

NON-INDIGENOUS AQUATIC SPECIES OF CONCERN FOR ALASKA

Fact Sheet 1

Green Crab *Carcinus maenas*

BIOLOGY & PHYSIOLOGY

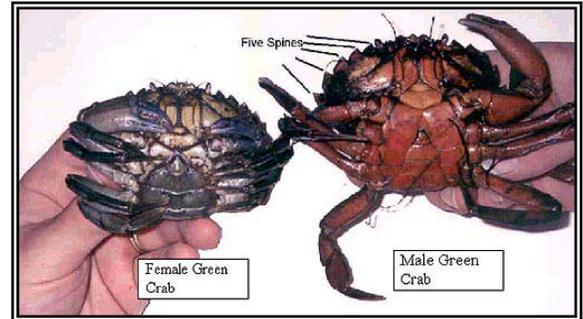
Physical Description: The Green Crab is a small shore crab. Adults measure about 3 inches across. The color of the dorsal (top side) of the shell is a mottled, dark brown to dark green with small yellow patches. Its ventral surface (underside) can display colors of green, yellow, red, and orange. Some studies have indicated that the color of the shell may be due to the amount of time the crab spends between molting stages. A distinguishing feature that can set green crabs apart from native crabs is the array of five evenly spaced triangular spines on either side of the eyes, on the front end of the shell. The three rounded lobes between its eyes may also be used to help identify the Green Crab.

Nutrition Requirements: The Green Crab is an omnivore, meaning that it can consume many different species of plants and animals. Its prey includes mussels, clams, snails, polychaetes, crabs, isopods, barnacles and algae. In both field observations and laboratory experiments, the Green Crab has been observed to eat an enormous variety of prey items from at least 104 families and 158 genera in 5 plant and protist and 14 animal phyla.

Reproduction: Female Green Crabs can reproduce twice in one season, spawning up to 185,000 eggs at a time. Like all crabs, mating between Green Crabs is a lengthy process whereby the male will attached itself to the female for weeks prior to copulation, waiting for the female to molt, and before her genital pores harden. As the female approaches the molting stage, she releases pheromones (a chemical messenger) to attract males. Mature females molt only once each year, typically between July and September. Prior to the female molt, the male partner typically pairs with her and attempts to defend her from predators and competing males. This pre-copulation behavior, described as pre-molt cradling, may commence many days prior to the female molt and it is at this time, and for a relatively short period after molting, the females are chemically attractive to males.

Lifecycle Stages: Green Crab have six larval stages: 1 protozoa (hatching stage), 4 zoea (feeding stages), and 1 megalopa (the transitional stage between the planktonic larval and the sedentary adult form). The total developmental time varies with water temperature and is estimated to be between 32-62 days. The larvae of Green Crabs can survive up to 80 days and are dispersed many miles along the coast by ocean currents. It has been shown that the larvae can tolerate a wide range of temperatures (41-86°F) and salinities (20 to 30 parts per thousand). The life span of the Green Crab is about 3 years for females, and about 5 years for males.

Habitat: The Green Crab is abundant on any kind of seashore in shallow waters (upper intertidal to shallow subtidal), including estuaries. It has been located in areas well upstream from river mouths, indicating tolerance of low-salinity environments. Some studies comparing crabs with different color shells have shown that red crabs tend to dominant the subtidal zone and crabs with green shells tend to dominate both the intertidal zone and salt marshes.



Photos by: Washington Dept. of Fish and Game



DISPERSAL POTENTIAL

Historical and Current Introduction/Spread: The native range of the Green Crab includes Europe and Northern Africa. It was first recorded in North America in 1817 along the Atlantic Coast. It was first collected in the San Francisco Bay in 1989 - 1990 and was most likely introduced there through ballast water. In 1993, it was collected from Drakes Estero, Tomales Bay and Bodega Harbor. In 1994, it was discovered in Elkhorne Slough and in 1995 in Humboldt Bay. It was first observed in Oregon in 1997, Washington State in 1998, and in British Columbia in 1999. The Green Crab has successfully invaded the East and West coasts of North America, and parts of South America, Asia, South Africa, Australia, and Tasmania. Its ability to tolerate a wide range of environmental conditions suggests that it could eventually range from Baja California to Alaska.

Dispersal Methods: The Green Crab can be dispersed by aquacultural activities, aquarium trade, live food trade, ship ballast water, ship/boat hull fouling, local currents, and by human activities such as boating.

IMPACTS AND CONTROL

General Impacts: The biggest concern for the Green Crab is its ability to displace native species through competition and predation. For example, they pose a direct threat to shorebirds, as they have similar diets.

In invaded areas, the Green Crab occurs principally along sheltered embayments. It normally requires planktonic (larvae) dispersal, usually by human assistance or unusual oceanographic events such as El Ninos, to expand its ranges between embayments. The pattern of invasion and range extension for the Green Crab appears to consist of periods of stasis followed by rare events of long distance dispersal when conditions are favorable. The importance of this observation is that even though the Green Crab has not been observed to have spread further north than British Columbia in recent years, a sudden change in weather patterns and currents can create a condition by which the Green Crab can successfully establish itself in Alaska. Even though it has not currently been observed in Alaskan waters, the potential for invasion will always be a possibility in the face of global climate change. Overall, there are seven qualities making this crab a perfect invasive species: a high reproductive rate, a high dispersal potential, a rapid growth rate, an extremely broad habitat adaptability, wide temperature and salinity tolerances, an extremely broad diet, and the lack of natural enemies such as parasites.

Management Information: A range of natural enemies for the Green Crab has been suggested as a potential biological control method. The one agent that has been given the most serious attention is the parasitic barnacle *Sacculina carcinus*. However, there has been insufficient field testing to determine the potential risks involved. Preliminary field tests appear to show that *S. carcinus* is not host specific and thus may pose a risk to native crabs. Important preventive measures include regulatory oversight by local, state and federal authorities. Regulatory agencies can help prevent new recruits by enforcing the discharge of ballast water outside of bays, and by controlling live food and aquarium trade. Some studies have shown that competition from local predators can restrict its spread and establishment; therefore, maintaining a healthy habitat with native species may help prevent the Green Crab from establishing itself.

What can you do? If you catch a European Green Crab:

1. Do not release it!
2. Note the location and date.
3. Keep the entire carcass, freeze if necessary.
4. Call the Alaska Department of Fish and Game at (907) 465-6109.

For information about how the State of Alaska is addressing the potential threat of this species through the State of Alaska Aquatic Nuisance Species Management Plan, please contact: Bob Piorkowski at the Alaska Department of Fish and Game, 907-465-6109 or Robert_Piorkowski@fishgame.state.ak.us.