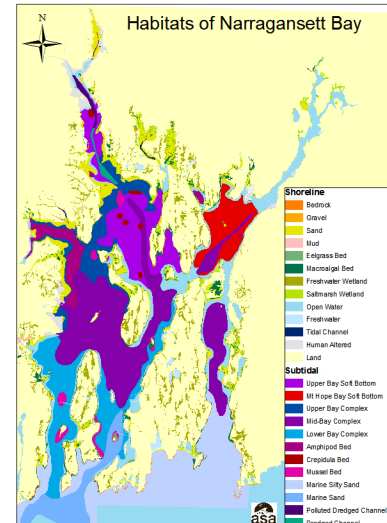


Ecological Service Value Index (ESVI)SM

ASA's Ecological Service Value Index (ESVI)SM measures the relative value of a location to biological resources and human uses of natural resources. The ESVI is a composite measure based on ecological service values for individual natural resources, including:

- Habitat type, quality and productivity
- Presence and degree of usage by biological resources, such as listed (i.e., threatened and endangered) species of concern, birds, marine and terrestrial mammals, sea turtles, other reptiles, fish and shellfish, bats, butterflies, and other species of interest
- Harvest value, such as to commercial and recreational fisheries
- Usage for aquaculture
- Recreational usage related to natural resources (e.g., wildlife viewing)

ASA has developed and applied its ecological service valuation model over the past two decades while performing environmental impact evaluations for proposed developments, pollutant discharges, and oil and chemical spill assessments. The underlying ecological analysis for producing the ESVI includes mapping of habitat values, as well as usage by birds, bats, mammals, other wildlife, and fisheries resources. For human usage of natural resources (fisheries utilization, aquaculture and wildlife viewing), spatial and statistical data are incorporated into the overall ESVI.



ASA applies its ESVI model to aquatic and terrestrial areas potentially affected by development, such as for renewable energy facilities (onshore and offshore wind, wave, and current), infrastructure, and shipping and port facilities. The ESVI model is ideally suited to siting evaluations, as it allows quantitative rankings of potential development sites to be developed and mapped based on ecological valuation. The layout of the development's infrastructure and use patterns can also be designed in consideration of the spatial distribution and usage of natural resources.

WILDMAPTM

To quantify distributions and relative densities of specific species of concern, ASA applies its wildlife movement (migration and behavior) model (WILDMAPTM) based on life history information, nesting/breeding and foraging locations, and available observational data for the species evaluated. The model is supported and ground-truthed by presence/absence, abundance, frequency and spatial observational data. Considerable information is available on general migratory pathways, the timing of migrations, temporal distributions of sightings, behavior of animals while migrating and foraging, habitats utilized, and reproductive behavior. The relative distribution of animals in space and time is quantified by modeling movements of representative individuals. Behavioral and sightings frequency distributions are used to determine behavioral choices at any given instant and location. The model tracks movements within the boundaries of the study area (a geographical map of habitat characteristics over a large enough domain to include normal movement patterns for the species), as well as migrations in and out of the modeled area. By modeling movements of a local population, relative densities of the species (in space and time) can be calculated from model results and compared to observational data for calibration and verification. ASA has combined its WILDMAP migration and behavior model with population modeling to evaluate the magnitudes of potential impacts to species of concern, as well as recovery time. Example applications are listed below.



Example publications:

French, D.P., M. Reed, J. Calambokidis and J. Cabbage, 1989. A simulation model of seasonal migration and daily movements of the northern fur seal, *Callorhinus ursinus*. *Ecological Modelling* 48:193-219.

Jayko, K., M. Reed and A. Bowles, 1990. Simulation of interactions between migrating whales and potential oil spills. *Environmental Pollution* 63:97-127.