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NUTRITIONAL, PHYSIOLOGICAL, AND BEHAVIORAL RESEARCH ON CAPTIVE SEADUCKS

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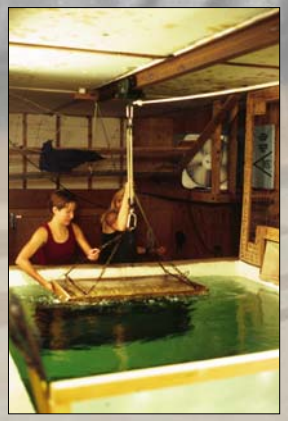
INTRODUCTION

Historically, the Chesapeake Bay has been an important area for wintering populations of waterfowl, especially seaducks and diving ducks. Approximately 25-35% of the Atlantic Flyway population of waterfowl winter in the Bay. However, the Chesapeake Bay has undergone an extensive change in the food resources it offers wintering waterfowl due to the degradation of water quality. There is a need for research on the availability and nutritional quality of these food resources as a possible explanation for the decline in the wintering populations. This is particularly important in areas of the Chesapeake Bay at depths of 20-40 feet where seaducks typically feed. These areas may be the first to be impacted by anoxic conditions if poor water conditions occur during the summer months. As the quality and (or) quantity of food declines, ducks may travel farther between suitable food items or food patches to maintain adequate energy/nutrient intake. The food taken at any one time depends on both the preferences of the ducks and the availability of the food items. Thus, as availability of any food items changes, the food habits and possibly the relative abundance of the ducks may change, and result in movement into or away from an area.



OBJECTIVES

The overall goal of this study is to help understand why seaduck populations are declining on wintering areas by modeling the feeding ecology and energetics of seaducks in response to changes in prey preference, availability, density, and size, and depth of substrate. Initial focus will be on the three species of scoters (black, surf, and white-winged) and the long-tailed duck.

This proposed study has a number of objectives:

- Determine the influence of nutrients on condition, behavior, and blood chemistry of captive seaducks in winter.
- Determine what food sources are preferred by each target species in dive tank experiments and compare to available foods in Chesapeake Bay (from Kidwell and Perry's study).
- Measure energetic intake and expenditure for each available food source at varying water depths, food densities, and substrate depths.
- Model the feeding ecology and energetics of each species in response to changes in prey preference, availability, density, and size, and depth of substrate.

METHODS

During 2003, a captive colony of seaducks was established at PWRC. Eggs were collected from the wild in northern Canada from nests of scoters (surf and white-winged) in areas where these species are successfully breeding. All incubation of eggs and propagation of young was conducted at PWRC. In 2004, black scoter and long-tailed duck eggs will be collected from known breeding areas to expand the captive flock.

Principal food organisms used by wintering seaducks in the Chesapeake Bay will be collected from major feeding areas. Four experimental diets will be formulated based on the proximate and amino acid analyses of the prey items presently being selected by seaducks that were determined by food habits analyses. The control diet will be created to simulate the results of the compositional analyses of the primary natural food source for each species. All ducks will be weighed at the end of each winter month to determine effects of diet on body condition. Blood samples will be drawn from all study ducks from each of the treatment diets during November, January, and March of each year to determine the effect of diet on blood parameters. Observers outside of pens will record the location and behavior of experimental ducks using scan sampling techniques.

METHODS CONT.

Two large aquariums (dive tanks) were constructed and installed (2 x 3 x 3m) in a pen facility for use on feeding trials. Prey preference will be evaluated to determine if the present food habits are truly the preferred food sources for each species and therefore determination of the energetic values per food source and its availability in the Bay would be most useful in determining the feeding ecology of each species. Feeding performance will be tested to determine the influences of environmental factors such as depth of water, density of food, and depth of substrate covering the food. To measure how a shift between food sources influences foraging energetics we will use a similar model as Richman and Lovvorn used at University of Wyoming. We will evaluate each food type in terms of profitability (energy intake – cost of diving), measuring both (1) the assimilation frequency (fraction of ingested energy absorbed by the gut) of different food sources found along migration and (2) the functional response (food intake rate for different prey sizes, densities, and depth in substrate).

With this information, we will model the feeding ecology and energetics of these species in response to changes in prey preference, availability, density, and size, and depth of substrate.

Changes in the distribution and abundance of food resources will be important to better understand the changes in the distribution and abundance of seaducks. These data will provide important information for natural resource agencies in managing seaduck populations on wintering habitats.

All dive tank photos by: Fred Greenslade, Delta Waterfowl Foundation