2015

The American Lobster Settlement Index: An Early Warning System?

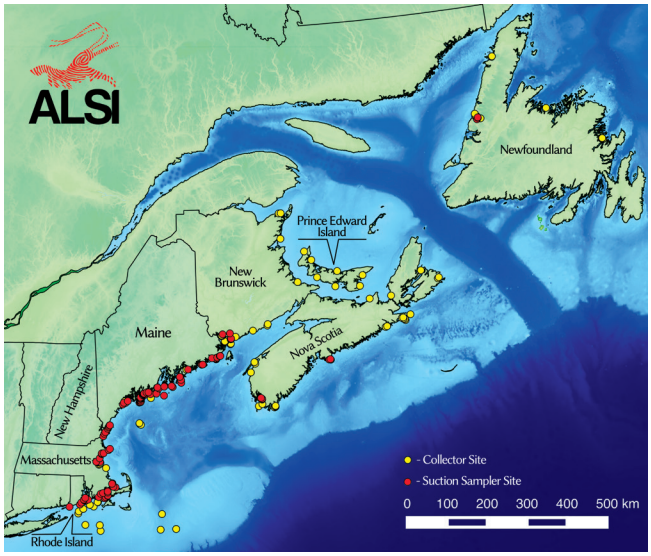
Maine Sea Grant College Program

The American Lobster Settlement Index: An Early Warning System?

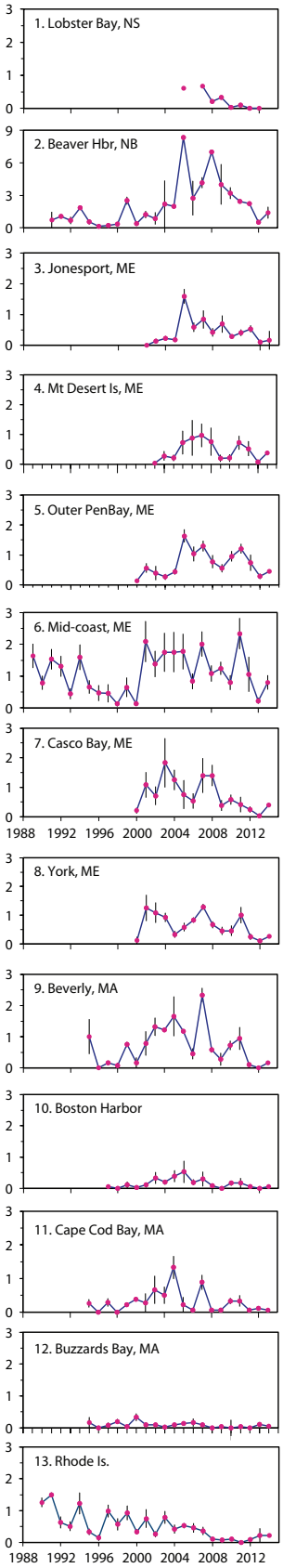
The harvest of American lobsters is the Gulf of Maine's largest, most valuable, and most iconic fishery. The catch has never been higher, but how long will it last? Fishing communities in eastern Maine and southern Nova Scotia are seeing historically high landings, some five times higher than the 1980s. At the same time, the lobster fishery south of Cape Cod has all but collapsed, plagued by shell disease and stressfully warm summers. It has never been more important to monitor this vital fishery. The American Lobster Settlement Index measures the annual pulse of baby lobsters to rocky nurseries some five to nine years before they appear in the fishery. This interstate and international monitoring program might provide an early warning system for trends in the fishery.

ALSI

About the Index

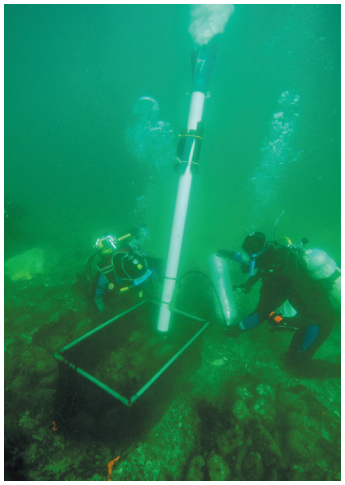


Initiated in 1989, the American Lobster Settlement Index has expanded from Maine south to Rhode Island and north to Newfoundland. In what is currently the only assessment of lobster nursery habitat, SCUBA divers and vessel-deployed collectors gather data on newly settled young-of-year lobsters, as well as older juvenile lobsters and associated crabs and fishes. More than 100 sites from all regions are sampled annually. The survey is supported by participating marine resource agencies and academic institutions, and the database is managed jointly by the University of Maine and the Atlantic Coastal Cooperative Statistics Program.



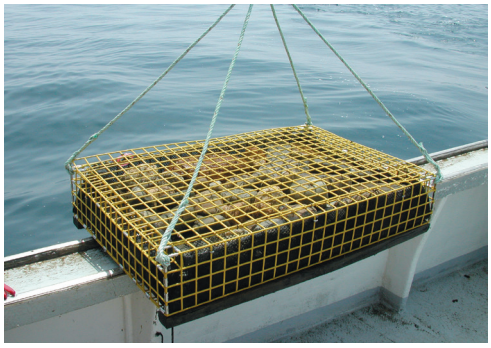
Two Types of Data

The Index is comprised of two data sources: diver-based airlift suction sampling and vessel-deployed passive collectors. Lobsters are the primary target, but some participants also report data on other species caught by the two sampling methods. For example, ALSI monitoring also collects data on Jonah crab, an important emerging fishery in New England.



Airlift suction sampling

At the end of the settlement season each year (late August in Rhode Island to mid-October in Atlantic Canada), divers use airlift suction sampling to quantify the smallest juvenile lobsters in cobble-boulder nursery sites using 10 to 20 half-square-meter quadrats. The quadrat is equipped with a mesh apron to minimize escapement during the sampling process. This is the most widely used method for the Index in the United States, but it is limited to relatively shallow depths.



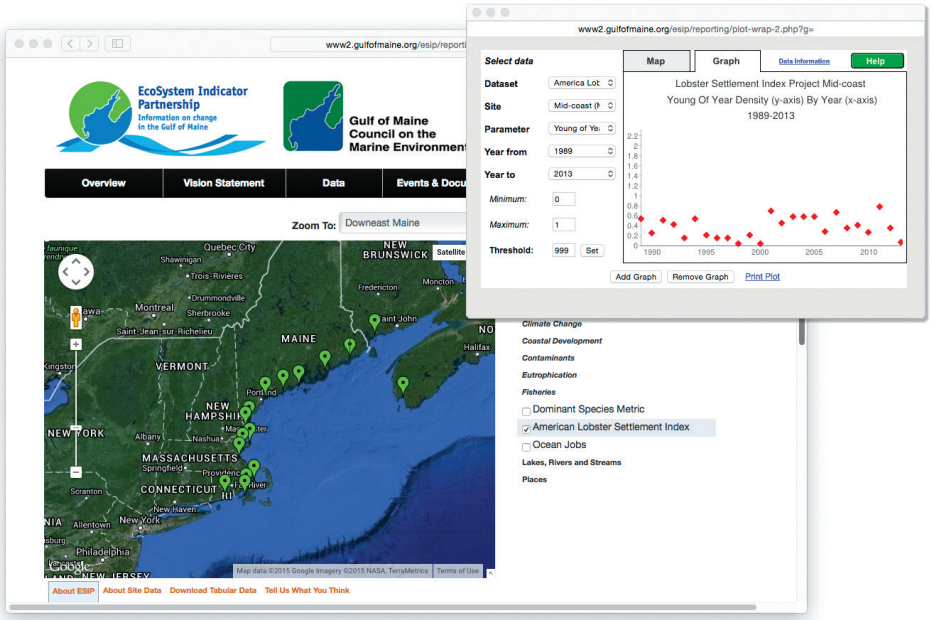
Vessel-deployed passive collector

Cobble filled colllectors the shape of a shallow box are place on the sea bed at places that are too deep or otherwise unsafe or impractical for divers. They have about the same foot print as a quadrat used in suction sampling, and are made of vinyl coated lobster trap wire mesh and lined with a finer mesh to retain small animals when they are retrieved. Collectors are deployed in early summer, prior to the onset of the settlement season, and are retrieved in early fall at the end of the settlement season.

The Database and Web Portals

The American Lobster Settlement Index web portal serves as a central database to compile and report historical data collected from the entire geographic area of the survey. Hosted by the Atlantic Coastal Cooperative Statistics Program in Washington, D.C., the portal allows participants to upload raw data and acquire data reports in the form of summary tables and graphs. Password-protected access facilitates accurate and timely reporting of the status of juvenile populations for purposes of stock assessment, forecasting, and research. Users can conduct their own data queries to produce customized reports and analyses.

As an added feature, public access to a subset of American Lobster Settlement Index data is provided by the Gulf of Maine Council on the Marine Environment's EcoSystem Indicator Reporting Tool, *gulfofmaine.org/esip/reporting*. The tool, shown at right, allows users to map study areas and graph data time series with other potentially important parameters such as climate and pollution indicators.



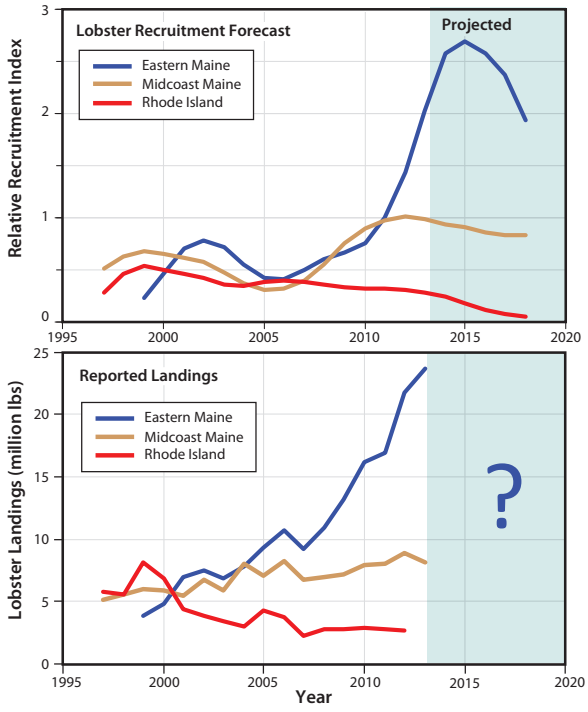
Predicting the future of the lobster fishery

Conserving a strong supply of breeders, as the industry does by not harvesting egg-bearing female lobsters, would seem to be enough to ensure future generations of lobsters. But an abundance of reproductive females is no guarantee of a bounty of new settlers, because larval settlement is strongly influenced by ocean currents and weather.

That is why monitoring the pulse of newly settled lobsters at the end of the settlement season is our best indicator of the strength of a year class. By tracking lobster year classes from settlement to the time adults "recruit" to the fishery some five to nine years later, we have an early warning system for trends in the fishery. Such forecasting power gives the fishing industry and managers time to consider their choices in the event of an impending downturn or upturn.

We can validate our projections against observations from landings statistics or independent trawl surveys, for example, by looking at three regions with the longest data records. These regions also represent dramatically contrasting temperature conditions across a large portion of the species' range. The projections capture the divergent trajectories of reported landings for these areas over the past decade.

The settlement index is a valuable early warning system, but it is not a crystal ball. It is important to note that the forecast gives an "index" of the direction recruitment will trend, not the absolute number of recruits. Uncertainty about changes in growth rate and natural mortality during the post-settlement years could change the outlook. Also, large segments of the coast and offshore areas are not monitored leaving open the question of what we might be missing. A host of environmental and economic factors unrelated to recruitment can also alter landings trends, so it will be critical to continue to validate model projections against observed landings and surveys.



American Lobster Settlement Index Partners

- UMaine School of Marine Sciences (Wahle Lab serves as data hub)
- Atlantic Coastal Cooperative Statistics Program
- Maine Department of Marine Resources
- New Hampshire Fish and Game
- Massachusetts Division of Marine Fisheries
- Rhode Island Department of Environmental Management
- Department of Fisheries and Oceans Canada/ Nova Scotia, New Brunswick, Prince Edward Island
- University of New Brunswick, St. John
- Guysborough County Inshore Fishermen's Association
- Prince Edward Island Fishermen's Association

umaine.edu/wahlelab/current-projects/american-lobster-settlement-index/

Sea Grant Maine at the University of Maine

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