

Status of the 5-spine (aka Green) Crab (*Carcinus maenas*) in Coos Bay: Monitoring Report 2025

Shon Schooler¹, Sylvia Yamada², and Kathy Andreasen¹

¹South Slough National Estuarine Research Reserve

²Oregon State University

Summary

Adult five-spine green crab abundance continued to increase in Coos Bay in 2025 with an average catch of 7.1 crabs per trap. The Coos Bay waterfront area, Metcalf Marsh, and Joe Ney Slough are hotspots for 5-spine crabs, perhaps due to habitat structure and food availability. The numbers of 5-spine crabs at many sites are high enough that negative effects are occurring, reducing the abundance of clams, oysters, juvenile native crabs, and eelgrass habitat. The number of new recruits was low in 2025 compared with last year, which was expected due to La Niña ocean conditions. We are starting to see negative correlations between 5-spine crab and Dungeness crab abundance at mid-estuary 5-spine crab hotspots.



South Slough student volunteers, Irelyn Gibbs and Justin Galway, counting 5-spine crabs from Fukui traps at the Valino Island survey site, Coos Bay, Oregon.

Introduction

The 5-spine crab (*Carcinus maenas*) has been transported around the world during the last century and has colonized many temperate coastlines (Behrens Yamada, 2001). The trait best used to distinguish *Carcinus maenas* from other crabs along the west coast of North America are the 5 spines on either side of the eyes. Numerous research studies have examined the biology and ecology of 5-spine crabs and have found the 5-spine crab to be an aggressive invader that negatively effects native species, important estuarine and marine habitats, and fisheries (Behrens Yamada, 2001; Grosholz et al., 2011; Malyshev & Quijo'n, 2011; Garbary et al., 2014; Neckles, 2015; Matheson et al., 2016; Howard et al., 2019; Green and Grosholz, 2021). The 5-spine crab became established in the San Francisco estuary prior to 1989 (Behrens Yamada, 2001). Since then, coastal currents have been seeding 5-spine crab larvae into estuaries of the Pacific Northwest, including Coos Bay (Behrens Yamada et al., 2015). In the past, this migration appears to be linked to strong northwards currents during El Niño years (Behrens Yamada et al., 2015; Behrens Yamada et al., 2021), as indicated by a mixture of high abundance years, low abundance years, and extinction events. However, since 2016 the abundance of 5-spine crabs has been continuously increasing in Coos Bay and is now at levels where negative impacts are expected to occur. The purpose of this project is to monitor changes in 5-spine crab abundance and annual recruitment in the Coos Bay Estuary. The project goals are to: 1) examine changes in adult 5-spine crab abundance among sites and over time, 2) track the abundance of new recruits (young-of-the-year, YOTY), and 3) detect impacts on native crab species.

Methods

At each of the sites (Appendix 1) we set either Fukui fish traps (adult crabs, June – August) and/or crayfish traps (YOTY, September) during morning low tide and retrieved traps at low tide the following morning (24-hour soak time). Sets of traps were set as 6 traps per site (10m between traps). Fukui and crayfish traps were baited with raw tuna enclosed in a plastic bait container and staked in place with a 20-inch steel rod. When traps were retrieved, the number of individuals of each crab species in each trap was recorded. Dungeness crabs (*Metacarcinus magister*), red rock crabs (*Cancer productus*), and shore crabs (*Hemigrapsus oregonensis* and *H. nudis*) were counted and released. When possible, we recorded water quality data (salinity, pH, temperature) at the trap site using a YSI hand-held meter. 5-spine crabs (*Carcinus maenas*) were counted in the field and then brought back to the laboratory and measured for size (carapace width, mm), weight (g), and sex (m/f). Abdomen color and missing limbs were also recorded.

Results

We set 218 crab traps (188 Fukui, 30 crayfish) at 11 sites in Coos Bay from June through September 2025. We captured a total of 1,374 five-spine, 17 Oregon shore, 164 Dungeness, and 4 red rock crabs from all sites for that sampling period.

Abundance among Coos Bay sites:

Adult abundance was compared across sites using the data for the 10 sites sampled using Fukui traps during the summer months (June-August) (Table 1). Crab abundance was highly dependent on site. 5-spine crabs were found at all sites but were most common in the mid to upper estuary sites where adult

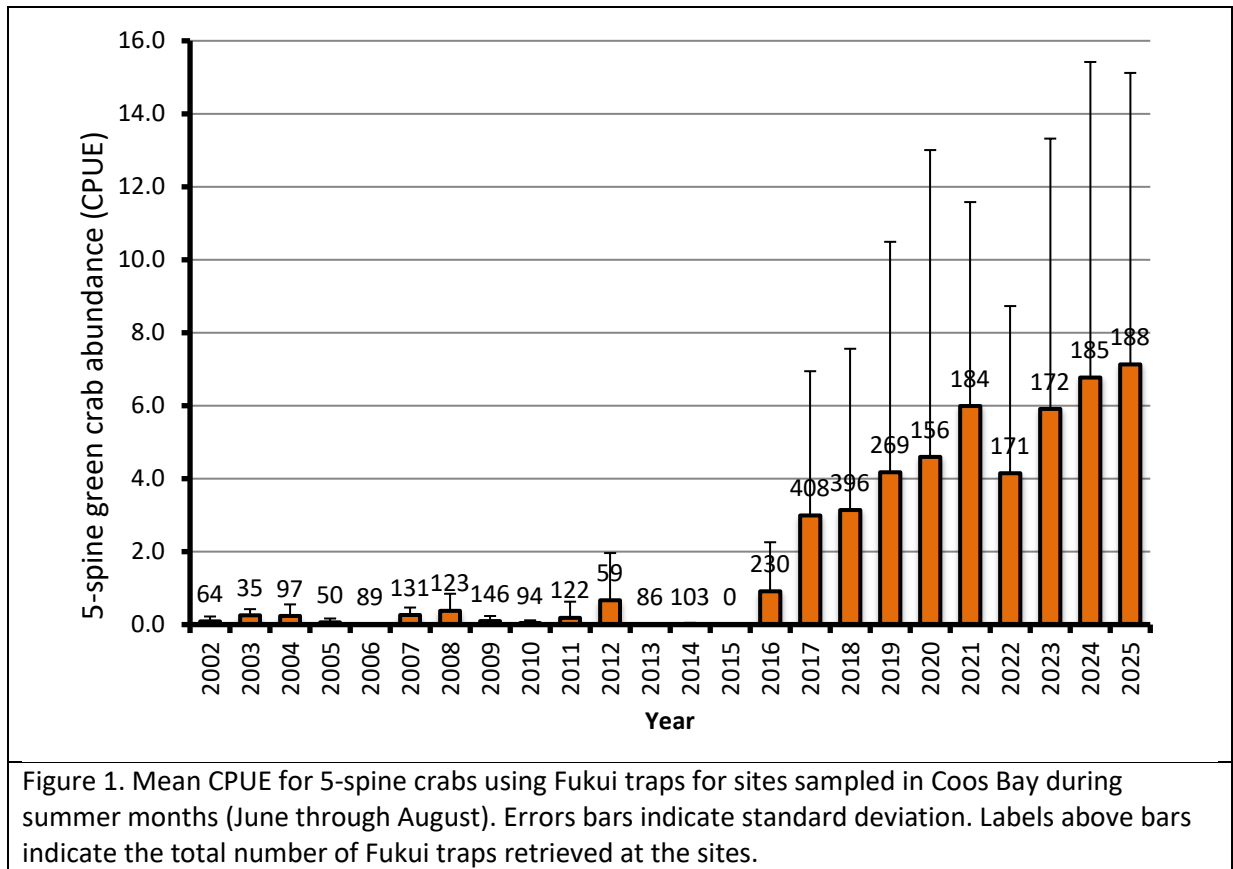
Dungeness and red rock crabs were absent (Coos History Museum, Isthmus Slough, Metcalf Slough, Joe Ney Slough). Red rock crabs were present only at sites lower in the estuary, in 2025 we only captured them at Empire Docks. Adult Dungeness crabs were most abundant at low and mid-estuary sites (Valino Island, Empire Docks, and Charleston Boat Basin).

Table 1. Mean CPUE for the four most common crab species trapped during summer 2025 in Coos Bay using baited Fukui traps (see map for locations, Appendix 1). Sites are ordered by distance from mouth.

Site	Latitude	Longitude	CPUE 5-spine (mean)	CPUE Red rock (mean)	CPUE Oregon shore crab (mean)	CPUE Dungeness (mean)
Coos Estuary						
Charleston Boat Basin	43.34674	-124.32839	2.00	0.00	0.00	0.89
Empire Docks	43.39300	-124.28000	2.09	0.19	0.00	2.97
Transpacific Lane	43.44285	-124.22300	7.89	0.00	0.00	0.13
Coos History Museum	43.37506	-124.21200	25.33	0.00	0.00	0.06
Isthmus Slough	43.35635	-124.19300	16.28	0.00	0.00	0.17
South Slough Estuary						
Metcalf Marsh	43.33393	-124.32700	8.11	0.00	0.00	0.00
Joe Ney Slough	43.33929	-124.31000	5.89	0.00	0.11	0.00
Valino Island	43.31514	-124.32100	1.67	0.00	0.06	4.00
Big Cedar	43.29801	-124.32270	1.61	0.00	0.67	0.00
Hinch Bridge	43.27627	-124.31969	0.39	0.00	0.00	0.00
Average CPUE			7.13	0.02	0.08	0.82

Abundance over time:

One objective is to look at changes in adult 5-spine crab abundance over time. The average 5-spine crab CPUE from Coos Bay sites during summer months (June through August) using Fukui traps has consistently increased in abundance since 2016 through 2025 (Figure 1). There is also an increase in variability in abundance among the sites over the 24-year period (Figure 1, standard deviation).



Variability may be caused by habitat differences among sites and/or presence of predators. The 2025 site data (Table 1) shows the variability in 5-spine crab abundance by site. Figure 2 examines temporal trends at each site. Trends in abundance among sites over time generally match the 2025 site data with consistently more 5-spine crabs at mid to upper estuary sites such as Isthmus Slough, Coos History Museum, Metcalf Marsh, and Joe Ney Slough (Figure 2).

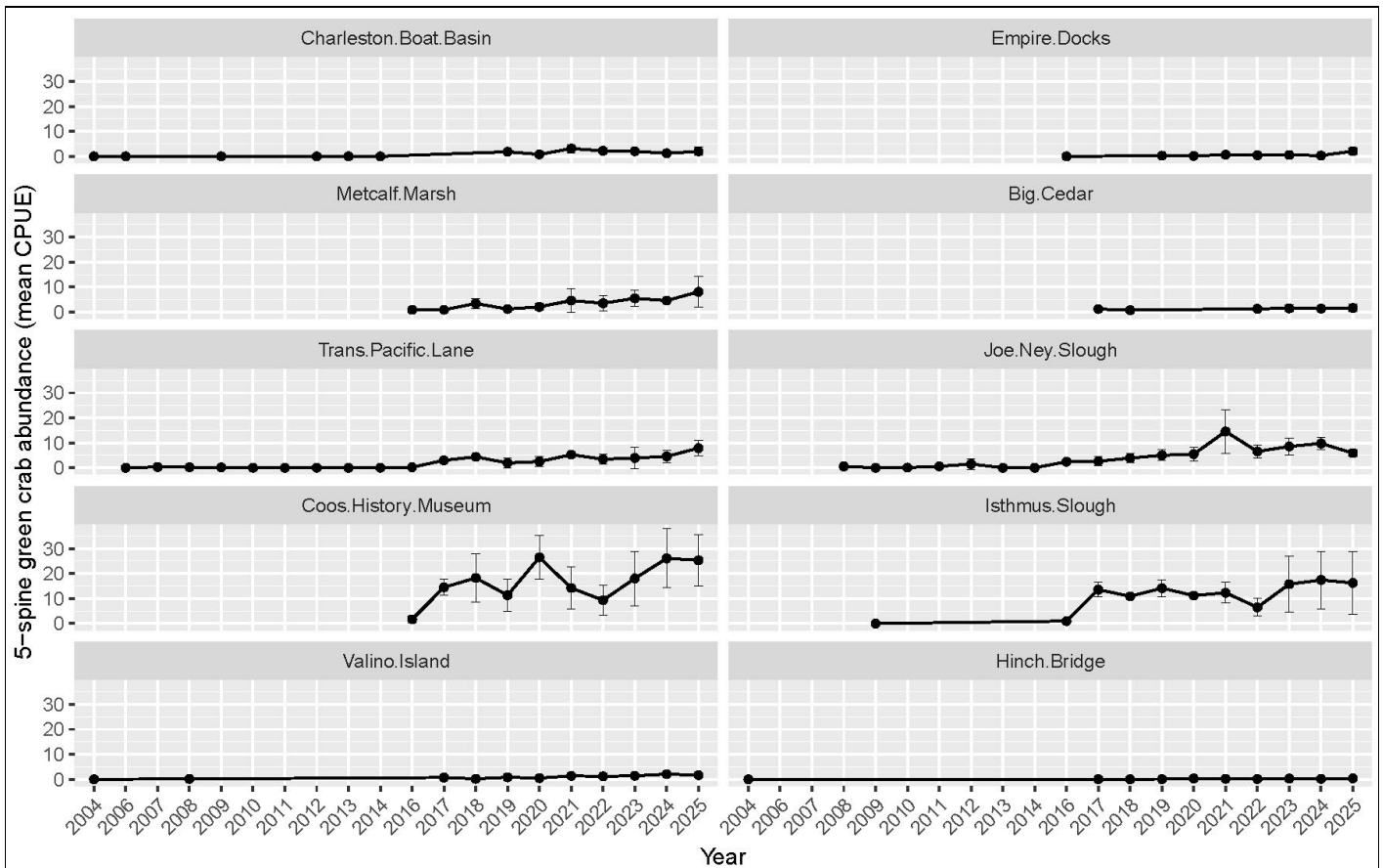
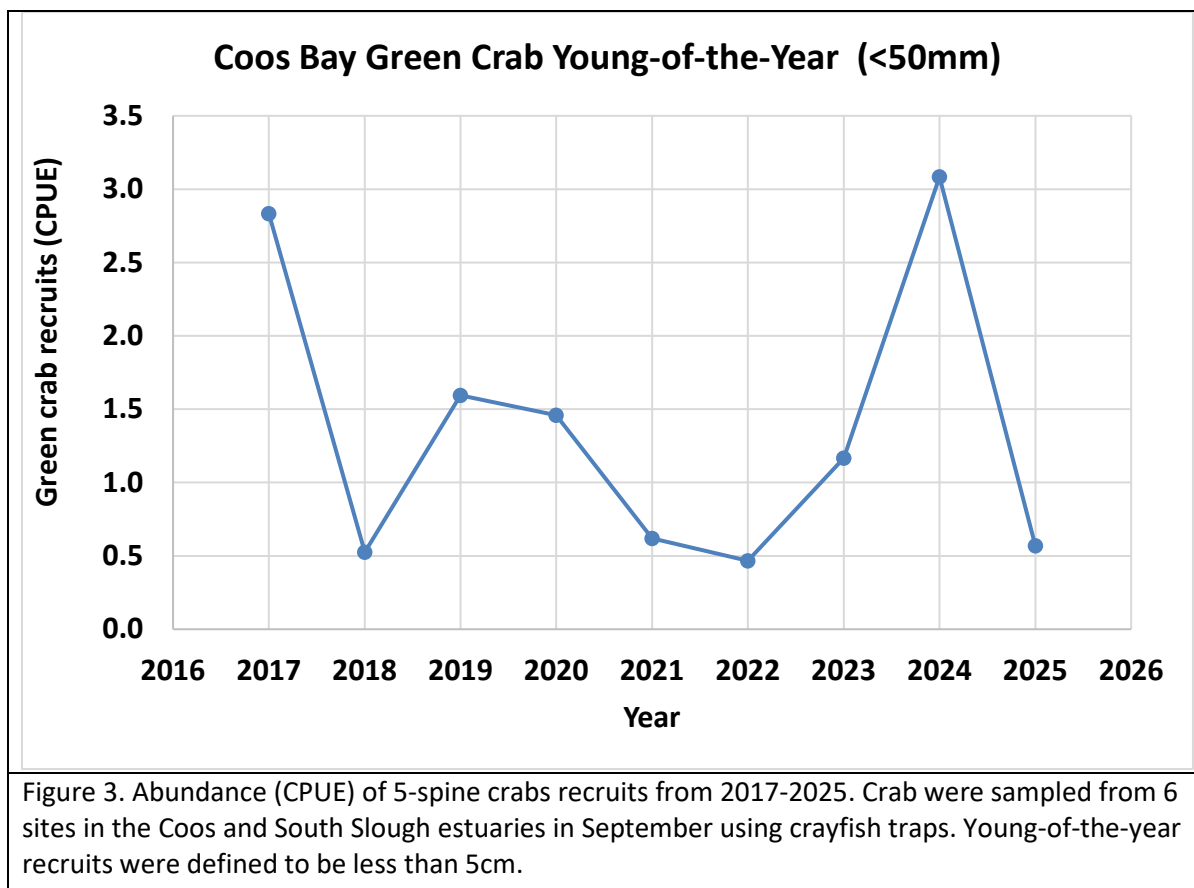
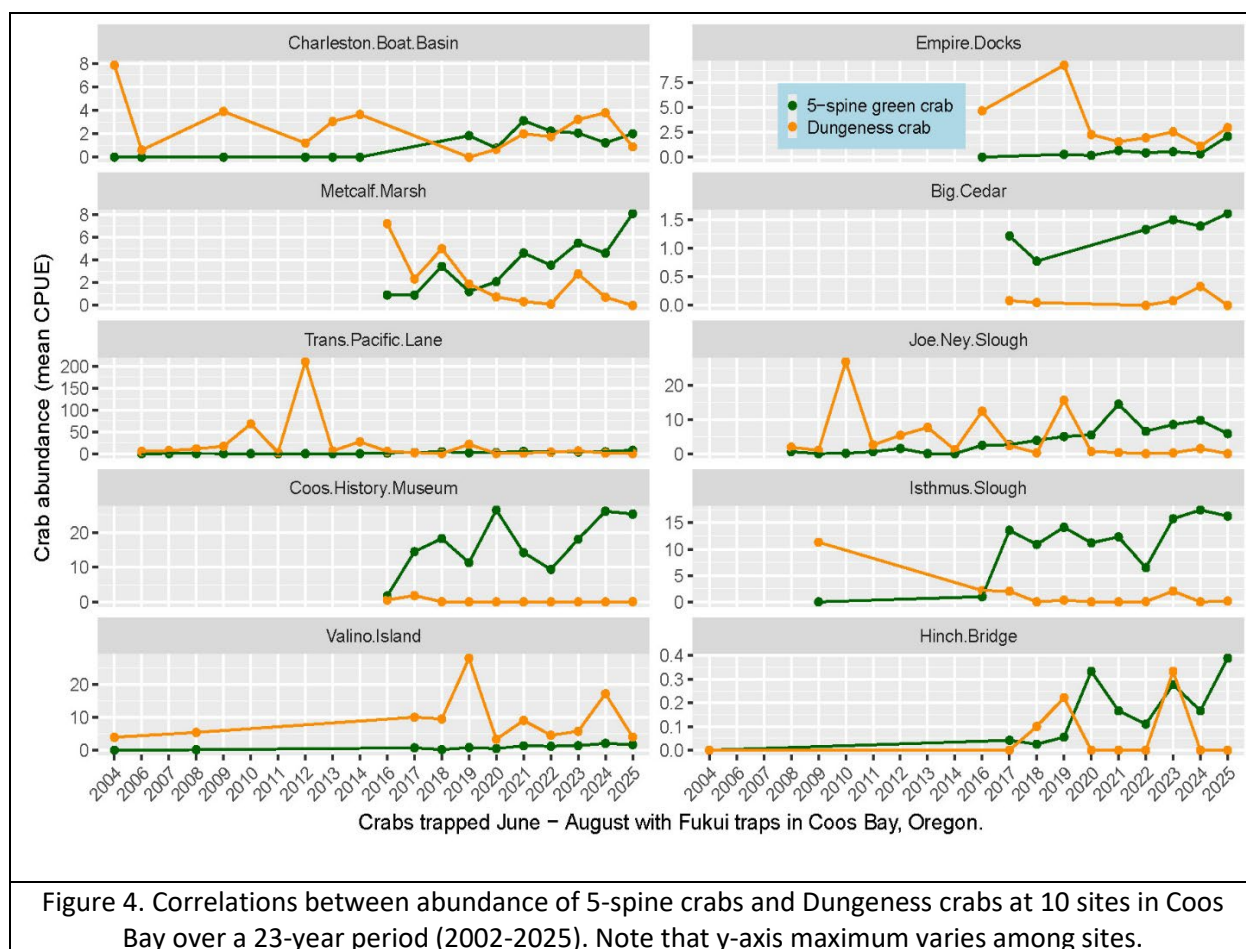


Figure 2. Mean 5-spine crab CPUE at 10 sites in Coos Bay over time trapped using Fukui traps from June – August 2004 through 2025. Error bars indicate standard deviation among sample dates at each site. See Appendix 1 for a maps of site locations.

Recruitment was low (0.6 CPUE) in 2025 based on the catch-per-unit-effort of young-of-the-year recruits (<50mm) recorded in crayfish traps at six sites sampled in September. Recruitment is correlated with ocean conditions from the winter prior to the sampling. Winter 2025 was under La Niña conditions and the recruit abundance was what we would expect under those ocean conditions (Figure 3) (Behrens Yamada, Fisher, and Kosro 2021).



Negative impacts of 5-spine crabs are difficult to quantify due to the difficulty of carrying out experiments in dynamic tidal zones and the natural variability in native crab populations. However, one of the trends we are beginning to see in our monitoring program is a negative correlation between 5-spine crabs and native Dungeness crabs over time in our Fukui trap data, particularly at sites in the mid-estuary region (Figure 4). Although we cannot be certain that the cause of reduced numbers of Dungeness is 5-spine crabs, the result is expected as 5-spine crabs predate on young Dungeness in the upper estuary region where both adult 5-spine crabs and vulnerable young Dungeness crabs are present.



Discussion

Adult 5-spine green crab abundance continued to increase in 2025. Although the average for Coos Bay is still relatively low, populations at some sites, particularly around the Coos Bay waterfront, Joe Ney Slough, and Metcalf Slough are high enough to expect negative effects on shellfish, eelgrass, and smaller native crabs, including Dungeness juveniles. Expected impacts are based on prior experiments and observations as detailed below.

Per capita Impacts of 5-spine Crabs on Shellfish Abundance

The degree of the negative impact of an invasive species is dependent on its density. Researchers have examined the relationship between the abundance of 5-spine crabs and decline in shellfish abundance. They found that negative impacts start between 10 and 20 CPUE (Green and Grosholz, 2021; Grosholz et al, 2011). This indicates we are likely experiencing significant reductions in shellfish abundance in areas of the Coos and South Slough estuaries, primarily in the mid-estuary regions.

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Potential Impact on Bivalves

5-spine crabs are known to negatively affect populations of clams, oysters, and mussels. Studies on the east coast of North America found that 5-spine crabs ate bivalve species including quahogs (*Mercenaria mercenaria*), eastern oysters (*Crassostrea virginica*), blue mussels (*Mytilus edulis*), and soft-shell clams (*Mya arenaria*) (Miron et al., 2005). They found predation on these species across a large range of sizes (0-40mm) with 5-spine crabs preferring to feed on mussels and clams. Therefore, decreasing populations of native clams including littleneck, gaper, butter, and cockles are expected. 5-spine crabs are also expected to negatively affect populations of native Olympia oysters. Several recreational shellfish harvesters have commented to South Slough staff on their observations that shellfish numbers have been declining recently.

5-spine crabs may also affect the farming of Pacific oysters. Oyster farmers have commented to South Slough staff they are finding large numbers of 5-spine crabs in their oyster beds, hiding in the shell and eating and deforming oysters. It was thought that the widespread use of mesh bags for rearing oysters would reduce the ability of 5-spine crabs to access oysters, at least those growing in the interior of the bags. However, oyster farmers have commented they are finding large 5-spine crabs in their mesh bags and believe the crabs colonize bags as megalopa or juveniles and consume oysters as they grow inside of them.

Potential Impact on Eelgrass

Studies along the east coast of North America, where 5-spine crabs have been abundant for decades, have found that the increasing 5-spine crab populations have caused large declines in eelgrass meadows (Malyshev & Quijo'n, 2011; Garbary et al., 2014; Neckles, 2015; Matheson et al., 2016). A recent study along the coast of British Columbia found similar results (Howard et al., 2019). These studies found that 5-spine crabs destroy eelgrass meadows both directly, by eating eelgrass rhizomes, and indirectly, when digging for food (bioturbation). Since eelgrass is an important foundational habitat for many marine and estuarine organisms, we expect to see indirect impacts (secondary effects caused by the loss of eelgrass caused by 5-spine crabs) to these species as their habitat declines. For example, researchers in Newfoundland found a 10-fold decrease in abundance and biomass of fish in beach seines when comparing areas of eelgrass habitat destroyed by 5-spine crabs and nearby eelgrass meadows without 5-spine crabs (Matheson et al., 2016). In addition, 5-spine crabs are known to predate on eelgrass seeds in their native range (Infantes et al., 2016). In summer 2024, South Slough staff and interns conducted experiments and observed 5-spine crabs can eat more than 10 eelgrass seeds per day. In addition, they actively dig seeds from the sediment and they eat significantly more eelgrass seeds than Dungeness crabs (Clark and Schooler, unpublished data).

Potential Impact on Dungeness Crab

The greatest increase in 5-spine crab abundance is at mid to upper estuary sites where adult Dungeness and red rock crabs are absent or in low abundance. However, juvenile Dungeness crabs tend to forage in upper and mid estuary nursery sites. For example, in 2018 we captured over 200 juvenile Dungeness crabs per seine sample in both September and October in the upper reaches of South Slough (Sengstacken arm near Elliot Creek). In 2025 we captured in excess of 200 juvenile Dungeness crabs in seine nets at sites near Valino, Elliot Creek, Hidden Creek, and Younker Point. Previous research found 5-spine crabs displace juvenile Dungeness crabs from desirable sheltered habitats, which increases their chance of being preyed upon (McDonald et al., 2001). 5-spine crabs also consistently win nocturnal foraging trials over juvenile Dungeness crabs (McDonald et al., 2001). The authors conclude that 5-spine crabs could negatively impact the Dungeness crab fishery as 5-spine crabs encroach on juvenile Dungeness crab nursery habitat, such as what is currently happening in Coos Bay. In support of this hypothesis, we observed negative trends between 5-spine crabs and Dungeness abundance in mid-estuary habitats where adult 5-spine crabs and juvenile Dungeness crabs are present. In addition, a 2019 study conducted by South Slough National Estuarine Research Reserve researchers found that red rock crabs prefer to predate on juvenile Dungeness crabs over 5-spine crabs of the same size, indicating that predation by adult red rock crabs might reduce 5-spine crab abundance, but will not necessarily be favorable to Dungeness crab populations (Heller and Schooler, unpublished data). As described above, as 5-spine crabs increase in abundance, they will also destroy eelgrass habitat, which is a favored habitat of juvenile Dungeness crabs.

More research is needed to: 1) determine the potential impacts of 5-spine crabs (per capita impact) on important estuarine fisheries, species, habitats, and food webs, 2) evaluate reasons for high variability in 5-spine crab abundance, 3) determine sources of recruitment of 5-spine crabs, and 4) identify and study management options.

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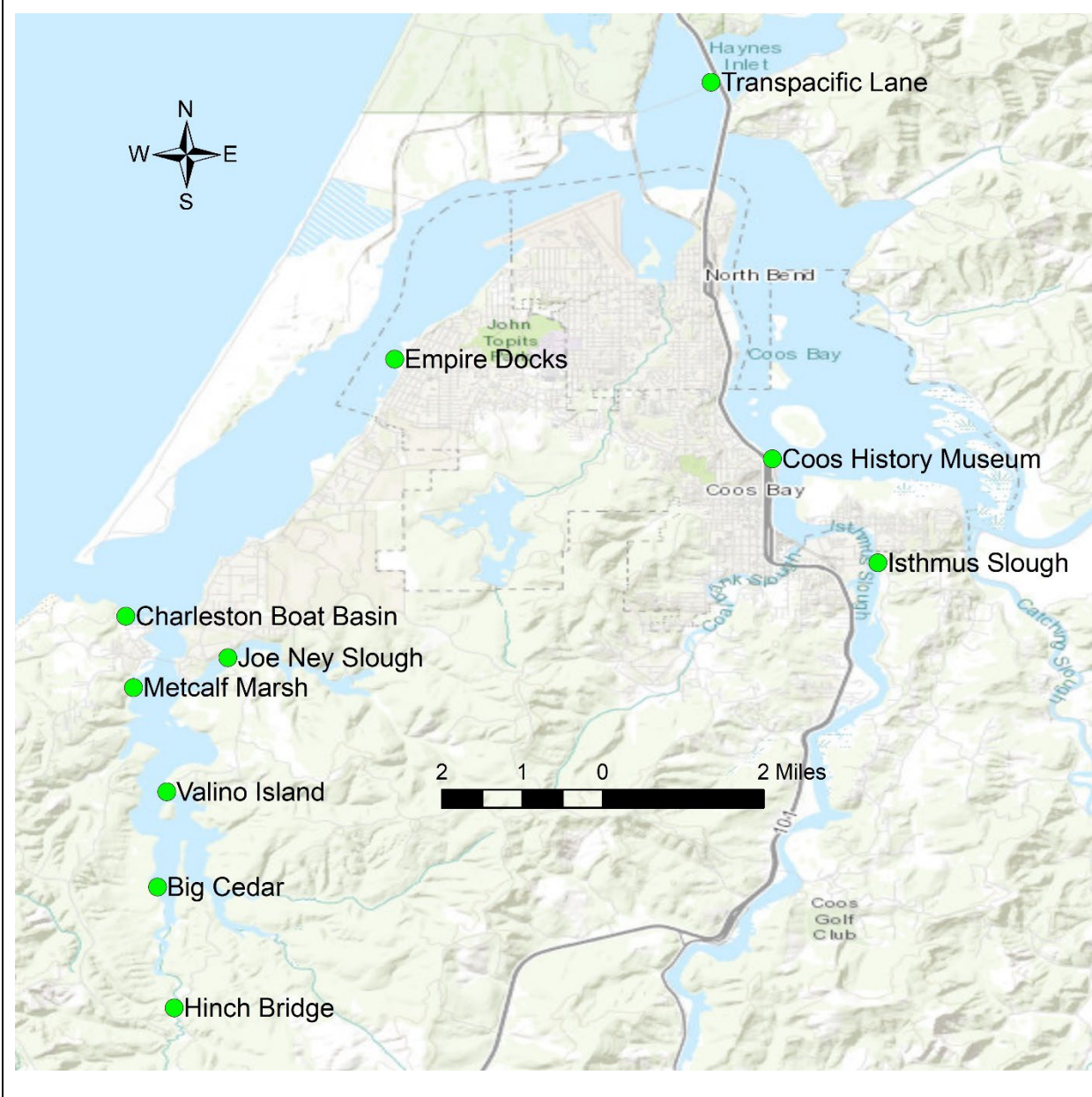
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Appendix 1. Map of the 10 adult 5-spine crab annual sampling sites in Coos Bay.



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