European Green Crab

Carcinus maenas

Green crabs are an adaptable intertidal species and one of the most successful and damaging invasive species worldwide. Distinguishable from native crab species by their characteristic pattern of five spines to the outside of each eye, adult green crabs are smaller than adult Dungeness, rock, or graceful crabs but larger than native shore crabs.

HABITAT

Because they have an extremely wide environmental tolerance, nearly all shorelines of Washington are 'habitable' for this species. However, they have the highest survival rates in habitat types that are less preferred by larger crab species — typically relatively fresh, warm, intertidal, low flow or impounded habitats, particularly those with protective structure, such as vertical banks for burrowing, vegetation, and hard debris such as shell, riprap, logs, etc. Pocket estuaries, such as lagoons and salt marshes, offer ideal habitat for green crab, in large part because they are a refuge from predation by larger crabs. For this reason, such sites may ultimately harbor the greatest densities of green crabs in our region, particularly while populations are still small, early in the invasion. They also may be the habitat types that experience the greatest impacts from this globally-damaging invader.

IMPACTS

Green crabs tend to become extremely abundant where they establish invasive populations, enabling them to substantially change ecosystems through predation, competition, and habitat disturbance. Capable and adaptable predators, green crabs have a broad diet that could include commercially, culturally, and ecologically valuable species, such as young Dungeness crabs and bivalves. Harvest of wild bivalves, which comprises the majority of tribal and recreational harvest, may experience the greatest impacts from green crab predation; unlike net-covered or bagged aquaculture, these resources have no protection from green crabs. Moreover, foraging and digging by green crabs can substantially alter ecological communities and lead to habitat damage. On the east coast of North America, there is growing evidence that green crabs damage eelgrass beds and make it hard to regrow and restore them, which could jeopardize critical habitats for salmonids.

The rich and productive ecosystems of Washington shorelines could be dramatically altered by abundant European green crab.

Ecosystems at risk

If European green crab becomes established, it could compete with and prey upon juvenile Dungeness and other small native crabs, consume shellfish such as clams, mussels and oysters, increase erosion of beneficial marshes through burrowing, and damage eelgrass beds, which are critical nursery habitats. These effects would ripple out to the native salmon, migratory shorebirds, and humans that rely on pocket estuaries and salt marshes for protection, recreation, and sustenance. The illustration on the left depicts a healthy nearshore habitat, while the illustration on the right shows the potential impacts of abundant green crab populations. Illustrations by Kate Hourihan.





marginal teeth 1 2 3 4

Up to 4" (10 cm)

Willapa Bay Green Crab sampling (1998-2021) at Stackpole site.

Data courtesy of Sylvia Behrens Yamada/PSMFC.



WEST COAST SPREAD

Green crabs spread with and without the help of humans

Human-assisted dispersal: Humans can unintentionally transport green crabs at different life stages. Larvae can be carried in ballast water while larger life stages, including juveniles or adults, might be accidentally moved with seafood products. Green crabs were most likely brought to San Francisco Bay (by 1989) in the seaweed used as packing material for lobsters or bait worms shipped from Maine. It's also believed that green crabs were accidentally brought to the Sooke basin in BC (by 2012) in bags of mussels used for biotoxin monitoring that had been transported from an embayment on the west coast of Vancouver Island.



Natural dispersal: Green crabs spend the first few months of their lives getting washed around on currents as larvae, and this is the primary way they have

expanded their range along the North American west coast. Major dispersal events have been associated with conditions during strong El Nino/ENSO years (1997/1998 and 2015/2016). Adult green crabs do not travel far on a daily basis, but stay within a tens of meters of their preferred habitat.

Photo credits: Above left, Sean McDonald; above right, Greg Jensen.



WASHINGTON'S TWO INVASIONS

Within Washington, green crab numbers and spread have been characterized by 'outbreaks' rather than a steady increase. Initially detected in Willapa Bay in 1998, green crabs failed to establish persistent populations, and were only periodically detectible the decade thereafter. At the same time green crabs were not observed at all along inland shorelines of the Salish Sea, until they were detected in the Sooke basin, BC in 2012. The 2015/2016 ENSO event was associated with a major population increase along coastal shorelines, and the very first detections along inland Washington (at Westcott Bay and Padilla Bay in 2016).

Since then, green crab spread has increased, but coast and inland shorelines currently face different invasion status due to oceanography and invasion timelines. Oceanographic modeling and genomic evidence suggest weak connectivity between coastal and inland green crab populations. Recent trapping indicates that green crab populations continue rapid growth and spread in coastal estuaries. Along inland shorelines, the number of sites where green crabs have been detected has been increasing, but in general populations are more spatially restricted and relative abundance is much lower than in the coastal estuaries. The notable exception to this pattern is the exponential population growth observed in the human-constructed sea pond on the Lummi Reservation starting in 2019. All of these lines of evidence may indicate that different management targets and strategies are warranted in these two regions.

FOR MORE INFORMATION

wsg.washington.edu /crabteam

wdfw.wa.gov/species -habitats/invasive/carcinus -maenas

Thanks to the many groups that support green crab management efforts and share information, including Washington Sea Grant, Washington Department of Fish and Wildlife, the Makah Tribe, Lummi Nation, Jamestown S'Klallam Tribe, Fisheries and Oceans Canada, USFWS, Padilla Bay National Estuarine Research Reserve, the Northwest Straits Commission, and to hundreds of other group and individual community members that make these efforts possible.

