

European Green Shore Crab *Carcinus maenas*

An information sheet for NSW oyster farmers

Summary

The European green shore crab (EGSC) *Carcinus maenas* is an introduced marine pest and is listed as a Class 1 Noxious Species in NSW, which prohibits its possession and sale.

The crab has been implicated in the decline of a number of shellfish industries in the US and can potentially impact NSW oyster industries.

The Sapphire Coast Marine Discovery Centre (SCMDC) received a Landcare Sustainable Practices grant in 2009 for a three-year project to develop a monitoring and trapping program for *C. maenas* (see Research Efforts). Results of the trapping program show a reduction in the number of crabs caught throughout the length of the project. Interviews with oyster farmers revealed that the effects of EGSC on oyster production are quite varied.

Anecdotal reports suggest that good hygiene practices will reduce the negative impact of EGSC on oyster production.

Regular inspection, grading and handling of oyster growing infrastructure and removal and correct disposal of suspected EGSC from oyster gear is recommended to minimize the negative impact on cultured oysters. For more information, see page 4.

If you suspect you have seen this marine pest in a new location, please report it immediately to NSW DPI Aquatic Biosecurity (details at the end of brochure).

Identifying European Green Shore Crabs

The EGSC can be distinguished from native crabs by:

- five pointed spines either side of the eye along the top of the carapace
- three blunt spines between the eyes
- no swimming paddles on the hind legs
- broad fan-shaped carapace (see figure 1)

European green shore crabs can vary significantly in their colouration. Adult crabs are generally olive to dark green or brown in colour, often with orange to red patches on the underside. Juveniles can be lighter (see figure 2). Identification of these species can be difficult, as it is tough to count spine on small crabs.

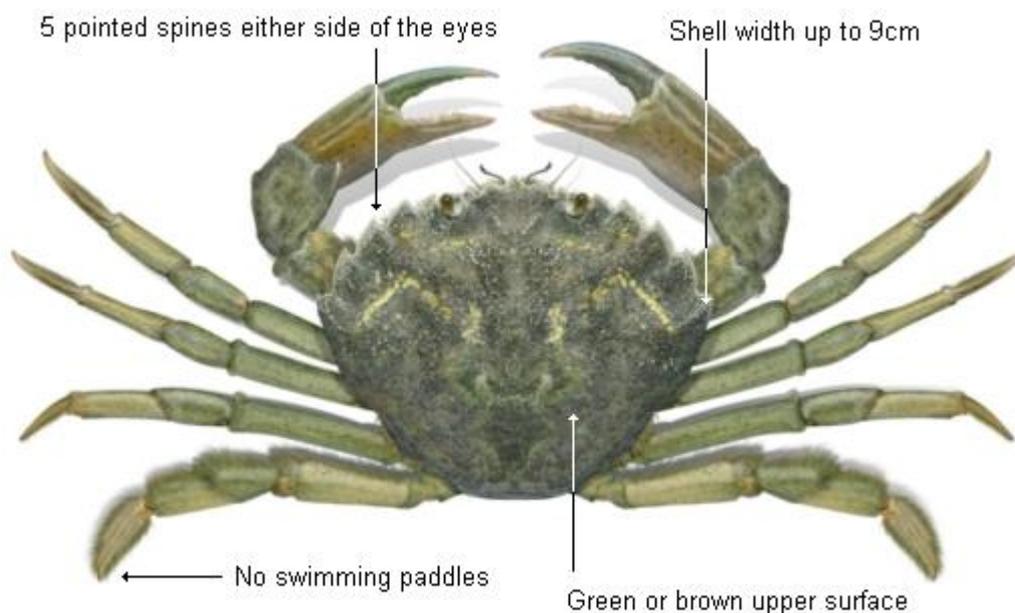


Figure 1. Identifying features of European Green Shore Crab (Image: Pat Tully, NSW DPI)



Figure 2. Varied colouration demonstrating that some crabs can also be reddish in colour.

Refer to NSW DPI marine pest brochure for more information on identifying European green shore crab and distinguishing from other native crab species.

Where are EGSC found in NSW?

EGSC are found in several estuaries and coastal lakes along the NSW south coast including Clyde River/Batemans Bay, Tomaga River, Candlagan Creek, Coila Lake, Lake Mummuga, Wagonga Inlet, Nangudga Lake, Corunna Lake, Tilba Tilba Lake, Wallaga Lake, Bermagui River, Cuttagee Lake, Wapengo Lake, Nelson Lagoon, Merimbula Lake, Pambula Lake, Twofold Bay, Wonboyn Lake and Nadgee Lake (Check NSW DPI website for up to date information).

Why are EGSC a problem?

Like any introduced species, the EGSC can compete with native species for both food and habitat. EGSC are voracious predators, are more dexterous than other crab species and are capable of improving their food gathering skills over time. They are also capable of tolerating a wide range of water temperatures and salinities, can produce up to 200,000 eggs per reproductive cycle and are capable of surviving out of water for extended periods of time.

Research efforts

Members of the Eden Local Aboriginal Land Council (ELALC), in collaboration with SCMDC, Southern Rivers Catchment Management Authority (SRCMA) and NSW Department of Primary Industries (NSW DPI) scientific staff, have completed monthly trapping of *C. maenas* in and around Twofold Bay since February 2007 to collect information on the abundance, size and sex of the crabs. The results show a reduction in the number of both male and female crabs throughout the length of the project. Very few EGSC have been caught in Twofold Bay in 2011.

Oyster growers throughout the Bega Valley Shire have been interviewed to gather anecdotal evidence regarding the seasonal abundance and potential impact of the crabs on oyster production. European green shore crabs have been recorded in all oyster-growing estuaries along the Sapphire Coast, from Bermagui in the north, to Wonboyn in the south, but their reported impacts on oyster production are quite varied. Some farmers reported substantial mortality of oysters in gear containing EGSC (up to 30%), whilst others reported little to no mortality where EGSC were present. Some growers report

Common points among oyster growers include:

- EGSC appear to be more active in spring and summer with few crabs reported during winter

- Some growers have noticed a general increase in numbers over the years, but this may be a result of increased awareness of the crabs
- EGSC have been recorded in all gear types, i.e. bags, tumblers, trays
- Growers reported very few crabs in 2011

Researchers from Macquarie University, in partnership with the SCMDC, the SRCMA, Batemans Marine Park and the Department of Primary Industries, have also secured funding from the Australian Research Council Linkage Grants program to investigate biological and physical factors that limit the spread of EGSC. This project is investigating:

- How estuarine morphology, especially cycles of natural and managed opening and closing of sandbars, impacts on the dynamics of the crab's invasion.
- The role of native predators and competitors of EGSC in limiting their proliferation.
- What part of the world the Australian EGSC populations originated from, whether there was a single or multiple translocation event that brought EGSC to our shores, and how well connected EGSC populations along the east coast of Australia are.
- How the availability of food resources influences the distribution of the crab.

To date, a quarterly trapping program in 14 south coast estuaries has failed to turn up EGSC in estuaries that spend most of their time closed to the ocean. This suggests that prolonged periods of sandbar closure hinder the crabs invasion of south coast estuaries. Analysis of by-catch in traps targeting EGSC has found that the abundance of EGSC is reduced in areas with abundant large vertebrate predators. Ongoing research is further examining this relationship. Trapping has also revealed that EGSC are particularly abundant within mangroves, perhaps because of their abundant prey resources or the protection mangrove roots offer from predation. EGSC populations along the east coast of Australia are more genetically similar to those from Europe than North America, and are well connected among estuaries.

The NSW Department of Primary Industries are also continuing *C. maenas* trapping surveys throughout central and southern NSW.

Evidence of crab predation on juvenile oysters

Simple feeding experiments conducted at the SCMDC have found that EGSC are capable of, and do prey on juvenile oysters. The crabs appear to access the oyster by punching a hole through the flattest and thinnest part of the oyster shell. Interestingly, some oyster growers have reported small, perfectly round holes in oyster shells, however these are caused by a marine mollusc that also preys on juvenile oysters. The crabs create more of a ragged-edged hole in the oysters. Crushed oyster shells are evidence of possible predation by EGSC (see figure 3).

SCMDC research also found evidence of the crabs prying apart the oyster valves. Further experiments are needed to determine whether, given an alternative food source, the crabs will continue to prey on oysters preferentially over other native bivalves.



Figure 3. Evidence of EGSC predation on juvenile oysters.

Suggested farm management practices to minimize the potential impact of EGSC on oyster production

Minimize the impact on oyster production: Anecdotal reports suggest that good husbandry practices may reduce the impact of the crab on oyster production. Regular grading, handling and inspection of oyster infrastructure and removal and correct disposal of suspected EGSC is recommended to minimize the impact of these predators on cultured oysters.

The oyster growers that reported the least amount of impact on their oyster production were following routine hygiene procedures and offer the following tips:

- Do not leave bags and tumblers out in the water for more than three months without handling
- Remove any suspected EGSC that are observed during grading and place in the freezer for at least 48 hours before disposing
- Use fine mesh bags and/or tumblers for nursery stock
- Keep larger oysters (at least 12 months old) in trays to reduce predation
- Dry and inspect gear/equipment regularly and remove suspected EGSC

ARE YOU KEEPING YOUR GEAR IN THE WATER TOO LONG?

Minimize the spread: The species cannot be eliminated, so controlling its spread is paramount. The main methods of dispersal of many invasive species are use as live bait, attachment to fishing gear and equipment, through ballast and biofouling on vessels. You can help by inspecting and cleaning equipment before transporting or relocating to other areas, especially EGSC-free estuaries and antifouling your vessel regularly.

Report suspected new sightings: Learn to recognise the EGSC, be aware and report any suspected new sightings. Please take a good quality digital photo to email, and/or collect a sample of the organism and place it in the freezer for later identification.

Report your sighting to the NSW DPI Aquatic Biosecurity Unit by emailing aquatic.pests@dpi.nsw.gov.au or call the 24hr recorded hotline 02 4916 3877.

For more information see <http://www.dpi.nsw.gov.au/fisheries/pests-diseases/marine-pests/nsw/european-shore-crab>



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