



Ask the lobster doc

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This column provides lobster health and handling information.

If you have questions or concerns, contact Cowan at (207) 832-8224 or e-mail <dcowan@lobsters.org>.

Lobsters and temperature

This is the third in a series of Ask the Lobster Doc columns exploring putative explanations for high lobster landings in Maine over the past two decades.

The graph shown below is of mean annual sea surface temperature in midcoast Maine. To the best of my knowledge, similar historic data for continuous monitoring of bottom temperatures are not available.

This column focuses on adult lobsters living on the bottom. Although bottom temperatures differ from surface temperatures, they tend to track well in shallow coastal waters.

Temperature tolerance partially defines the lobster's geographic range from waters well off the North Carolina coast to the Strait of Belle Isle in Newfoundland.

Lobsters are most abundant where temperature conditions are most suitable. The Gulf of Maine, New Brunswick, and Nova Scotia account for approximately 90% of the total lobster harvest.

The extremes of distribution where lobsters are less common are determined

in part by upper and lower tolerance to temperature.

Lobsters are poikilotherms, meaning they are unable to regulate their internal body temperature metabolically. As a result, the body of a lobster is basically the same temperature as its external environment.

Environmental conditions such as water temperature have a huge influence on behavior, survival, growth, production of offspring, and susceptibility to diseases because temperature influences lobster metabolic processes in a general way.

Within the lobster's tolerance range of approximately 32°F-77°F, metabolic processes are slow at temperatures below 45°F and speed up at higher temperatures.

Lobsters are capable of surviving slightly higher and lower temperatures for short periods of time if properly acclimated.

Temperature is the most influential of all the factors affecting lobster growth – both in terms of intermolt interval (time between molts) and molt increment (size

increase at molting). Growth in lobsters is accelerated in proportion to temperature between temperatures of 47°F and 77°F. Although lobsters molt more frequently at higher temperatures, they gain less in size at each molt.

Population wide, lobsters growing into harvestable size in a given year experience two molt peaks per year in warm waters (such that shedders are captured in both spring and fall), but only one molt peak per year in colder waters where most shedders are captured during the fall.

The timing of the molt peak is also 2-3 weeks later in colder waters with a delay of approximately one week for each couple of degrees of reduction in mean summer water temperature.

The proportion of lobsters molting in a given year in a given location varies so dramatically with temperature that twice as many lobsters may reach minimum legal size in a warm year than in a cold year.

More lobsters reaching harvestable size can be a result of both more lobsters molting twice in one year and more lobsters molting that would otherwise not be molting that year. This could seriously impact landings in areas where the bulk of the catch is comprised of lobsters that have recently molted into the minimum legal size.

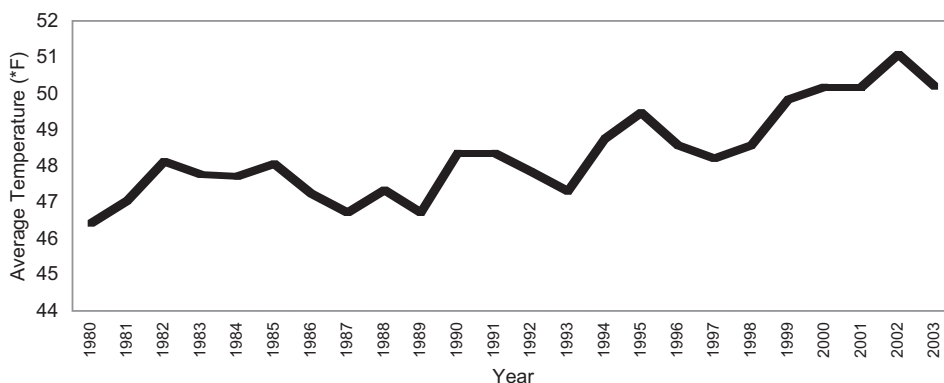
In general, during relatively warm years a greater number of short lobsters grow to harvestable size.

During the decade of dramatic increase in Maine lobster harvest discussed in August's Ask the Lobster Doc column, mean annual sea surface temperature was relatively warm. Warm waters favorable for growth combined with increased fishing effort discussed in the September column help to explain the magnitude

of the harvest.

Next time we'll explore how changes in lobster regulations corresponded to increased landings. ■

Mean Annual Sea Surface Temp



Data for this graph were provided by the Environmental Monitoring Project of Maine Department of Marine Resources at West Boothbay Harbor, where surface water temperatures have been recorded since 1905.