry County containing soils with morphologies that result in seasonal perched water tables. Future management should focus on acquiring property with *D. youngineri* sites and managing for open canopy habitats with prairie or savanna-like vegetation structure. The species current global status of “critically imperiled” is appropriate.

Cambarus reflexus habitat was modeled at the Webb Wildlife Center, Palachucola Wildlife Management Area (WMA), and Hamilton Ridge WMA in Hampton and Jasper counties South Carolina. A stratified random sampling protocol with three habitat categories as strata was used to survey *C. reflexus* in the study area. Negative binomial regression, Akaike’s Information Criterion corrected for small sample size and Akaike weights were used to compare and select *C. reflexus* habitat models. Several important habitat variables were significantly correlated and thus could not all be included in the analysis. Most importantly, the presence of wiregrass (*Aristida* sp.) was negatively associated with mechanical site preparations that disturbed the soil surface, and sites with wiregrass were significantly older than sites without wiregrass. Model selection indicated that the presence of wiregrass was the most important habitat component measured in the study. The importance of wiregrass and stand age indicated that *C. reflexus* was associated with “high quality” fire-maintained pine savanna habitats. Furthermore, the study suggested that *C. reflexus* was limited to these sites and thus could be included as an invertebrate component used to identify “high quality” pine savanna habitats for conservation and restoration. The species appears to be limited to the Coastal Plain in South Carolina and sensitive to soil surface disturbances. Several historical locations were visited and the species was not detected, suggesting the species may be extirpated from portions of its historical range. Management should focus on maintaining remnant pine savanna stands containing *C. reflexus* with prescribed burns. Restoration efforts should focus on stands adjacent to *C. reflexus* colonies and restore savanna vegetation structure. The species current global status of “currently stable” and “vulnerable” in South Carolina likely underestimates its level of imperilment.

Significant deviations

Drought conditions in the South Carolina Piedmont region during the study likely decreased the ability to detect *D. hunteri* and prevented additional habitat modeling. The apparent sensitivity of *C. reflexus* to soil surface disturbance greatly reduced our ability to model the species at the landscape-scale.

Estimated Federal Cost (grant level): \$16,000. Grant spent out.

Recommendations: It is recommended that the grant be closed.