

1. Berrill, M. (1982). The Life Cycle of the Green Crab *Carcinus Maenas* at the Northern End of Its Range.

Journal of Crustacean Biology, 2(1), 31–39. <https://doi.org/10.2307/1548108>

- Old paper talking about the effects of green crabs life cycle on the eastern US shore and warming events in the GOM
- Slower growth in colder temps
 - Potentially delay larval recruitment to an extent sufficient to restrict the species from permanent colonization of the area?
 - Mostly described in the UK where waters are warmer then the GOM
- 3848 crabs → lots of descriptions of habitat, sex ratios, sizes and other information describing the baseline of the crabs found in the GOM
- Paper shows that in colder water the life cycle is compressed (late to settle, shorter reproductive time span, slower first year development)

2. deRivera, C., Grosholz, E., & Ruiz, G. (2011). Multiple and long-term effects of an introduced predatory crab. *Marine Ecology Progress Series*, 429, 145–155. <https://doi.org/10.3354/meps09101>

- Long term consequences of european green crab invasion on the hairy shore crab in cali
- Combined multiple years of field data
- Negative correlation between green crab and native crab, but hairy shore crab rebounded to previous levels when the green crab declines
- Hairy shore crab body size declined with the presence of green crabs, but it did not go back to normal after the green crabs declined
 - Lasting change to the structure of the population
- More hairy shore crabs in higher intertidal areas → being pushed into less favorable habitats

3. Dunagan, C. (n.d.). *Ten years of confronting a costly green crab invasion in Puget Sound* | *Encyclopedia of Puget Sound*. Retrieved April 7, 2026, from https://www.eopugetsound.org/magazine/ten-years-of_confronting-a-costly-green-crab-invasion
 - The history of the crab sightings in the sound
 - First sighting was at san juan island 2016
 - Up to 200,000 as of last summer
 - The crabs arrive as free floating larvae from coastal populations
 - Harder to trap down a population than it is to prevent it from growing in the first place
 - Moved north from California in the heat waves of 97 and 98 to washington
 - Early life stage dungeness crabs cannot compete with green crabs
 - They are really great invaders with a super large diet
 - Colder temps in Washington lessen survival, but heat waves and warming temps allow them to expand their range to puget sound
 - First came up here during the blob
 - Lummi sea pond
 - 64 crabs → 81,000 crabs due to the unique environment that perpetuated crab breeding
4. *European green crab* | *Washington Department of Fish & Wildlife*. (n.d.). Retrieved April 7, 2026, from <https://wdfw.wa.gov/species-habitats/invasive/carcinus-maenas>
5. Fisher, M. C., Moore, S. K., Jardine, S. L., Watson, J. R., & Samhour, J. F. (2021). Climate shock effects and mediation in fisheries. *Proceedings of the National Academy of Sciences*, 118(2), e2014379117. <https://doi.org/10.1073/pnas.2014379117>
 - 2014-2016 north pacific marine heatwave caused a HAB that closed the dungeness fishery
 - Huge impacts on the revenue and the commercial fleet on the pacific coast
 - Analysis on the spillover resulting from boats switching to other fisheries to maintain revenue during the closer and the affected seasons afterwards (cali specifically)

- Participation networks to quantify patterns of resource use and deconstruct dungeness crab vessel activity
- Leads to temporary exits of vessels, spillover where the vessel switches to another fishery, or moving areas to different fishing locations
 - Inequality in the impacts felt by different vessels (bigger boats have more ability to shift farther away from typical fishing location than smaller vessels do)
- The ability of a fishery to “bounce back” after a climate event + ecosystem change is highly variable and affects the environment and the people who rely on it differently
 - What are the effects if these events are happening frequently and in repetition?

6. Jensen, G., McDonald, P., & Armstrong, D. (2002). East meets west: Competitive interactions between green crab *Carcinus maenas*, and native and introduced shore crab *Hemigrapsus* spp. *Marine Ecology Progress Series*, 225, 251–262. <https://doi.org/10.3354/meps225251>

- Competitive dynamics between the two over the course of the invasion
- Shore crabs are excluding the green crabs from their habitat and under rocks that they are occupying
- New invaders on the east coast are affecting the effectiveness of the green crabs invasion and its ability to find shelter during larval stages
- There are biotic effects from other crabs on the success of the crabs, not just abiotic

7. Monteiro, J. N., Ovelheiro, A., Maia, F., Teodósio, M. A., & Leitão, F. (2025). Biological traits and population dynamics for sustainable harvesting of *Carcinus maenas*. *Fisheries Research*, 281, 107243. <https://doi.org/10.1016/j.fishres.2024.107243>

- Surveys across Portugal to determine the population dynamics and patterns of green crabs in the context of fisheries
 - They harvest green crabs commercially there
 - Applying this to management policies because current policies use science based out of the UK

- Year round spawners → warmer water triggers spawning earlier
- The legal landing size is set above the average size at which individuals are reproductively mature
 - Unnecessarily restrictive management
- Grow fast and are continuously recruiting to the population year-round
- Stock assessment shows that harvest is currently sustainable in this area, fishery is not overexploited despite lack of science based management
 - Suggests that more crabs could be caught

8. Stram, D. L., & Evans, D. C. K. (2009). Fishery management responses to climate change in the North Pacific. *ICES Journal of Marine Science*, 66(7), 1633–1639. <https://doi.org/10.1093/icesjms/fsp138>

- How NPFMC can alter FMPs in response to climate change
 - Its already being affected through shifting species distribution
- AK fisheries are relatively precautionary compared to other councils
- EBFM limits the potential for crazy changes because there is a system in place for changing environments
 - Recommends more flexible management strategies that can adapt to uncertainty
 - Climate indicators and adjustable quotas
 - If there is a “bad crab year” adjusting quota to allow native species a better chance to compete with the invaders

9. Walton, W. C., MacKinnon, C., Rodriguez, L. F., Proctor, C., & Ruiz, G. M. (2002). Effect of an invasive crab upon a marine fishery: Green crab, *Carcinus maenas*, predation upon a venerid clam, *Katelysia scalarina*, in Tasmania (Australia). *Journal of Experimental Marine Biology and Ecology*, 272(2), 171–189. [https://doi.org/10.1016/S0022-0981\(02\)00127-2](https://doi.org/10.1016/S0022-0981(02)00127-2)

- There are a lot of arguments that councils should start incorporating proactive climate change strategies into FMPs to be prepared for climate related changes/affects in stocks

- NPFMC making management decisions about the crab fishery based on predicted changes in the population due to climate change → preemptive changes
 - Closure of the arctic ocean to commercial fishing until additional research is evaluated
 - Slow the movement of the fleet into newly melted waters that were once protected by sea ice coverage
- Species range expansion by warming waters is leading to expanding trawling and commercial fishing with little info known about the effects on these previously untouched areas
 - Red king crab, snow crab, tanner crab all shifted north directly related to bottom temperature
- Implementing fishery ecosystem plans that take into account the environment and interactions between the ecosystem and the stocks of interest

10. Yamada, S. B., Gillespie, G. E., Thomson, R. E., & Norgard, T. C. (2021). Ocean Indicators Predict Range Expansion of an Introduced Species: Invasion History of the European Green Crab *Carcinus maenas* on the North American Pacific Coast. *Journal of Shellfish Research*, 40(2).

<https://doi.org/10.2983/035.040.0212>

- Green crab invasion occurs when heat waves warm northern waters that are typically colder
 - Initial spread to CA and the blob to WA
- Oceanographic conditions drive the expansion of the crab
 - Not just ocean temps but also currents that transport larvae around
 - Which is the important thing because without the transport of larvae from currents the crabs cannot distribute nearly as effectively or efficiently as they have been in the past
- We should use climate conditions and predicted warming events to preemptively prepare for green crab invasions (or increased numbers than normal)
 - Target high risk areas