

# Predicting the Effects of Sea Level Rise on Wintering Waterfowl Carrying Capacity in Delaware

Mark C. Livolsi<sup>1</sup>, Christopher K. Williams<sup>2</sup>, Matthew DiBona<sup>3</sup>, John M. Coluccy<sup>4</sup>

<sup>1</sup> M.S. Candidate, Department of Entomology and Wildlife Ecology, University of Delaware

<sup>2</sup> Associate Professor, Department of Entomology and Wildlife Ecology, University of Delaware

<sup>3</sup> Wildlife Biologist, Delaware Department of Natural Resources and Environmental Control

<sup>4</sup> Director of Conservation Planning, Ducks Unlimited

## Abstract:

Tidal wetlands and coastal impoundments in Delaware serve as important wintering habitats for several migrating waterfowl species. Sea level rise (SLR) will likely alter Delaware's marshland habitat over time, which may in turn alter food composition and availability for wintering waterfowl. Reduced food availability can lead to mortality, health degradation, and impeded recruitment in waterfowl populations. To address this problem, we are comparing food availability, energy expenditure and waterfowl use between impounded and unmanaged wetlands, and apply SLR models to determine current and future wintering waterfowl carrying capacities. To quantify waterfowl food availability, we collected soil core, nekton, and vegetation samples in six habitat types: impoundment, subtidal, mudflat, low marsh, high marsh, and tidal pool. To quantify waterfowl energy expenditure, we conducted instantaneous behavioral scans, and are converting the percentages of each exhibited behavior into energy expended. To determine waterfowl use we are using point counts and aerial survey data to determine which habitats waterfowl preferentially select. Finally, we will apply a variety of SLR scenarios based on Delaware's Sea Level Rise Affecting Marsh Model (SLAMM) and NOAA's Coastal Impacts model to determine changes in marsh composition and its effect on carrying capacity. Additionally, we will create "hotspot" maps to predict where future wintering waterfowl will likely be most concentrated.