An Economic Analysis of Shorebird Preservation in the Delaware Bay

Kelley H. Appleman
March 20, 2008

Abstract

Each spring the Delaware Bay is home to a natural phenomenon that combines the world's largest population of spawning horseshoe crabs and the annual migration of a diverse group of shorebirds from South America. The four primary species of shorebirds that visit the Bay are the red knot, ruddy turnstone, sanderling and semi-palmated sandpiper. The Delaware Bay serves as the only major stop-over for these birds during their lengthy trip to their breeding grounds. The birds feast on the horseshoe crabs' eggs before flying to the Arctic, and without enough eggs, the birds would not gain the weight necessary to continue their journey or to breed successfully once they arrive. Out of the four species mentioned above, the red knot population has reached dangerously low population levels, while the other birds have experienced similar but less dramatic declines. The two main factors contributing to the shorebirds decline are habitat loss from coastal development and erosion and the lack of available food resources in the Delaware Bay.

Renewed interest in the commercial harvest of horseshoe crabs in the 1990's has reduced the adult spawning population in the Delaware Bay. The horseshoe crab is considered a 'multiple-use' resource with a diverse group of stakeholders who have a vested interest in the future of its' population. Scientists and conservationists concerned about the future of shorebird populations in the Delaware Bay, commercial fisherman who use the crabs as bait in the Eel and Conch fisheries, and biomedical firms who use the crabs for research are all concerned that the current stock is not sufficient to meet their objectives. Policy intervention to protect shorebird populations leads to economic benefits and costs for all parties involved, and understanding the magnitude of these trade-offs is critical in determining how scarce resources should be allocated.

The main objective of my research is to use economic analysis to measure the marginal benefits of shorebird preservation. The two types of values associated with this resource are use values, represented by those who participate in recreational bird watching, and non-use or existence values, represented by the general public. The current study design combines stated preference techniques that are used primarily to measure non-use values, and revealed preference techniques that capture the demand for trips to the Delaware Bay to view shorebirds. Stated preference techniques, like contingent valuation, use surveys to estimate an individual's willingness to pay for shorebird protection by asking them to give up a portion of their wealth for an improvement in the expected status of the red knot population. The estimated individual welfare values collected from the contingent valuation surveys can be aggregated to provide a measure of the marginal benefits to society. These values have not been measured for shorebird populations in the Delaware Bay and are necessary to compare with the marginal costs of policy intervention. In the future, I would also like to estimate the marginal costs of a shorebird policy in order to determine the socially optimal level of protection.