



AMERICAN LOBSTER

Homarus americanus

Life History and Habitat Needs

Geographic Range

The American lobster is distributed over the continental shelf of the western North Atlantic Ocean from Labrador to North Carolina. In inshore U.S. waters (out to a depth of 40 m), lobsters are most abundant from Maine to Massachusetts. In offshore areas, lobsters occur from Maine through Virginia. Lobster abundance declines from northern to southern areas, and from inshore to offshore depths in U.S. waters.

Movement/Migration

Lobsters usually remain within a home range of about 5 to 10 square km. In offshore areas, large mature lobsters make seasonal migrations inshore to reproduce. In southern inshore areas, large lobsters may move to deeper, cooler waters seasonally, to avoid overly warm summer temperatures, or permanently. In winter, lobsters may move into deeper waters to avoid near-freezing inshore temperatures.

Reproduction

Reproduction and growth are linked to the molting cycle. Lobsters have hard, external skeletons that provide protection and body support. Lobsters periodically shed their exoskeleton to allow their body size to increase. Sperm is deposited in "soft" (recently molted) females and stored internally for two years. When extruded, the eggs are fertilized externally by simultaneously extruded sperm. Fertilized eggs are attached to the swimmerets on the underside of the abdomen, where they are carried by the female for 9 to 11 months before hatching. Hatching peaks in mid-May to mid-July when water temperatures rise above 12.5°C.

Habitat Use

Newly hatched lobsters are planktonic (free-swimming) larvae during their first four molts, a period lasting 20-100 days depending on water temperature. Larvae tend to concentrate in surface waters where currents converge which also create retention areas for their food sources. After their fourth molt, juvenile lobsters settle to the ocean floor where they stay for the remainder of their life. Post-larval lobsters have been observed settling into rock or gravel often covered with algae, salt-marsh peat, eelgrass, seaweed substrates, and firm mud. The preferred habitat for settlement of post-larval lobster appears to be any area with three-dimensional structure where they can build and maintain burrows for shelter from predators. Adult lobsters have been found in waters from the intertidal zone to as deep as 700 meters. Coastal populations concentrate in areas where shelter is readily available. Offshore populations are most abundant in the vicinity of submarine canyons along the continental shelf edge. Lobsters are most active at night.

Temperature is the primary driving force influencing lobster metabolism, activity levels, spawning, development, growth, and possibly life span. Lobsters of all life-stages are reported to live in areas that range broadly in water temperature from -1°C to over 25°C. Changes in temperature have striking effects resulting in at least a two-fold increase in activity (e.g., heart and respiration rates) with each 10°C rise in temperature. Water temperature can have a significant impact on juvenile and adult lobster growth, survival, and reproduction particularly at non-optimal dissolved oxygen and salinity levels. Adult lobsters exposed to temperatures above 20°C for several days show symptoms of respiratory stress and compromised immune response. Further, juvenile and adult lobsters may be more sensitive to low dissolved oxygen levels and high temperatures when they prepare to molt. Adult lobsters respond to

small changes in temperature both behaviorally (e.g., movement) and physiologically (e.g., changes in cardiac cycle). Lab studies have shown that lobsters tend to avoid water temperatures below 5°C and above 18°C and exhibit a thermal preference of 16°C.

Lobsters require more oxygen as water temperature increases and hypoxic waters become more stressful as they warm. Dissolved oxygen levels below 1 mg l⁻¹ are often lethal and field studies have shown that lobsters demonstrate a behavioral avoidance of DO levels < 2 ppm. Prior to molting, juveniles and adults become more susceptible and sensitive to low DO as oxygen consumption peaks.

Salinity tolerance varies with developmental stage. Because lobsters can be found inhabiting shallow coastal areas, bays, estuaries and subtidal areas, they are frequently subjected to conditions of dramatic fluctuations in salinity (e.g., spring run-off and large storm events) where they may be subjected to short-term exposure to varying salinities ranging from 15 to 32, but salinities of 20 to 25 are preferred.

Threats to Habitat

- Pollutants such as heavy metals, pesticides, and petroleum products
- Open water dumping of sewage sludge, and sewage treatment (chlorine), especially in areas susceptible to hypoxia
- Dredging and spoil placement, especially sediment high in organics (ammonia, sulfides)
- Fishing gear such as otter trawls and scallop dredges

ASMFC Habitat Areas of Particular Concern

Scientists, managers, and fishermen are concerned about the habitat conditions for American lobster in southern New England waters where rising water temperature has combined with degraded water quality to create conditions lethal to lobsters. Such a combination of environmental factors and events resulted in a massive die-off of lobster in western Long Island Sound in late 1999, with a lesser events in later years. Continued elevated water temperatures, coupled with routine fall hypoxia and other water quality stress factors, have caused recruitment failure for the stock of lobster south of Cape Cod. North of Cape Cod, the same rise in water temperature has resulted in historically high reproduction and survival of young lobsters.

Recommendations to Improve Habitat Quality

- Support water quality programs that reduce the severity and duration of hypoxia and pollutant concentrations in nearshore waters.
- Regulate environmentally destructive fishing gear and practices, and develop gears that minimize impacts to lobster habitat.

Habit Research Needs

- Map, characterize, and quantify lobster habitat types throughout U.S. waters.
- Identify important habitat to post-larval settlement and early benthic phase lobsters.
- Assess the contribution of the bacterial disease Epizootic Shell Disease to natural mortality and determine if the mode of infection in the wild includes disruption of natural shell biofilm.

Additional Information

American lobster are currently managed by the ASMFC under Amendment 3 (1997) to the Interstate Fishery Management Plan for American Lobster, and Addenda I-XXIII to Amendment 3. Addendum XXIII (2014) contains the habitat considerations. Amendment 3 and related documents are available on the ASMFC website at www.asmfc.org or by contacting the ASMFC Habitat Program Coordinator at 703.842.0740.