

Gulf of Maine/Georges Bank Lobster Larvae Survey

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In the summer of 2021, we conducted a survey for lobster larvae at a scale not previously undertaken in an effort to better understand the relationship between lobster larvae and their zooplankton food sources and to assess regional difference in the timing and abundance of lobster larvae in the plankton.

We measured the abundance of lobster larvae at locations in the Gulf of Maine (GOM) spanning from Seabrook, NH to Milbridge, ME and one location on Georges Bank (Figure 1). Sampling was conducted weekly from commercial lobster boats and a vessel from Maine Maritime Academy. Each location included nearshore (~3 NM from shore) middle (~12 NM) and offshore station (~20 NM). Stage I and IV larvae were most abundant in our samples. Stage I larvae are recently hatched and reflect the approximate location of hatching. Stage IV or postlarvae are the last stage that lives in up in the water and they are ready to settle on the bottom. From the survey results (Figure 2), we have made the following observations:

- Stage I larvae and stage IV larvae vary considerably across the GOM in both abundance and timing.
- At the NH location we found stage I larvae at all stations from nearshore to offshore. This is consistent with reports by lobstermen that eggers have been moving further offshore during the hatching period. However, this was not evident at the other transects along the coast where stage I were found mostly at the stations closest to shore.
- At both Seabrook, NH and Boothbay, ME, stage IV larvae were found at all stations from nearshore to offshore. Historically, settlement has been in shallow waters closer to shore but settlement has been getting deeper as the ocean bottom temperature has warmed. This raises the questions about what happens to stage IV larvae that are 20+ NM offshore? Can they settle in water that deep? Are they lost at sea? Are they carried to Georges Bank? The data collected in this project will provide the basis to answer those questions in the future.
- Inside the mouth of Penobscot Bay, we found very few larvae of any stage which is consistent with low settlement observed in the 2021 DMR lobster settlement survey.
- At the Milbridge, ME transect all larval stages appeared at the same time late in the season. A large number of stage IV larvae were found at the offshore station that were very unlikely to have been hatched in the Downeast region due to the timing and the possibility of currents transporting stage IVs in and out of this area. Likely upstream sources of larvae based on the circulation of currents in the GOM might include the Bay of Fundy or Browns Bank.
- We found both stage I and stage IV larvae at our Georges Bank station suggesting for the first time in recent years that both hatching and potentially settlement could be occurring on Georges Bank

This survey provides the first GOM-wide picture of seasonal abundance of lobster larvae. Our continuing research will analyze the abundance of zooplankton food sources with respect to the larval patterns reported here. We are grateful for all who participated in collecting these data including Ruby Dener, Sarah Caron, Kara Villone, Lauren Staples, Rusty Brewer (F/V Lookout), Joe Locurto (F/V Jasmine Marie), Damon Frampton (F/V Vivian Mae), Grant and John Moore (F/V Direction), Haley Kent and Kaitlyn Reny (MMA students), and Finn Welch and Kelly Gunthorpe (MMA vessel ops). This project was funded by NOAA Sea Grant award number NA20OAR4170505.

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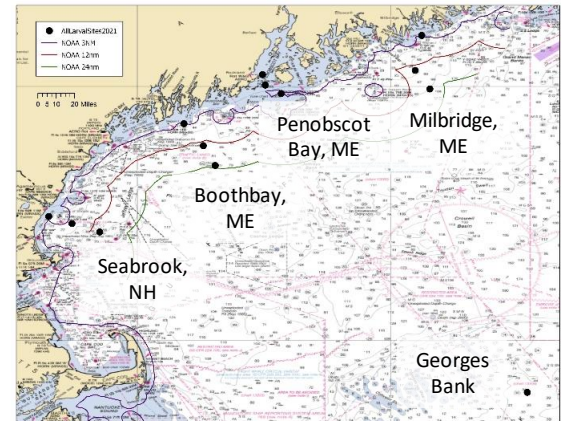


Figure 1. Sampling locations (●) for 2021 lobster larvae survey.

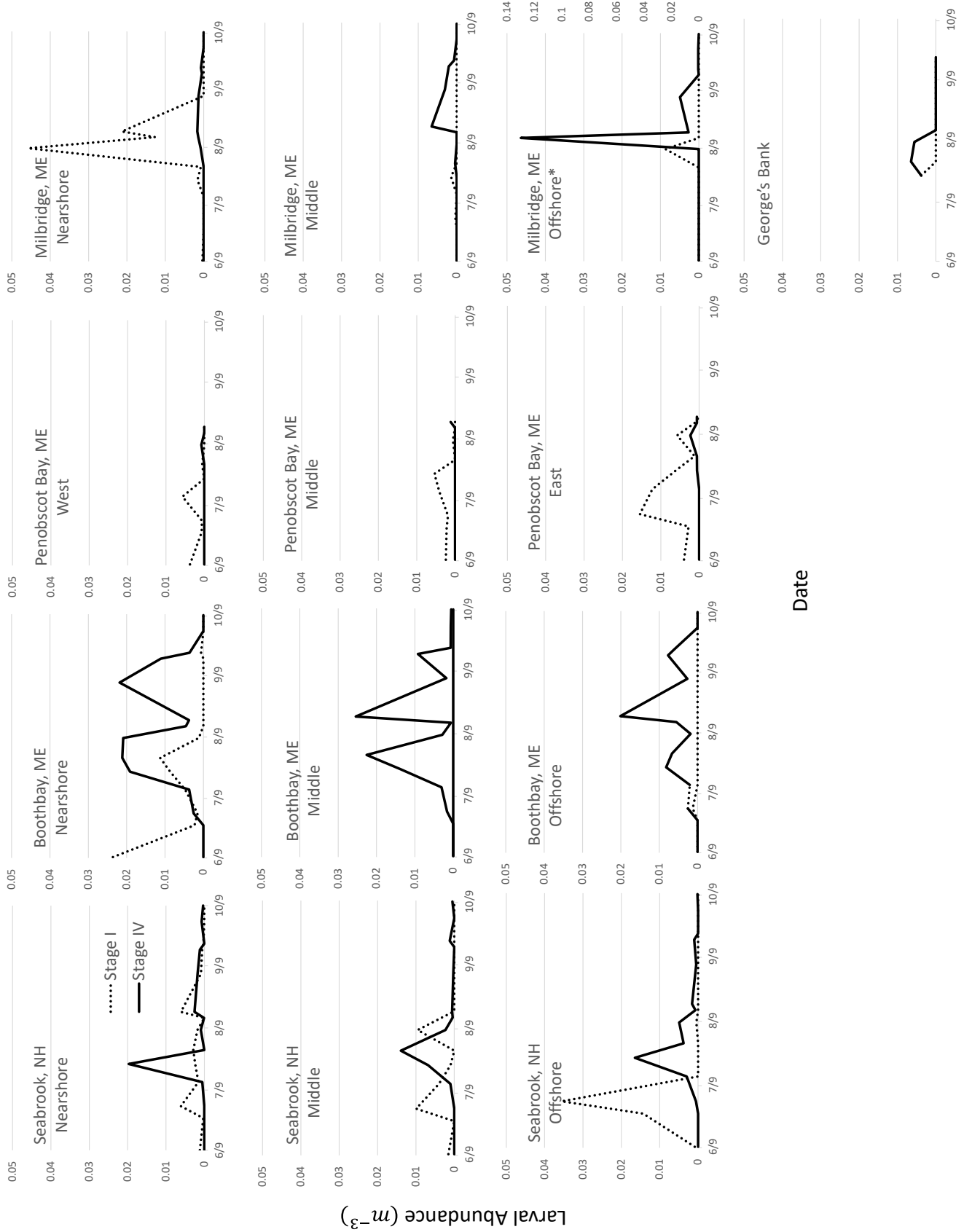


Figure 2. Lobster larvae abundance for stage I (dotted line) and IV (solid line) in 2021 at stations across the Gulf of Maine (see Figure 1 for locations). In the Milbridge, Offshore panel, Stage I abundance is depicted on the left axis and Stage IV is on the right axis.