American Lobster Settlement Index

Update 2010

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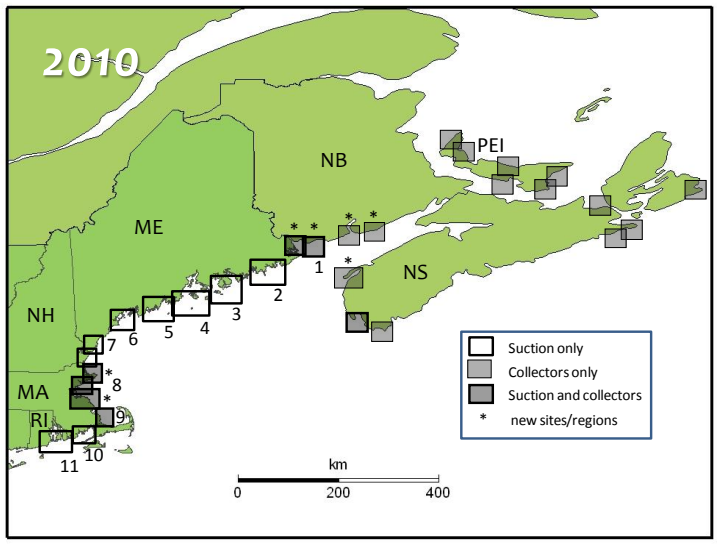
The American Lobster Settlement Index (ALSI) reached new milestones in 2010. Just as the Atlantic States Marine Fisheries Commission deliberated using the index as a new reference point in US lobster stock assessment, monitoring was expanding into new territory both in New England and Atlantic Canada during the year. This issue of the *Update* gives the usual overview of the year's survey, compares the two methods used to monitor settlement, and explains ASMFC decisions on the use of the index in US lobster management.

Settlement 2010: Time trends for the 11 regions with the longest time series (Fig. 1) point to diverging patterns from north to south (Fig. 2). Lobster nurseries south of Cape Cod have continued their distressing, almost decade-long, decline. In Rhode Island and Buzzards Bay over the past few years, young-of-year lobsters have barely been detected. Commercial landings and other abundance indices have followed suit, leading fisheries managers to ponder the unprecedented prospect of a moratorium on southern New England lobster fishing.

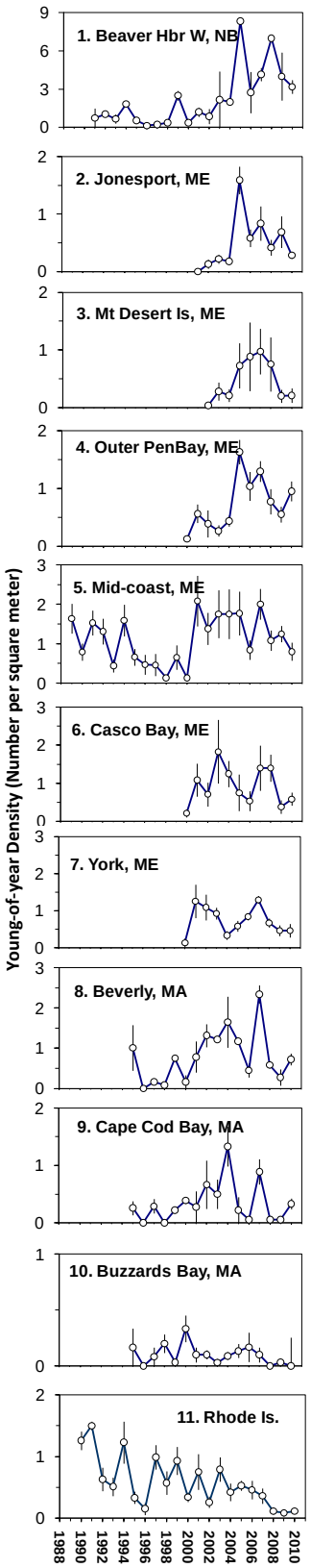
While regions in the middle ground, between Massachusetts Bay and mid-coast Maine, have generally fluctuated without much trend, eastern Maine and the lower Bay of Fundy have seen a decade of increasingly populated nurseries, with especially strong settlement years between 2005 and 2008. In the past couple of years, though, settlement has fallen off between Mt. Desert and New Brunswick. By all accounts, the growing lobster population in eastern Maine over the past decade has largely fueled the continued surge in Maine's catch - 2010 was another historic landings record. We will keep an eye on whether fishery recruitment in the region begins to dip in the coming years.

Meanwhile, the number of sites and regions sampled by diver-based suction sampling and passive collectors has expanded. In 2010 new monitoring sites were established in the Bay of Fundy, Passamaquoddy Bay, and Massachusetts Bay, providing greater coverage, as well as finer spatial resolution of settlement patterns in these regions (Fig. 1).



← **Figure 1.** Lobster settlement data were collected in 2010 by suction sampling, passive collectors, or both. Numbered boxes surround suction sampling sites used for regional averages in Fig. 2.

→ **Figure 2.** Complete time series of settlement, expressed as mean densities of young-of-year lobsters at 11 regions with the longest time series of suction sampling data.



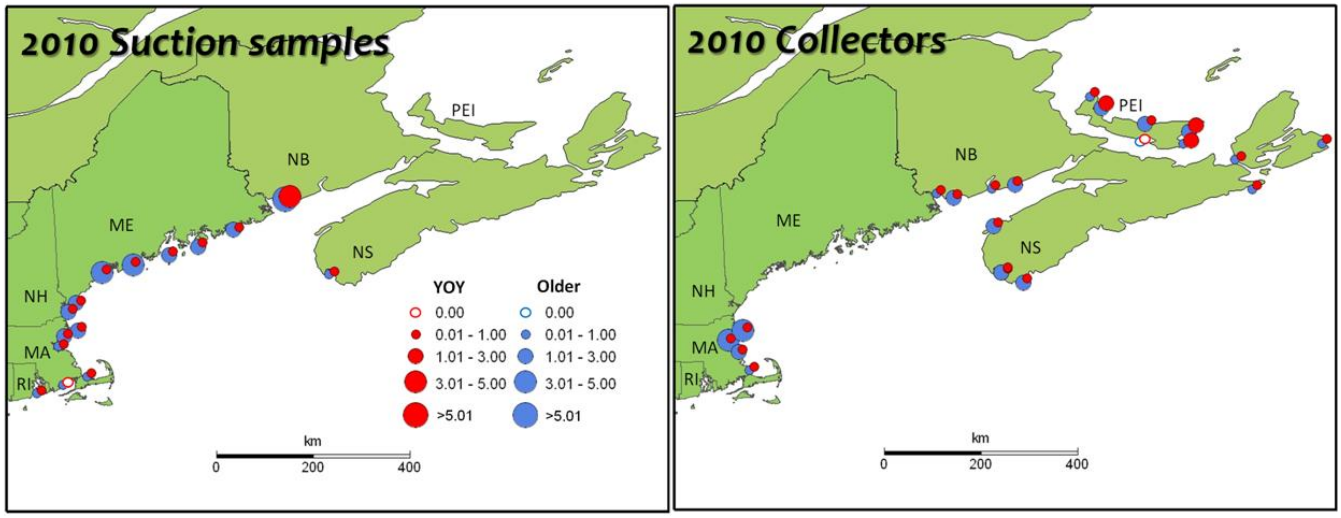


Figure 3. Spatial patterns by suction sampling and collectors. Average densities of young-of-year (**red**) and older juvenile lobsters (**blue**) found in suction samples (**left**), and collectors (**right**) deployed in 2010. Symbols represent regional multi-site averages.

Apples to apples? Using two different sampling methods for population counts always raises questions about whether data from the two sources are comparable. At a number of locations we have side-by-side monitoring by collectors and suction sampler, allowing the fairest comparison of the two methods. One way to check for bias is to plot on a set of axes densities collected by one method against those collected by the other at the same location. If the methods perform equally, on average there will be a one-to-one relationship in the counts; that is, the slope of the relationship in Fig. 4 will equal one. So far it looks as if collectors may on average get slightly higher numbers of lobsters than the suction sampler. A likely explanation for the difference: collectors offer more uniform coverage of cobble nursery habitat than might be found on the same area of natural sea bed sampled by a suction sampler. While both methods are useful tools in measuring settlement, this kind of analysis helps calibrate our counts.

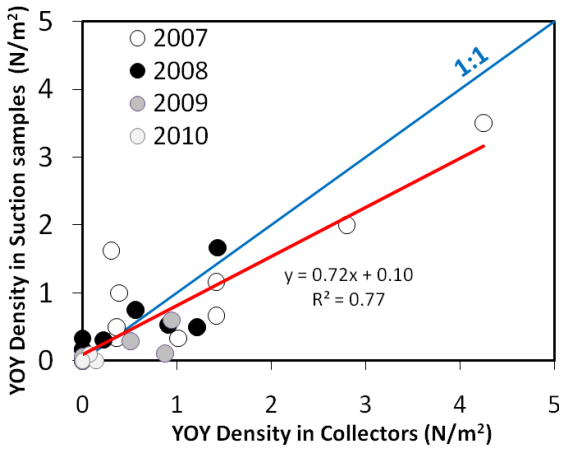


Figure 4. Correlation between collector-based and suction-sampling-based estimates of young-of-year lobster density 2007-2010. Diagonal blue line denotes expected 1:1 relationship if the two methods perform equally. Red line is the best fitting relationship to date.

The Management Spotlight: Just as last year's *Update* was going to press, the Atlantic States Marine Fisheries Commission Lobster Management Board was considering adopting trend-based reference points as an interim tool to assess lobster stocks until improvements could be made to biological model–based reference points that have become controversial in recent stock assessments. The Lobster Technical Committee, charged with the nuts and bolts of US lobster stock assessment, recommended setting thresholds such that multiple years of poor settlement and spawning stock biomass would initiate a management response. "If those are crashing, that's telling you something," said TC Chairman, Carl Wilson, to *Commercial Fisheries News*. For better or for worse, the Board decided to manage the fishery using only reference points based on estimates of adult abundance and exploitation. In effect, that buys time until the next assessment in 2013. Nevertheless, the settlement index will continue to be a key data set evaluated in lobster stock assessment. Monitoring multiple indicators – much like an annual medical check-up – is a common sense approach to assess the health of the fishery.

Looking Ahead: The ALSI collaborative is grateful to the Atlantic Coastal Cooperative Statistics Program for its assistance over the coming year in developing a web portal to help streamline data entry, reporting and outreach of settlement index results. Also, in Rhode Island, the Commercial Fisheries Research Foundation will be supporting the first comprehensive re-survey of lobster nurseries in Narragansett Bay by these methods since 1990, when lobster populations were at historic highs in the region. ϴ