

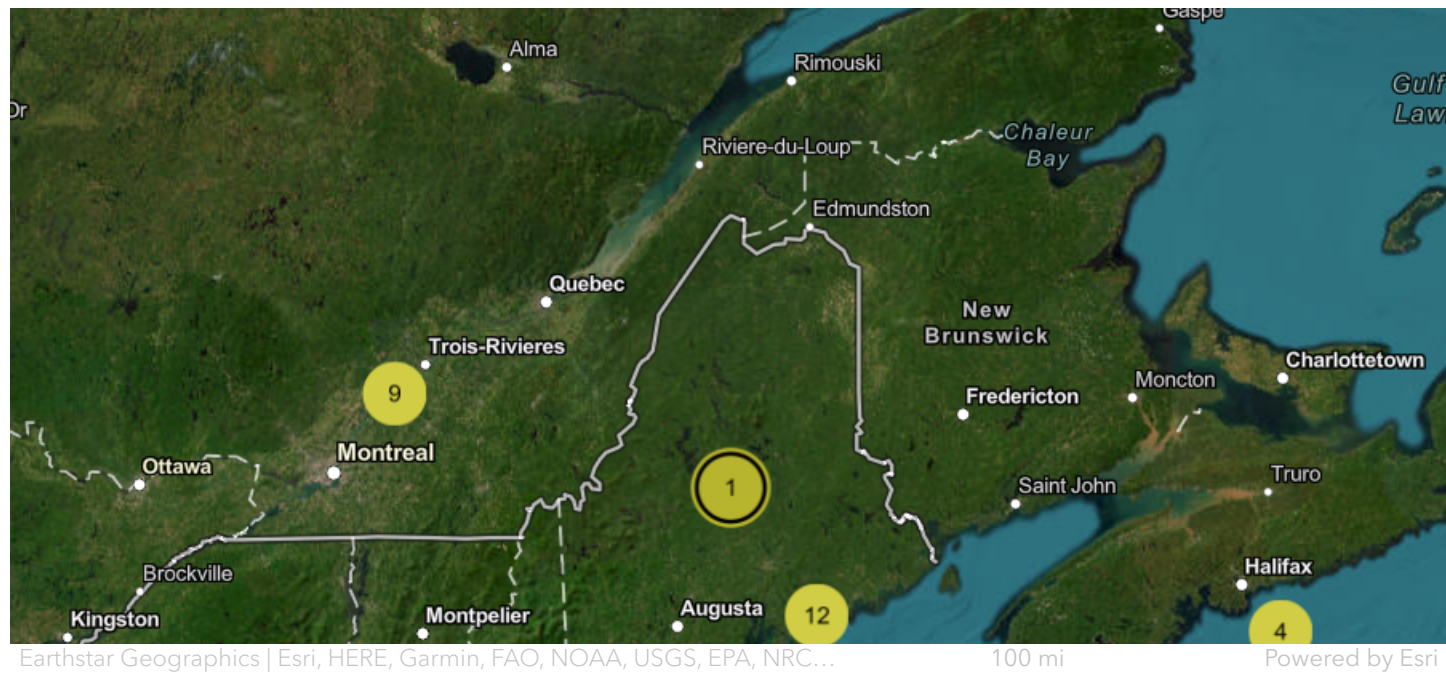


Invasive Species and Maine

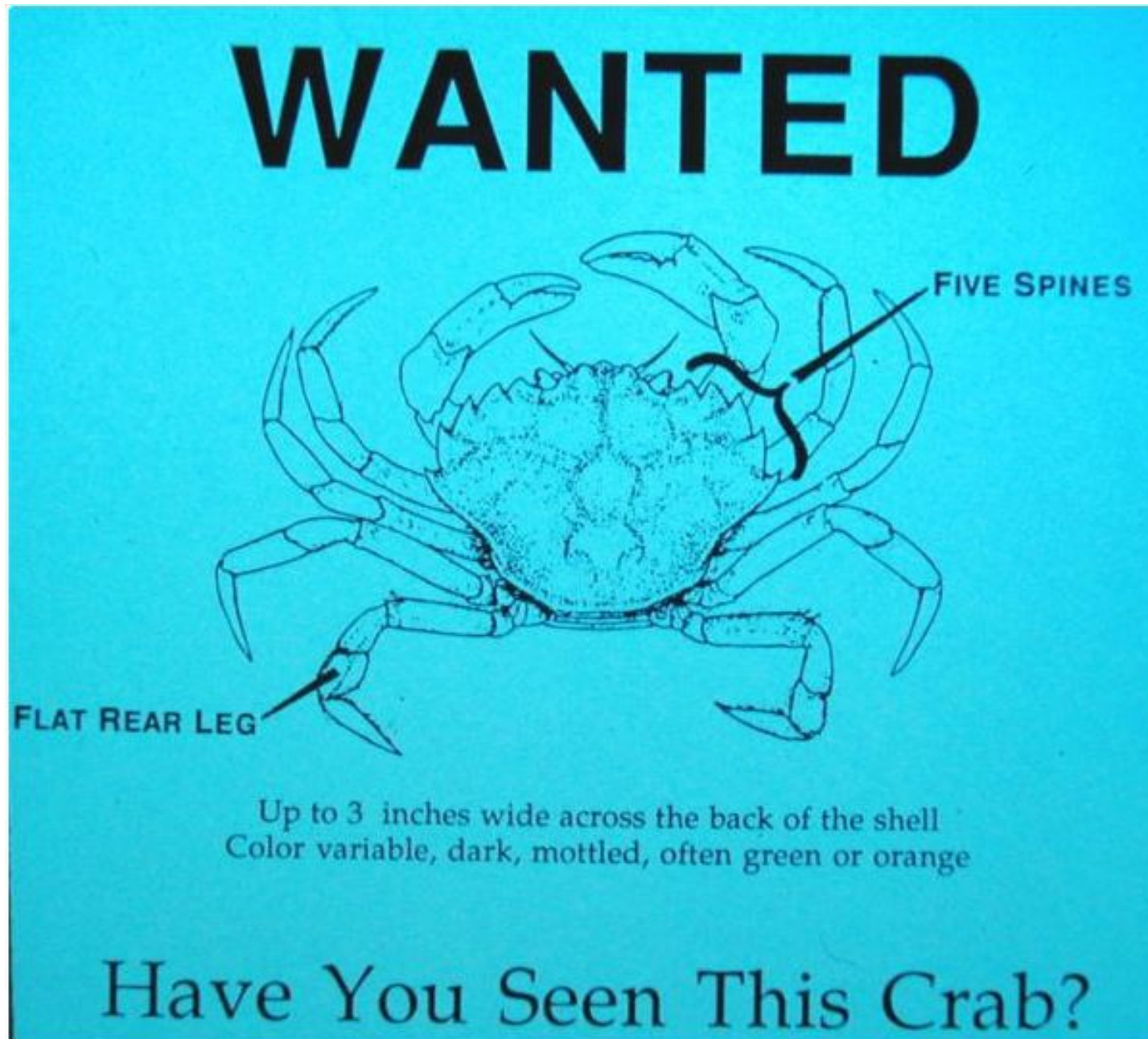
Invasive species have been here for a long time: what
now?

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Draft



1 Introduction



Invasive species often bring significant harm to the ecosystems they are introduced into. As they do not face many of the pressures of native species such as predation, diseases or competition, invasives can explode in population.

Their incompatibility with the local ecosystem also means that they can be disruptive to the point of driving native species towards being endangered or extinct. There are many traits that define an invasive species. These are high growth rate, wide climatic or environmental tolerance, short generation time, prolific reproduction, small seed or egg size, good dispersal, high capacity for uniparental reproduction, absence of specialized germination, high competitive ability, and ability to escape or survive natural enemies. Whitney et al noticed that these traits can change in rather short time-periods once they are introduced. Phenotypic plasticity is another trait that assists in the ability for the invasive to succeed. This is the ability for a gene to express phenotypes and is vital to the adaptability within a new environment. Uniquely, invasive species do not have the genetic diversity typically needed in order for this plasticity. In invasive species, this allows for a rapid adaptation to the environment. Many of the species have been in the local ecosystem for a long time, some for hundreds of years. No longer can we look at the broader idea of invasives as they were originally. Through mutual relationships to changing environments, the conversation must change about how they will live within these communities into the future. Through such advantages, invasive species and their evolution can make a significant impact on the local ecosystem. How Maine then deals with their specific species, from a native response to human management, can give us an idea of what invasive species will be doing in the future.

Every location on the map marks where they might have originated from. In the end, they all came to Maine? are they friendly new neighbors or do we kick them out?

2**Japanese Barberry**



Japanese Barberry was introduced from Japan and has taken over the Eastern US. It has strong resistance to grazing by deer, and is also becoming very beneficial habitat for native birds. The resilience to grazing is unique among invasive species as invasive species could still be checked in numbers by native herbivores. The inability for defoliation to greatly impact how the plant acts in terms of growth or physiology means the species can tolerate greater than others. ¹ The benefits to habitat for local birds could be significant as it might save the local birds from invasive changes. Mice are a threat to these bird nests, and this might change as invasive species are introduced. When native species

are under threat, such benefits might aid them in recovery. However, this relationship is not entirely beneficial. The deer-resistance of this invasive creates better areas for the white-footed mouse, and this increases ticks. With Japanese barberry living along park trails, lyme disease becomes a greater risk. 2.

3

Green Crab



Green Crab were introduced from Europe to the US in the 1800s. Since then, there has been multiple ways in which the species has evolved. One is the ability to adapt to water temperature changes. 1. A particular risk comes from a very

aggressive hybrid of Canadian green crabs from Nova Scotia. 2. Fishermen are threatened by both green crabs and climate change impact local mussels and softshells like clams. These are massive blows to the local industries as well as the ecosystems. Furthermore, the local habitat is changed as eelgrass is a favored food of the green crabs. Local crabs are pushed out by the more aggressive behavior of the invasive³. Not only does the European green crab pose a threat, but I has now created more acclimated hybrids. Their behavioral competitiveness as well as their ability to adapt to these conditions make them a larger risk. Luckily traps have some success on changing population numbers and preserving eelgrass plots.⁴.

4**Crabs from Canada**



Green crab hybrids are now coming from Canada as a new change as a hybrid.

5

House Birds



House Finch's were introduced in 1939 from the release by a pet store owner. They originally came from the west coast and we brought to Brooklyn from California. they have gone throughout the country, and are able to adapt to both cold and warm environments. Humans also play a role in boosting behavior around bird feeders, changing how the species behaves. They also are able to use this to compete with other species by being territorial around birdfeeders 1. House sparrows were introduced to the US in the 1800s. Their rapid ability to adapt to the environment allowed them to change once introduced. As they

greatly depend on humans, they impact those areas the most. They are also territorial and push out native birds from agricultural areas. They are aggressive in destroying other bird's nests. Frugivores like cedar waxwings eat the fruits of invasive plants, choosing them over the others as important sources of sugar. This relationship could greatly boost the population of both the invasive plant but also the waxwing 1.

6

House Finches



Possibly released in 1939 from a pet shop in Brooklyn, and they were trapped in California.

7 House Sparrows





Coming to New York in the 1800s, possibly as a way to remove pests.

8

Japanese Beetle



Japanese Beetles are It was first found in New Jersey in 1916. From there it spread widely, including to Maine. They like to eat fruits and ornamental plants, so they are a risk to both agriculture and home gardens. Jim Dill, a pest managements specialist at UMaine in 2023 was surprised to see that this species is now seen on new foods that they did not feed on previously. Their wide range of foods they eat regularly now might be expanding to new foods such as azaleas and rhubarb. Japanese beetles are in Lewiston-Auburn, and they have an impact on another invasive, the Japanese Knotweed. They are fighting with native ants for the leaves of this invasive plant, and both native and invasive help pollinate them. Therefore the beetle might be changing the local ants to become territorial, or that they begin to use the same plants at different life stages to avoid competition.

9

Northern Pike



This fish was introduced from Northern America to the Belgrade lake chain in Maine in the 1970s. As predators they eat the local fish, and have been exploding in population. They are a threat to trout and salmon fisheries. They are very popular with Maine fishers so it is easy to get them onboard with fishing this species. However, some still do catch and release and other smaller watersheds are at risk of another fisherman starting the same introduction that occurred in Maine lakes.

10 Purple Loosestrife



This species came from Eurasia in the 1800s. It is a threat to the wetlands of Maine, as it chokes out other species that are important to the habitat. It is very adaptive to differing weather, and did not lose any of its genetic diversity when it invaded the US. With plastic traits where the species is able to respond to its environment, purple loosestrife can adapt quickly without specific genetics needed. Luckily some studies suggest that biological controls using a leaf beetle are effective regardless of its ability to adapt rapidly. It remains to be seen if this is viable for Maine.

11 Native Responses



While invasive species can drastically change the environment around them, adaptation by local species is also possible. Some examples are the Snail *Littorina obtusata* are beginning to learn to hide deeper in their shells when exposed to green crabs. 1. Mussels produce thicker shells when exposed to green crabs 2. Either through behavioral or physical traits, These adaptations are good news as the long time of invasives (green crabs have been in the US almost 200 years) is ample time for some native evolution to take place. Prey

responses means that the species might return to more common dynamics that no longer threaten the entire ecosystem. At the extreme, humans could attempt to genetic engineering or breed these traits to quicken the process.

12 Programs



Friends of Acadia

Friends of Cobossee Watershed

Volunteer organizations assist in the tracking and removal of invasive species

People can out-hunt and out-fish invasive species, we need to make sure they care to

many of these species are ones we enjoy like sparrows and pike. Mainers need to consider if they need to change their behavior to protect more local ones. Especially those that think a little invasive introduction would "help" the local lake.

“In most cases, it’s nearly impossible to remove invasive fish species from the ecosystem once they are established”- James Pellerin, regional fisheries biologist with Maine’s Department of Inland Fisheries and Wildlife. This is a bold claim, but we’ve seen it in action: many of the species shown are examples. we need to consider for the long term, as these species are not always possible to remove. Their adaptation however does give ideas on how they can become more beneficial neighbors.

