Habitat Modeling Approaches for Restoration Site Selection

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Numerous modeling approaches have been used to develop predictive models of species-environment and species-habitat relationships. These models have been used in conservation biology and habitat or species management, but their application to restoration efforts has been minimal. Predictive habitat distribution modeling is not only useful as a tool for population-level risk assessment, but for site selection to increase the efficiency of restoration efforts as well. In order to create effective models, researchers need to be aware of the ecological foundations of the species-environmental models that they are developing. These include influences of space and time on the observed species patterns, the nonlinear nature of relationships between species and their habitats, the importance of scale in modeling, and the dynamic nature of species distributions that influence the generality and accuracy of the models. Numerous types of models have been employed for habitat-species relationships and the selection of an appropriate method should not be based solely on statistical concerns but should also consider the shape and nature of a species response (i.e., the realized niche). Testing models over a wider range of applications can help to define the range of applications for the model predictions. An example of a species-habitat modeling effort is the Bay Scallop Habitat Assessment Models that are being developed at the Atlantic Ecology Division. This effort combines habitat mapping, a Habitat Suitability Index model, a demographic population model, and a systems-level model to define the habitat requirements for the bay scallop (*Argopecten irradians*) in two systems in Massachusetts.

KEY WORDS: Habitat models, spatial patterns, habitat-species relationships, *Argopecten irradians*, Habitat Suitability Index.