Public Abstract
First Name:Doreen
Middle Name:Catherine
Last Name:Mengel
Adviser's First Name:David
Adviser's Last Name:Galat
Co-Adviser's First Name:
Co-Adviser's Last Name:
Graduation Term:FS 2010
Department:Fisheries & Wildlife
Degree:MS
Title:AMPHIBIANS AS WETLAND RESTORATION INDICATORS ON WETLANDS RESERVE PROGRAM SITES IN LOWER GRAND RIVER BASIN, MISSOURI

Globally, amphibians have suffered dramatic population declines in the past twenty years with habitat destruction implicated as the primary threat. The Wetlands Reserve Program (WRP), administered by the Natural Resources Conservation Service, restores wetlands on marginal agricultural land and is a means to restore the spatio-temporal wetland habitat required by amphibians to prevent, reverse, or stabilize declining population trends. The goal of WRP is *to achieve the greatest wetland functions and values, along with optimum wildlife habitat, on every acre enrolled in the program.* Functions and values are defined as the hydrological and biological characteristics of wetlands. A key unanswered question is to what extent is this goal being achieved? Amphibians enable quantifying the WRP goal due to their life-history requirements and explicit incorporation of their habitat needs into WRP plans. My research goal was to determine if hydrological and biological wetland characteristics had been restored to WRP sites in the Lower Grand River basin, north-central Missouri, based on distribution, recruitment success, and relative species richness estimates for members of a regional species pool. I identified three design strategies applied to WRP sites over time: walk-away, maximize hydrology, and naturalistic; the latter emphasizing restoring process as well as structure; and evaluated if design strategy was a useful covariate for restoration efforts. I encountered 10 amphibian species representing 59% of the regional species pool. Design strategy was not a predictive site-level covariate as sites within all three design strategies had varying hydrological wetland conditions resulting in greater habitat heterogeneity than anticipated on maximize hydrology and walk-away sites and less than anticipated on naturalistic sites. Amphibian detections occurred across all sites resulting in no difference among design strategy as the degree of heterogeneity in habitat conditions at the within site-scale demonstrated that amphibians were responding to ecological conditions that occur at a finer resolution than site. Results, irrespective of design strategy, indicate seven of the detected species or groups were widely- distributed, two were moderately- distributed, and two were sparsely distributed on WRP sites indicating hydrological wetland characteristics have been restored to sites given the moderate- to wide-distribution of species associated with both seasonal and permanent wetlands. Although species were successfully recruiting young into adult populations, only leopard frogs had high estimates of recruitment success whereas the remaining species had moderately high to moderate to low recruitment estimates indicating biological wetland characteristics are somewhat lacking to lacking for these species. Results from the relative species richness assessment indicate that, whereas 74% of the sites provided some degree of wetland habitat for members of the regional species pool over the course of the field season (7 March through 19 September), 52% of the sites lacked suitable habitat conditions during the peak of amphibian breeding and larval development (May through July). Targeting management actions that result in suitable seasonal wetland habitat conditions (shallow, vegetated wetlands that gradually dry by mid-to late-summer) throughout the time needed for species to complete their life history requirements is one method to increase the biological wetland value of restored WRP sites. Results show the value of WRP at conserving and restoring river-floodplain amphibians; however, achieving optimum wildlife habitat on every enrolled acre will be difficult at a site-level scale as habitat requirements, although overlapping, vary widely for the full range of species. Providing for all species in the regional species pool requires sites that transverse both the longitudinal and lateral floodplain gradient. If WRP is to realize its full potential, there must be recognition that optimum wildlife

habitat can be defined at multiple spatial and temporal scales that match the landscape setting. Optimum wildlife habitat at a wetland scale is not the same as optimum wildlife habitat at the floodplain scale. The intent of WRP is to convert marginal, flood-prone agricultural lands back into wetlands so enrollment of lands located outside the active floodplain may be impracticable or unrealistic. Whereas attaining optimum wildlife habitat on every acre enrolled in the program may not be an achievable objective, providing optimum wildlife habitat for members of a regional species pool within an appropriately defined geography that includes both a longitudinal and lateral gradient represents an objective that is both desirable and attainable.