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CRABS, CLAMS, AND THE CORPS:
REGIONAL REALITIES AND THE FEDERAL FRAMEWORK

*Jessica Hollenkamp**

Since the invasive European green crab was first detected in the Gulf of Maine over one hundred years ago, its population has dramatically increased, resulting in devastating consequences. This predatory species is remarkably resilient and voracious, feeding on hard- and soft-shell clams, blue mussels, and other bivalve shellfish. There are even reports that the green crab poses a threat to Maine's most lucrative fishery – the lobster. As the green crab makes its nests in the intertidal zone and subtidal habitats, it destroys native resources such as eelgrass beds and mudflats. Maine's economy relies heavily on its well-known fishing industry – not only as a draw for tourists, but also for Mainers who make their living off the sea. The direst predictions estimate that the clamming industry, Maine's third most profitable fishery, will be completely decimated within two years. Dr. Brian Beal, a marine ecologist from the University of Maine, posed it simply: "How do you have a clambake without any clams?"

Unfortunately, it is impossible to eradicate green crabs. Clam fishermen have begun evolving from a hunter and gatherer mindset to a farming mindset. The methods of fencing, netting, trapping, or a combination thereof have proven successful at mitigating the effects of green crab predation on soft-shell clams. Although it is not possible to net or fence the thousands of miles of Maine's coastline, clambers can net or fence small plots to save their industry. However, one obstacle stands in their way: the U.S. Army Corps of Engineers' permitting process. The U.S. Army Corps of Engineers (the Corps) is the federal agency responsible for regulating the nation's navigable waters. Any structure that is deemed an obstruction to navigation is unlawful without a permit. Clammers claim that the Corps is inflexible in its issuance of fencing permits, and dispute claims that netting is an obstruction to navigation. If the clamming industry turns to a farming model, then these differences in opinion regarding permitting requirements will come to a head.

Part I of this paper explains the origin and effects of the European Green Crab on the soft-shell clam industry. Part II discusses the U.S. Army Corps of Engineer's regulatory framework. Finally, Part III attempts to reconcile the concerns of clambers and the authority of the Corps.

I. EUROPEAN GREEN CRABS AND SOFT-SHELL CLAMS

A. Introduction

The European green crab, *Carcinus maenas*, is one of the most successful invasive predators in coastal marine systems in the world.¹ Native to Western Europe and northwestern Africa,² the green crab is an Aquatic Nuisance Species on five continents.³ Aquatic Nuisance

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¹ Edwin Grosholz and Gregory Ruiz, *Management Plan for the European Green Crab Submitted to the Aquatic Nuisance Species Task Force*, at 3 (Nov. 13, 2002) [hereinafter Grosholz].

² Deborah R. Holmes, *The Green Crab Invasion: A Global Perspective, with Lessons from Washington State*, at 4 (Sept. 2001) (unpublished thesis, Evergreen State College) (on file at Evergreen State College library) [hereinafter Holmes].

³ Grosholz, *supra* note 1.

Species are aquatic and terrestrial organisms that produce harmful impacts on natural resources when introduced into non-native habitats.⁴ The Aquatic Nuisance Species Task Force, an intergovernmental organization co-chaired by the U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration,⁵ has deemed the European green crab to be “one of the most ecologically potent and economically damaging predators . . . of both eastern and western North America.”⁶

The green crab has been an established invader for at least 180 years on the Atlantic coast of the United States.⁷ It is estimated that ships carrying goods from Europe over the major transatlantic trade routes in the early nineteenth century likely brought the green crab to America’s shores.⁸ Several different mechanisms, including solid ballast and ballast water, would have made it possible for the green crab to survive the long voyage.⁹ The green crab first landed in the Mid-Atlantic region where it then migrated to northern waters.¹⁰ The eight-legged creature was spotted off the coast of Cape Cod in 1872, southern Maine in the 1890s, and at the Canadian border in 1951.¹¹

Green crabs are remarkably resilient in all types of environments, reproduce in alarmingly large numbers, and aggressively outcompete native species for food. They can survive in nearly all types of marine and estuarine habitats, including mud, sand, rock, cordgrass marshes, and eelgrass beds.¹² Moreover, green crabs can survive in water with a broad salinity range and extremely high and low temperatures,¹³ and even out of water for more than ten days at summer temperatures.¹⁴ There have even been improbable sounding anecdotal reports. For example, one fisherman reported that green crabs had survived for a month in a bucket without food or water, and another claimed that green crabs abandoned in fish totes in October were still alive in April.¹⁵ Although green crabs are able to tolerate freezing temperatures, there is evidence that suggests

⁴ AQUATIC NUISANCE SPECIES TASK FORCE, <http://www.anstaskforce.gov/default.php> (last visited Oct. 23, 2014).

⁵ *Id.* The Task Force implements the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 and the National Invasive Species Act of 1996.

⁶ Grosholz, *supra* note 1, at 5.

⁷ *Id.* at 3.

⁸ James Carlton & Andrew Cohen, *Episodic global dispersal in shallow water marine organisms: the case history of the European shore crabs *Carcinus maenas* and *C. aestuarii**, 30 J. OF BIOGEOGRAPHY 1809, 1810 (2003) [hereinafter Carlton].

⁹ *Id.* at 1813. Large ships often carry millions of gallons of water in order to maintain stability in ocean and coastal waters. Ballast water is siphoned into tanks at the port of origin and then discharged at the destination port. L. David Smith, *Ballast Water*, MIT SEA GRANT RESOURCES, <http://massbay.mit.edu/exoticspecies/ballast/index.html> (last visited Apr. 19, 2016).

¹⁰ Carlton, *supra* note 8.

¹¹ *Id.* at 1810.

¹² Holmes, *supra* note 2.

¹³ *Id.*

¹⁴ Laurie Schreiber, *Green Crabs*, 19.1 FISHERMEN’S VOICE, at 4 (Jan. 2014) [hereinafter Schreiber].

¹⁵ Elizabeth Royte, *Clawing Their Way to the Top*, ON EARTH, at 2, Oct. 7, 2014 [hereinafter Royte].

frigid temperatures may suppress the reproductive season.¹⁶ The towns of Brunswick and Freeport reported fewer numbers of green crabs after the long, cold winter of 2014 than in the previous two years.¹⁷ In Maine, mating season generally occurs during the warmer months from July to October.¹⁸ Female crabs can spawn as many as 185,000 eggs at a time, and larvae grow and develop into juvenile crabs in only two weeks.¹⁹ Green crabs reach maturity within two to three years, but can live as long as seven years²⁰, and may breed up to three times a year.²¹ Their survival and reproductive capabilities make them a deadly competitor when pitted against native species.

B. Effects of Green Crabs on Native Animal Species

In addition to its survival and reproductive capabilities, the European green crab is physically superior and has an indiscriminate appetite. Their rear legs enable them to move quickly across mudflats,²² and there have even been reports of green crabs standing on their hind legs “presumably for increasing their visibility.”²³ Also, green crabs are able to open the shells of its prey more quickly and deftly than other crab species.²⁴ The green crab uses these skills to feast on more than 100 species,²⁵ including clams, oysters, snails, other crabs, mussels, barnacles, and algae.²⁶ Green crabs also eat lobster bait, juvenile lobsters and lobster larvae which is especially concerning given that Maine’s lobster industry generates \$364 million annually.²⁷ To further exacerbate the problem, “one laboratory experiment found that green crabs beat lobsters to a food source every time, and that lobsters were only able to displace the crabs in two of sixty-five attempts.”²⁸ For example, lobsters eat barnacle meat by crushing its shell, but a green crab is not only able to crush its shell, it can also chip away at the shell and pry it open.²⁹ Therefore, the green crab is not only outcompeting native species for food, but is simultaneously eating the native

¹⁶ James Niedzinski, *Battle plans for green crab*, GLOUCESTER DAILY TIMES, Mar. 6, 2014, available at http://www.gloucestertimes.com/news/local_news/battle-plans-for-green-crab/article_ae98c976-9da7-5a46-bf14-cadd448a67c3.html [hereinafter Niedzinski].

¹⁷ Royte, *supra* note 15.

¹⁸ Holmes, *supra* note 2, at 6.

¹⁹ *Id.*

²⁰ Niedzinski, *supra* note 16.

²¹ Holmes, *supra* note 2, at 6.

²² *Id.* at 7.

²³ *Id.*

²⁴ *Id.*

²⁵ Brian F. Beal, *Has the DMR gone mad over green crab harvesting?*, BANGOR DAILY NEWS, Jul. 25, 2001, available at <http://archive.bangordailynews.com/2001/07/25/has-the-dmr-gone-mad-over-green-crab-harvesting/> [hereinafter Beal].

²⁶ Holmes, *supra* note 2, at 6.

²⁷ Royte, *supra* note 15.

²⁸ Edgar Allen Beem, *Will Carcinus maenas destroy Maine’s \$15 million soft-shell clam industry?*, DOWN EAST, available at <http://www.downeast.com/green-crab-invasion/> [hereinafter Beem].

²⁹ Royte, *supra* note 15.

populations. Lobstermen have moved their traps and gear to the refuge of deeper waters in order to escape the clutches of the green crab³⁰, but the green crab has spread to deeper waters as well.³¹

In addition to lobster, Maine's coast is home to the soft-shell clam. The clamming industry is the third largest fishery for the Pine Tree State and generates approximately \$17 million per year.³² Although that is just a fraction of the lobster industry, it is a sizeable sum for the 1,600 licensed clammers and for the local businesses and processors that depend on them.³³ Twenty years ago a bushel of clams cost just \$30-\$40, but in 2013 that price soared to \$110 per bushel due to the scarcity of clams.³⁴ Maine's Department of Marine Resources "reported that between 2012 and 2013, the state's soft-shell clam landing declined from 11.1 million pounds to 10.6 million pounds", and "attributed at least part of the decline to destruction by green crabs."³⁵ Unbelievably, one green crab can eat as many as forty young shellfish per day.³⁶ Clammers have been able to sustain the size of the annual catch, but only because they are harvesting from much wider areas.³⁷ As clammers scramble to expand their harvesting range, green crabs appear to be expanding the range of conditions they can tolerate.³⁸ The devastation to clam, lobster and other shellfish populations poses a serious threat to Maine's economy, ecology and even its culture and customs.³⁹

C. *The Green Crab Population Explosion of the 1950s*

This is not the first time that the green crab has reared its carapace. In 1938, a record number of soft-shell clams were harvested in New England (14.5 million pounds).⁴⁰ However, in 1959, fishermen produced a mere 2.3 million pounds.⁴¹ Scientists believe that an increase in the ocean temperature in the 1950s led to a green crab population increase, devastating the soft-shell clam industry.⁴² The reduced numbers caused many clammers to either leave the industry entirely or leave in part.⁴³ After the colder winters of the 1960s, the green crab population was significantly

³⁰ Schreiber, *supra* note 14.

³¹ Royte, *supra* note 15.

³² Wanda Curtis, *More Markets Explored*, THE WORKING WATERFRONT, Sept. 23, 2014 [hereinafter Curtis].

³³ Royte, *supra* note 15.

³⁴ *Id.*

³⁵ Curtis, *supra* note 32.

³⁶ Holmes, *supra* note 2, at 9.

³⁷ Royte, *supra* note 15.

³⁸ *Id.*

³⁹ *Id.* Brunswick's town seal features the images of a logger, a professor, and not one but *two* clammers.

⁴⁰ Holmes, *supra* note 2, at 8.

⁴¹ *Id.*

⁴² MAINE DEPARTMENT OF MARINE RESOURCES, <http://www.maine.gov/dmr/greencrabs/intro.htm>, (last visited Oct. 4, 2014) [hereinafter DMR].

⁴³ Beal, *supra* note 25.

reduced enabling the clammers to make a comeback.⁴⁴ The cold winter temperatures of 2014 appear to have kept the green crab population numbers at bay.⁴⁵

D. Effects of Green Crabs on Native Plant Species and Habitats

Eelgrass beds are an essential part of Maine's coastal habitat. Mostly composed of green fronds, eelgrass beds provide nurseries for many types of fish and other sea creatures as well as sustenance for wading birds.⁴⁶ Eelgrass beds are not just essential to animal populations, but they also protect the environment. The plants curtail water pollution by absorbing nutrients and protect shorelines by slowing currents and lessening wave energy.⁴⁷



*Bank erosion caused by green crab burrows.*⁴⁸

Green crabs are as destructive to the shoreline as they are to native populations. They have been referred to as an “ecological catastrophe”⁴⁹ causing “complete devastation.”⁵⁰ The green

⁴⁴ DMR, *supra* note 42.

⁴⁵ Beth Brogan, *Midcoast researchers prepare for new battle with invasive green crabs*, BANGOR DAILY NEWS, Jul. 2, 2014.

⁴⁶ Royte, *supra* note 15.

⁴⁷ *Id.*

⁴⁸ *2013 Field Trials*, DOWNEAST INSTITUTE, <http://www.downeastinstitute.org/2013-field-trials.htm> (last visited Mar. 24, 2015) (hereinafter DEI).

⁴⁹ Beem, *supra* note 28.

⁵⁰ Schreiber, *supra* note 14.

invader cuts through eelgrass blades and loosens the plants' roots as it hunts prey.⁵¹ In the past fifteen years, the eelgrass beds of Casco Bay have been reduced by 58%,⁵² and about 2,500 acres have disappeared from Maquoit Bay.⁵³ Green crabs have even dislodged eelgrass beds the size of houses that can be seen floating in Maine's bays.⁵⁴ The Damariscotta River has also suffered from the green crab invasion: severe erosion, unstable marsh, clipped grass, and overhanging marsh "flaps" at the edges of the river's banks are just a few examples of the devastation.⁵⁵ Since the arrival of the green crab, lush, green meadows have been replaced with barren, gray mudflats.⁵⁶ Nova Scotia, Maine's northern neighbor, has also experienced a decline in eelgrass beds, and even sedimentation and desertification.⁵⁷ Ecologist Chris McCarthy noted that the beauty above the surface belies the poor conditions beneath it.⁵⁸

E. Control methods

Green crabs are ferocious predators, but they are not without enemies. Striped bass, flounder, and sea gulls prey on green crabs.⁵⁹ However, these natural predators are less effective on the larger varieties of green crab.⁶⁰ "[I]n their native European habitat . . . disease, parasites, and competition" keep green crab populations in check.⁶¹ The castrating barnacle renders both male and female green crabs unable to reproduce, but the barnacle has not been imported to Maine as a solution to the green crab problem.⁶² When the parasitic castrator was introduced on the West Coast, it also infected native crab species.⁶³

1. Creation of a Sustainable Market

Creating a sustainable market is a frequently circulated proposal to solve an invasive species problem. Profiting from invasive species has been tried with varying degrees of success with other animals including lionfish, wild boar, nutria, bullfrog, and northern snakehead.⁶⁴

⁵¹ Royte, *supra* note 15.

⁵² *Id.*

⁵³ Schreiber, *supra* note 14.

⁵⁴ Beem, *supra* note 28.

⁵⁵ Schreiber, *supra* note 14.

⁵⁶ Royte, *supra* note 15.

⁵⁷ Schreiber, *supra* note 14.

⁵⁸ *Id.*

⁵⁹ Rick Dumont, *Green Crabs in Maine threatening economy, ecosystem; less so in N.H.*, FOSTERS, Dec. 1, 2013, available at http://www.fosters.com/apps/pbcs.dll/article?AID=/20131201/GJNEWS_01/131209969/0/fosnews1401&Template=printart.

⁶⁰ Niedzinski, *supra* note 16.

⁶¹ Schreiber, *supra* note 14.

⁶² *Id.*

⁶³ Gary L. Ray, U.S. ARMY CORPS OF ENGINEERS, *Invasive Animal Species in Marine and Estuarine Environments: Biology and Ecology*, at 26 (2005), available at <http://el.erdc.usace.army.mil/elpubs/pdf/trel05-2.pdf>.

⁶⁴ Royte, *supra* note 15.

Fisheries created in response to other invasive species, such as sea urchins, whelks, and sea cucumbers, were boom-and-bust ventures.⁶⁵ Green crab meat is “thought to be useful as bait for the lobster fishery, and for compost and fertilizer,”⁶⁶ but finding a market for green crabs has proven difficult, if not impossible. An entrepreneur from New Brunswick, Ron Howse, developed a plan to export live green crabs to Asia which is known for having an appetite for seafood.⁶⁷ He expected overseas wholefood buyers to purchase the green crabs for thirty to thirty-five cents a pound.⁶⁸ Howse hoped to purchase “a 3,500-square-foot plant in Sullivan to process green crabs . . . [and] plan[ned] to hire up to 80 people. . . .”⁶⁹ He further stated that he has deals with forty fishermen and a letter of intent with a frozen food company to buy green crab meat for further resale.⁷⁰ Howse had hoped to open in 2015,⁷¹ however, his plan has been placed on hold several times.⁷²

A Maine shellfish harvester, Rachel Huntley, attempted to develop a market in 2013, but also had little success.⁷³ Buyers in the bait market were willing to purchase the green crab, but after expenses, Huntley only earned about twenty cents per pound which was not enough money for the physical effort required to harvest them.⁷⁴ Similarly, a North Carolina company purchased 22,000 pounds of green crabs from Boothbay Harbor-area harvesters for making cat food.⁷⁵ Due to the high costs of packaging and transporting the crabs from Maine to North Carolina, the company was only able to pay shellfish harvesters twenty-five cents per pound.⁷⁶ The partnership was not able to continue because twenty-five cents per pound was not enough money to pay for fishermen’s basic harvesting costs.⁷⁷

A retired science teacher and businessman, John Der Kinderen, received a grant to determine the “feasibility of marketing both shells and meat from green crabs.”⁷⁸ Der Kinderen claims to have found equipment that can extract chunk meat from green crabs that are at least two inches in length.⁷⁹ Unfortunately, most of the green crabs are smaller than this minimum

⁶⁵ Beal, *supra* note 24.

⁶⁶ Schreiber, *supra* note 14.

⁶⁷ Royte, *supra* note 15.

⁶⁸ *Id.*

⁶⁹ Jennifer Van Allen, *Effort on to prevent green crab invasion in Maine*, PORTLAND PRESS HERALD, Jul. 12, 2014, available at <http://www.pressherald.com/2014/07/12/some-claws-for-alarm-green-crabs/> [hereinafter Van Allen].

⁷⁰ *Id.*

⁷¹ *Id.*

⁷² Royte, *supra* note 15.

⁷³ Schreiber, *supra* note 14.

⁷⁴ *Id.*

⁷⁵ Beth Brogan, *NC firm encourages Maine fishermen to sell invasive green crabs to be processed into cat food*, BANGOR DAILY NEWS, Aug. 15, 2014, <http://bangordailynews.com/2014/08/15/news/portland/nc-firm-encourages-maine-fishermen-to-sell-invasive-green-crabs-to-be-processed-into-cat-food/> [hereinafter Brogan].

⁷⁶ *Id.*

⁷⁷ *Id.*

⁷⁸ Curtis, *supra* note 32.

⁷⁹ *Id.*

requirement and have very little meat.⁸⁰ Der Kinderen also explored the possibility of marketing chitin, a sugar found in the shell that has been used for medical purposes, including treating battle wounds in Iraq and Afghanistan and even reconstructive surgery.⁸¹ The reduction in the green crab population from 2013 to 2014 is promising, but if the trend continues then it is even less likely that creating a sustainable market will be successful.

Although there is some promise that green crabs can be ground to make a high-quality organic fertilizer,⁸² a limited number of green crabs can be composted.⁸³ Nova Scotian green crab fishermen have earned as much as \$100 for one hundred pounds of green crabs to be used as lobster bait.⁸⁴ The crabs are spiked live and placed inside lobster traps, but only large crabs are able to be spiked.⁸⁵ Massachusetts State Senator Bruce Tarr has suggested employing a limited number of people during the summer to trap the green crab.⁸⁶ Tarr estimates that a \$10,000 to \$30,000 short-term investment could be worthwhile when considering the long-term threat.⁸⁷ However, Tarr added that the possibility of commercial markets should be explored before government involvement.⁸⁸

In 2001, then-Governor Angus King signed into law “An Act to Establish a Commercial Green Crab Fishing License,” which required individuals to purchase licenses costing between \$33 and \$66, depending on residency, for harvesting and selling green crabs for human consumption.⁸⁹ The bill also created a management fund for the regulation of a green crab fishery.⁹⁰ There was some concern at the time that the law would encourage the sustainment of an invasive species when it ought to be discouraged.⁹¹ Clearly, the license did not promote the creation of a sustainable green crab fishery in Maine, nor did it make eradicating green crabs any easier. In August 2014, the Maine Department of Marine Resources (DMR) eliminated the license requirement based on the recommendation of the Green Crab Task Force created by Governor Paul LePage.⁹² The DMR made other changes including allowing green crab bycatch by lobstermen, selling green crabs without a license, eliminating reporting requirements, and permitting green crab harvesting in certain waters that are closed to other types of crabbing during the winter months.⁹³ Moreover, the DMR has focused its regulatory efforts on monitoring, containing, and

⁸⁰ *Green Crab Invasion Mitigation*, MAINE CLAMMERS ASSOCIATION, <http://maineclammers.org/what-we-do/war-on-invasive-green-crabs/green-crab-invasion-mitigation/> (last visited Mar. 4, 2015) [hereinafter MCA].

⁸¹ Schreiber, *supra* note 14.

⁸² MCA, *supra* note 80.

⁸³ Schreiber, *supra* note 14; Brogan, *supra* note 75.

⁸⁴ Beem, *supra* note 28.

⁸⁵ *Id.*

⁸⁶ Niedzinski, *supra* note 16.

⁸⁷ *Id.*

⁸⁸ *Id.*

⁸⁹ Beal, *supra* note 25; 12 M.R.S.A. §6808 (2014).

⁹⁰ Beal, *supra* note 25.

⁹¹ *Id.*

⁹² Anne Berleant, *DMR eases rules on green crab harvesting*, PENOBSCOT BAY PRESS, Aug. 28, 2014 [hereinafter Berleant]; Van Allen, *supra* note 69.

⁹³ Berleant, *supra* note 92.

reducing green crab populations rather than on management of a sustainable commercial fishery.⁹⁴ The Maine Clammers Association also remains cautious of creating a sustainable market.⁹⁵ According to most experts in the field, any effort that encourages the continued existence of green crabs should not be pursued.⁹⁶

2. Trapping, Netting, and Fencing

Many studies have been conducted and hundreds of thousands of dollars have been spent on the study of green crab mitigation.⁹⁷ The town of Freeport has taken the lead in Maine in devoting resources to protecting the soft-shell clam industry from green crabs.⁹⁸ In 2012, Freeport allocated over \$100,000, the largest ever financial allocation by a municipality, to a comprehensive research project.⁹⁹ One of the primary goals of the “Shellfish Restoration Project” was to understand how trapping, netting, and fencing can reduce green crab predation of juvenile clams.¹⁰⁰ The DMR previously defined a “green crab trap” as “a trap, pot or other stationary contrivance or device that may be set on the ocean bottom and used for taking green crabs.”¹⁰¹ According to the Freeport project, the most critical factors for successful trapping are trap location and the ability to keep the trap baited.¹⁰² Additionally, trapping during the winter months when green crabs cluster together in deeper waters should be a priority.¹⁰³ While an intensive focus on trapping has the potential to reduce populations, “tending these traps is incredibly time consuming, and Maine has 4,000 miles of coastline to defend.”¹⁰⁴

⁹⁴ DMR, *supra* note 42.

⁹⁵ MCA, *supra* note 80.

⁹⁶ *Id.*

⁹⁷ Six separate studies in Freeport, funded by more than \$550,000 in grants and \$165,000 from the town of Freeport were led by Dr. Brian Beal. Other projects, funded by the state and non-profit organizations, took place in the southern midcoast towns of Harpswell, West Bath, and Brunswick. Beth Brogan, *Midcoast researchers prepare for new battle with invasive green crabs*, BANGOR DAILY NEWS, Jul. 2, 2014, <http://bangordailynews.com/2014/07/02/news/midcoast/midcoast-researchers-prepare-for-new-battle-with-invasive-green-crabs/>.

⁹⁸ MCA, *supra* note 80.

⁹⁹ Brendan Twist, *Researcher: Little learned from \$100,000 green crab studies in Freeport*, BANGOR DAILY NEWS, Jan. 29, 2014, <http://bangordailynews.com/2014/01/29/news/midcoast/researcher-little-learned-from-100000-green-crab-studies-in-freeport/> [hereinafter Twist].

¹⁰⁰ Brian F. Beal, DOWNEAST INST. FOR APPLIED MARINE RESEARCH & EDUC., *Final Report, Green Crab, Carcinus maenas, Trapping Studies in the Harraseeket River, and Manipulative Field Trials to Determine Effects of Green Crabs on the Fate and Growth of Wild and Cultured Individuals of Soft-Shell Clams, Mya arenaria (May to November 2013)*, at 2 (2014), available at http://www.downeastinstitute.org/assets/files/manuals/1_24-Final-Report---Freeport-Shellfish-Restoration-Project---B.-Beal.pdf.

¹⁰¹ DMR 25.40(B)(1)(b).

¹⁰² MCA, *supra* note 80.

¹⁰³ *Id.* Trapping green crabs in the summer is more difficult because they are spread out on the flats.

¹⁰⁴ Royte, *supra* note 15.

The DMR began holding formal talks about green crabs in early 2013.¹⁰⁵ Although the DMR was aware of the species existence, the extent of the problem was unknown.¹⁰⁶ In order to find out, the DMR coordinated volunteers from around the state to participate in a one-day green crab trapping survey.¹⁰⁷ The purpose was to provide the DMR with a general understanding of the abundance and distribution of green crab populations along the coast of Maine and to alert municipal shellfish program officials and industry members to the presence of green crabs in their harvest areas.¹⁰⁸ “Volunteers from 28 towns captured nearly 19,000 medium-to-large specimens; the smaller ones escaped.”¹⁰⁹ Although there were some limitations to the study, the survey irrefutably showed that “green crabs [were] present throughout the state and largely in numbers that represent[ed] a detrimental impact to bivalve shellfish.”¹¹⁰ Similarly, during the Freeport experiment, participants literally pulled in several tons of green crabs using the trapping method.¹¹¹ The fact that green crabs were consistently pulled in such large numbers indicates that the trapping method, while good for catching crabs, is probably insufficient to make a dent in their numbers.¹¹²

The protective technique known as “netting” is the process of applying durable, plastic netting onto seeded clam beds in the sub-tidal or inter-tidal zones.¹¹³ A trough several inches deep is dug around the perimeter of the clam bed and the edge of the netting is placed in the trough.¹¹⁴ Typically, the unearthed sediment is backfilled to secure the net to the ocean bottom, but occasionally the netting must be staked.¹¹⁵ Floats or toggles are attached to the underside of the netting to allow the nets to rise several inches into the water column during high tide, and fall during low tide.¹¹⁶ This creates a “dome” which has a similar effect to naturally occurring brush, rocks, and seaweed which reduce water motion; consequently, clams are able to burrow into the ocean bottom instead of being swept away and the green crabs’ ability to extract the clams is significantly hampered.¹¹⁷ The floats also discourage the build-up of sediment on top of the net so clam seeds are not smothered.¹¹⁸ The nets are generally quite large, in the range of 12-14 feet wide

¹⁰⁵ Schreiber, *supra* note 14.

¹⁰⁶ *Id.*

¹⁰⁷ Michelle M. Webber, MAINE DEP’T OF MARINE RES., *Results of the One-Day Green Crab Trapping Survey Along the Coast of Maine From August 27 – 28, 2013*, 1 (2013), available at <https://www1.maine.gov/dmr/msf/greencrabsurveyreport.pdf> [hereinafter Webber].

¹⁰⁸ *Id.*

¹⁰⁹ Royte, *supra* note 15.

¹¹⁰ Webber, *supra* note 107, at 6.

¹¹¹ Larry Gard, *Study: Trap green crabs, Clammers say more needed to save livelihood*, TRI-TOWN WEEKLY, Jan. 21, 2014, available at http://www.keepmecurrent.com/tri_town_weekly/news/study-trap-green-crabs/article_031cd6b6-82be-11e3-807b-0019bb2963f4.html [hereinafter Gard].

¹¹² *Id.*

¹¹³ Clam Netting, INDUSTRIAL NETTING, <http://www.industrialnetting.com/industry-solutions/aquaculture/clam-netting.html> (last visited Apr. 17, 2015).

¹¹⁴ MAINE DEP’T OF MARINE RES., *Coastal Fishery Research Priorities* (2001), available at http://www.maine.gov/dmr/research/soft_shell_clams.htm [hereinafter Research Priorities].

¹¹⁵ *Id.*

¹¹⁶ *Id.*

¹¹⁷ *Id.*

¹¹⁸ *Id.*

by 20-22 feet long, and approximately 20-40 clams are seeded per square foot.¹¹⁹ Because netting is easily erected and is generally successful, the DMR assists and encourages the use of nets in municipal clam seeding activities to the extent practicable.¹²⁰



*Flexible netting and Styrofoam floats deter green crabs from seeded clam beds on mudflats.*¹²¹

During the Freeport experiment, ten nets were initially installed, but four of them floated away by the end of the project.¹²² Nevertheless, Dr. Brian Beal determined that netting can successfully protect clam beds and it is easier to accomplish than other methods.¹²³ In another experiment, Dr. Beal seeded clams in planter pots, but only placed half of the pots under protective netting.¹²⁴ Although there was evidence that crabs were sometimes able to get through the netting, 60% of the clams in protected pots survived.¹²⁵ Not a single clam survived in the pots without netting.¹²⁶ A netting experiment conducted in 2006 in the Hampton-Seabrook Estuary in New Hampshire yielded similar results.¹²⁷ Dr. Beal and volunteers analyzed 360 mud core samples from thirty netted plots and found that the juvenile clams generally thrived.¹²⁸ However, major flooding

¹¹⁹ *Id.*

¹²⁰ *Id.*

¹²¹ DEI, *supra* note 48.

¹²² Gard, *supra* note 111.

¹²³ *Id.*

¹²⁴ *Id.*

¹²⁵ *Id.*

¹²⁶ *Id.*

¹²⁷ Dave Kellam, *Good news for local clammers*, SEACOAST ONLINE, Dec. 27, 2006 (hereinafter Kellam]; Brian F. Beal, *Juvenile Clam Mortality Study at Three Intertidal Flats in Hampton Harbor, New Hampshire*, UNIVERSITY OF NEW HAMPSHIRE, Dec. 27, 2002.

¹²⁸ Kellam, *supra* note 127.

caused many of the nets to tear; thus, year-round use of nets as a protective measure against green crabs would likely require regular maintenance.¹²⁹

Fencing is the most effective means of reducing green crab predation. During the green crab explosion in the 1950s, the DMR worked with municipalities to develop a fence that would keep green crabs out of clam beds.¹³⁰ Finally, after several years, the following design proved to be effective: 18 inches high, made of ½ inch mesh hardware cloth, supported by posts and boards, with a flange on top and a 6 inch skirt below the fence in the sediment.¹³¹ Shortly thereafter, the Maine Legislature passed a bill authorizing the DMR to assist municipalities with fence building projects.¹³² “When the Commissioner [of the DMR] determined that a soft-shell clam growing area was adversely affected by green crab predation, he could provide funds, materials or expertise for the construction and installation of fencing to municipalities.”¹³³ The DMR was allowed to spend up to \$25,000 annually on fencing projects throughout the state, and each participating town was expected to contribute 50% of the total expenditures.¹³⁴ However, few towns sought the funds for fencing when the frigid winters of the 1960s reduced the green crab population.¹³⁵ Unfortunately, the statute was repealed in 2012 just when the green crab population experienced resurgence.¹³⁶



A 30 x 30 foot fenced plot on the Little River.¹³⁷

¹²⁹ *Id.*

¹³⁰ Research Priorities, *supra* note 114.

¹³¹ *Id.* at 19.

¹³² *Id.*

¹³³ J. Khol Kanwit et al., REPORT BY THE GOVERNOR'S TASK FORCE ON THE INVASIVE EUROPEAN GREEN CRAB 26 (2014); 12 M.R.S.A. § 4252-A (repealed).

¹³⁴ *Id.*; Beem, *supra* note 28.

¹³⁵ Research Priorities, *supra* note 114, at 19.

¹³⁶ Beem, *supra* note 28; 12 M.R.S.A. § 6672 (repealed) and § 4252-A green crab fencing program (repealed).

¹³⁷ DEI, *supra* note 48, at 16.

Fencing not only protects clam beds, but also guards eelgrass beds from green crab destruction. Dr. Hilary Neckles constructed “exclosures,” an area from which intruders are excluded by fencing or other means,¹³⁸ to determine “whether environmental conditions in the bay were suitable for eelgrass growth in the absence of green crabs.”¹³⁹ At the conclusion of the experiment, the eelgrass within the fenced area flourished, and the eelgrass outside the enclosure was decimated.¹⁴⁰ The results of the study indicate that restoration of eelgrass beds, through transplanting and reseeded, is possible through use of fencing.¹⁴¹ However, it is not possible to build 4,000 miles of fencing along Maine’s coastline to restore the shore, so it is not a practical solution to this wide-spread problem.

F. *Shifting from Shellfish Harvesting to Shellfish Farming*

The results of the experiments and studies conducted over the past sixty years seem to lead to one conclusion: green crabs may be “from away”¹⁴², but they are here to stay. A combination of netting and fencing are the only means currently available to effectively mitigate green crab predation of soft-shell clams. As mentioned, Maine has thousands of miles of coastline, and it is impossible to net or fence all of it. Over a century ago, Maine “began experimenting with aquaculture, transplanting clams on leased areas of depleted tidal flats, and promoting reservations with harvesting restrictions.”¹⁴³ In 1911, the Maine Legislature passed a law authorizing towns to lease one-quarter of their clam flats while leaving the remaining three-quarters open to the public.¹⁴⁴ The law has rarely been used.¹⁴⁵ One explanation may be that fishermen, as well as others, hold a fundamental belief that clams are not owned by the State, and therefore, the State does not have a right to privatize them.¹⁴⁶ Another reason may be that municipalities are not aware of the existence of the law. In 1912, the Commissioner of Sea and Shore Fisheries, the predecessor to the DMR, reported his surprise that few had taken advantage of the recently-enacted law.¹⁴⁷ He surmised that it was largely due to the towns’ selectmen either not giving the law much attention or not being aware of its existence.¹⁴⁸ The Commissioner predicted that this would change within a few years,¹⁴⁹ but clearly it has not. Encouraging private individuals to lease sections of the ocean

¹³⁸ Exclosure, MERRIAM-WEBSTER.COM, <http://www.merriam-webster.com/dictionary/exclosure> (last visited Apr. 19, 2016).

¹³⁹ Schreiber, *supra* note 14, at 3.

¹⁴⁰ *Id.*

¹⁴¹ *Id.*

¹⁴² “From away” is a phrase used by native Mainers to describe someone who is not originally from Maine.

¹⁴³ Ray Crouch, Catherine Schmitt, and Natalie Springuel, *Fisheries then: Clams*, DOWNEAST FISHERIES TRAIL, <http://www.downeastfisheriestrail.org/fisheries-then/clams/> (last visited Jan. 23, 2015) [hereinafter Crouch].

¹⁴⁴ *Id.*

¹⁴⁵ *Id.*

¹⁴⁶ *Id.*

¹⁴⁷ 32D REPORT OF THE COMMISSIONER OF THE SEA AND SHORES (Jul. 25, 1913), http://www.penbay.org/ssf/ssf_1911_12.html [hereinafter Report].

¹⁴⁸ *Id.*

¹⁴⁹ *Id.*

for clam farming from the current community-based management structure would represent a significant, philosophical shift.¹⁵⁰ The Commissioner noted that “[i]f one-quarter of the flats in each town were leased and seeded and cultivated . . . the benefits derived by the three-quarters reserved for the public would be of great value; as the spawn coming from the cultivated pieces would drift and settle on the public flats, thereby increasing the product of all.”¹⁵¹ Of course, this theory was true at the time because green crab predation was not a concern. Today’s clambers may despise the idea of privatization of municipal clam flats, but these are desperate times. Dr. Beal had the following to say about leasing clam flats:

It's their garden . . . Whatever the individual can do in their flat belongs to them. It's up to them to make it work. You can't net the world, . . . [b]ut you can net small places, and that will work. What you're doing is creating pockets of clams so people don't have to go hunting for them. They know they're there. It's the difference between hunting and gathering, and a farmer mentality.¹⁵²

Limited options and philosophical differences are just a few of the obstacles to saving the soft-shell clam industry. The U.S. Army Corps of Engineers’ regulatory scheme may be another.

II: THE U.S. ARMY CORPS OF ENGINEERS’ REGULATORY FRAMEWORK

A. *Purpose and Jurisdiction Defined*

Congress established the Corps of Engineers within the U.S. Army in 1802.¹⁵³ Since its creation, the Corps has been called upon to carry out both military missions and civil projects.¹⁵⁴ The Corps’ regulatory program initially served the singular purpose of “protect[ing] and maintain[ing] the navigable capacity of the nation’s waters.”¹⁵⁵ “Time, changing public needs, evolving policy, case law, and new statutory mandates have changed the complexion of the program, adding to its breadth, complexity, and authority.”¹⁵⁶ The scope of the Corps’ missions has expanded to include: navigation, flood control, shore and hurricane protection, hydropower, recreation, water supply and quality, wetland protection, environmental restoration and assistance to the Environmental Protection Agency.¹⁵⁷ The Corps’ authority primarily stems from two major

¹⁵⁰ Crouch, *supra* note 143.

¹⁵¹ Report, *supra* note 147.

¹⁵² Brendan Twist, *Freeport’s study of green crabs yields little*, THE FORECASTER (Jan. 29, 2014), <http://www.theforecaster.net/news/print/2014/01/29/freeports-study-green-crabs-yields-little/185881>.

¹⁵³ U.S. ARMY CORPS OF ENGINEERS, NEW ENGLAND DISTRICT, *History*, <http://www.nae.usace.army.mil/About/History.aspx> (last visited Apr. 15, 2015) [hereinafter USACE NEW ENGLAND].

¹⁵⁴ *Id.*

¹⁵⁵ U.S. ARMY CORPS OF ENGINEERS, *Regulatory Jurisdiction Overview*, www.usace.army.mil/Portals/2/docs/civilworks/regulatory/reg_juris_ov.pdf (last visited Apr. 15, 2015) [hereinafter *Overview*].

¹⁵⁶ *Id.*

¹⁵⁷ USACE NEW ENGLAND, *supra* note 153.

pieces of legislation: the Rivers and Harbors Act and the Clean Water Act.¹⁵⁸ The Corps most frequently exercises its authority under Section 10 of the Rivers and Harbors Act,¹⁵⁹ and this comment will exclusively focus on that section. Section 10 prohibits the construction of any obstruction to the navigable capacity of any waters of the United States without express authorization from the Corps.¹⁶⁰ Moreover, any activity that may alter the course, condition, or capacity of any navigable waters is also unlawful unless approved by the Corps.¹⁶¹ In short, obstacles and activities that affect navigable waters require Corps' approval. Violators of this section may be subject to criminal, civil, and administrative penalties.¹⁶² However, "the Corps strives to reduce violations by effective publicity, an aggressive general permit program and an efficient and fair evaluation of individual permit applications."¹⁶³ Therefore, anyone wishing to build a structure or engage in any work within the navigable waters of the United States must receive a permit from the Corps. There are several sections in the Code which establish permit requirements, but it is necessary to have a basic understanding of Section 10 and the extent of the Corps' jurisdiction.

Under Section 10, the term "navigable waters of the United States"¹⁶⁴ is defined as "those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce."¹⁶⁵ The Corps' regulatory jurisdiction includes all ocean and coastal waters within a zone three nautical miles seaward from the baseline and limited jurisdiction in ocean waters on the outer continental shelf.¹⁶⁶ In Maine, certain bodies of water have been declared navigable waters by the Corps including all tidal waters and their tributaries to the head of tide, the Kennebec River to Moosehead Lake, the Penobscot River to the confluence of the East and West Branch at Medway, and Lake Umbagog.¹⁶⁷ Defining "navigable waters of the United States" or "navigability" is ultimately dependent upon judicial interpretation of those terms.¹⁶⁸ Once a body of water is deemed navigable, the Corps' jurisdiction applies laterally across the surface of the water and jurisdiction cannot be extinguished, even if a future event causes the water to no longer be navigable.¹⁶⁹

¹⁵⁸ Rivers and Harbors Act of 1989, 33 U.S.C. § 401 et. seq.; the Clean Water Act, 33 U.S.C. § 1251.

¹⁵⁹ *Overview, supra* note 155.

¹⁶⁰ 33 U.S.C. § 403 (2012).

¹⁶¹ *Id.*

¹⁶² *Overview, supra* note 155; 33 U.S.C. § 403(a) (2012); 33 U.S.C. § 406 (2012).

¹⁶³ *Id.* at 155

¹⁶⁴ 33 C.F.R. 329.1 (2013).

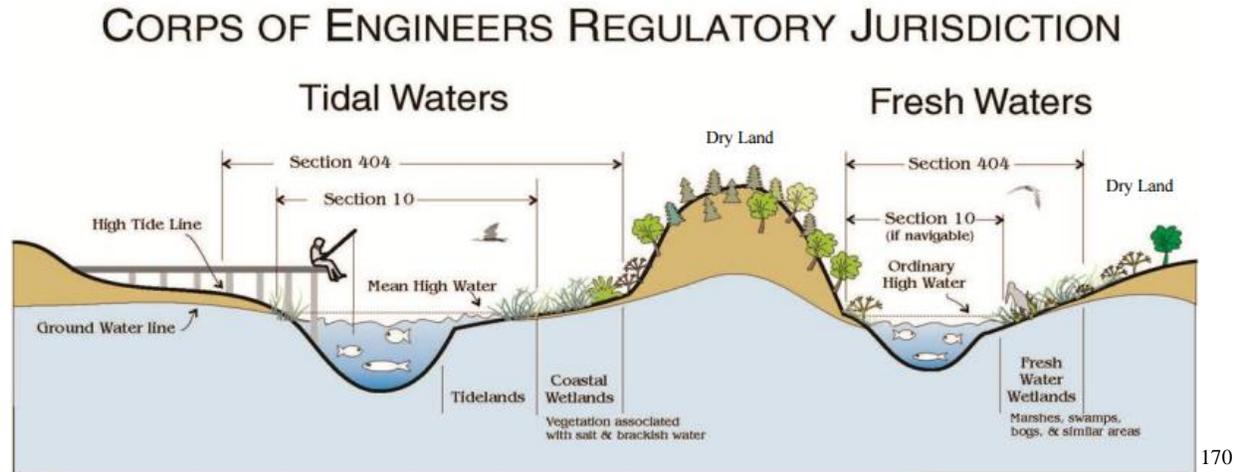
¹⁶⁵ 33 C.F.R. 329.4 (2013).

¹⁶⁶ 33 C.F.R. 329.12 (2013); 43 U.S.C. § 333(e) (2012).

¹⁶⁷ *What are the limits of the Corps Jurisdiction?*, U.S. ARMY CORPS OF ENGINEERS (Jul. 2012), www.nae.usace.army.mil/Portals/74/docs/regulatory/JurisdictionalLimits/Jurisdictional_Limits_Brochure.pdf [hereinafter Brochure].

¹⁶⁸ 33 C.F.R. 329.3 (1986).

¹⁶⁹ 33 C.F.R. 329.4 (1986).



Section 10 prohibits the placement of any obstruction in navigable waters without a permit.¹⁷¹ The Code lists some examples of an “obstruction” including a “wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structure”¹⁷² “Structure” is not further defined, and case law is limited. Interestingly, the few cases that have further defined or reviewed the meaning of “structure” involved houseboats.¹⁷³

B. The Corps’ Permitting Scheme

The Corps’ regulatory framework provides several mechanisms for obtaining authorization to build a structure in navigable waters.¹⁷⁴ First, the Corps has divided the United States and its territories into eleven divisions and has further subdivided the divisions into thirty-six districts.¹⁷⁵ For example, Maine is located in the North Atlantic Division and the New England District.¹⁷⁶ The Corps has a “decentralized nature and management philosophy... [with] the regulatory program and administration focused at the district office level.”¹⁷⁷

Second, the Corps has two broad categories of permits: general and individual.¹⁷⁸ “General permits apply to activities the Corps has determined are substantially similar in nature and cause

¹⁷⁰ *Pictorial Representations of Jurisdiction*, U.S. ARMY CORPS OF ENGINEERS, http://www.usace.army.mil/Portals/2/docs/civilworks/regulatory/juris_imagesv2.pdf.

¹⁷¹ 33 U.S.C. § 403 (2012).

¹⁷² *Id.*

¹⁷³ *See* U.S. v. Hernandez, 187 F.3d 623 (1st Cir. 1998).

¹⁷⁴ 33 C.F.R. 325.4 – 325.7 (2013).

¹⁷⁵ 33 C.F.R. 320.1(2) (2013).

¹⁷⁶ The New England District of the U.S. Army Corps of Engineers is responsible for managing the Corps’ Civil Works responsibilities in a 66,000-square-mile region encompassing the six New England states east of the Lake Champlain drainage basin. USACE NEW ENGLAND, *supra* note 153.

¹⁷⁷ *Overview*, *supra* note 155.

¹⁷⁸ 33 C.F.R. 320.1(2)(c) (1999).

minimal environmental impacts, both individually and cumulatively.”¹⁷⁹ The Corps requires notification for some general permits before the activity is authorized and work can begin.”¹⁸⁰ There are two types of general permits: nationwide and regional.

Nationwide permits are designed to minimize the paperwork and delays for certain activities occurring across the United States.¹⁸¹ Activities authorized by a nationwide permit must have a minimal impact on navigable waters, such as mooring buoys, residential developments, utility lines, road crossings, mining activities, wetland and stream restoration activities, and commercial shellfish aquaculture activities.¹⁸² In most cases, nationwide permittees may proceed with activities without notifying the Corps.¹⁸³ However, this should only occur after a careful review of the language of the nationwide permit.¹⁸⁴ Approximately 40,000 reported activities and 30,000 unreported activities occur each year pursuant to the fifty nationwide permits.¹⁸⁵

Regional permits apply “to certain minor activities authorized by the Corps on a regional or statewide basis. Activities allowed by a regional permit may include constructing docks, piers and mooring buoys in tidal waters, minor road work by a town or state agency, minor hydro projects and maintenance dredging with upland disposal.”¹⁸⁶ Most activities that qualify for a regional permit require Corps’ approval and notification prior to commencing work.¹⁸⁷

The New England District recently issued the 2015 general regional permit for jurisdictional waters within the boundaries of the State of Maine.¹⁸⁸ The general permit for Maine is in effect from October 12, 2015 through October 12, 2020.¹⁸⁹ Similar to the nationwide permit, the regional permit for Maine concerns the construction of any structure in, over, or under navigable waters, any excavating or dredging, and any work affecting the course, condition, or capacity of said waters.¹⁹⁰ The regional permit for Maine lists twenty-four activities that may be authorized if the activity and the permittee satisfy all of the terms and conditions of the permit.¹⁹¹ Listed activities that relate to green crab mitigation and soft-shell clam harvesting include: (1) fish

¹⁷⁹ USACE NEW ENGLAND, *Are you planning work in a waterway or wetland?*, www.nae.usace.army.mil/Portals/74/docs/regulatory/Forms/WorkInWaterway2014.pdf.

¹⁸⁰ *Id.*

¹⁸¹ 33 C.F.R. 330.1(b) (2013).

¹⁸² U.S. ARMY CORPS OF ENGINEERS, *Nationwide Permit Reissuance News Release*, Feb. 15, 2012, <http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/NationwidePermits.aspx> [hereinafter News Release].

¹⁸³ 33 C.F.R. 330.1(e)(1) (2013).

¹⁸⁴ *Id.*

¹⁸⁵ News Release, *supra* note 182. The process for issuing nationwide permits is a rulemaking activity that occurs every five years. Approximately 26,600 comments were received in response to the Federal Register in 2011 for the 2012 nationwide permits. *Id.*

¹⁸⁶ Brochure, *supra* note 167.

¹⁸⁷ *Id.*

¹⁸⁸ U.S. ARMY CORPS OF ENGINEERS, General Permit for the State of Maine, effective Oct. 12, 2015 and in effect until Oct. 12, 2020, *available at* <http://www.nae.usace.army.mil/Portals/74/docs/regulatory/StateGeneralPermits/ME/MEGPDraft-15Apr2015.pdf> [hereinafter GENERAL PERMIT].

¹⁸⁹ *Id.*

¹⁹⁰ *Id.*

¹⁹¹ *Id.*

and wildlife harvesting, enhancement, and attraction devices; (2) habitat restoration, establishment and enhancement activities; and (3) aquaculture.¹⁹² The permit application lists forty-five conditions that prospective permittees must meet, as applicable, in order to qualify for a permit.¹⁹³

Finally, the Corps also issues individual permits for activities not covered by general permits. The individual permit application resembles the process for a general permit and also includes a period of public notice and comment.¹⁹⁴ Alternatively, the Corps issues letters of permission when “in the opinion of the district engineer, the proposed work would be minor, not have significant individual or cumulative impact on environmental values, and should encounter no appreciable opposition.”¹⁹⁵

When making a permit decision, the Corps engages in a careful balancing process. The Corps considers many factors in determining the pros and cons to the public of each proposed project.¹⁹⁶ “Relevant factors may include conservation, economics, aesthetics, wetlands, cultural values, navigation, fish and wildlife values, water supply, water quality, and any other factors judged important to the needs and welfare of the people.”¹⁹⁷ The Corps uses the following general criteria in its evaluation: (1) the extent of public and private needs, (2) alternative locations and methods in the event of a conflict, and (3) the extent and permanence of the beneficial and/or detrimental effects the proposed project may have on public and private uses.¹⁹⁸ The Corps has implemented procedural safeguards, such as pre-application consultations, to assist in its assessments.¹⁹⁹ In weighing the public interest factors, the Corps does not allow a single factor (i.e., commercial or economic benefits) to drive the boat, “but rather the decision represents the net effect of balancing all factors, many of which are frequently in conflict.”²⁰⁰

III: RECONCILING REGIONAL REALITIES WITHIN THE FEDERAL FRAMEWORK

A. *The Dilemma of a Difference of Opinion*

As previously noted, fencing, netting, trapping, or a combination thereof, are the only known methods for mitigating the effects of green crab predation on soft-shell clams. Clearly, the Gulf of Maine is a navigable water within the Corps’ jurisdiction, and there is no dispute that fencing is a structure within the meaning of Section 10. Therefore, fencing projects along the coast require a permit.

Significant netting and fencing experiments commissioned by the town of Freeport were hampered due to a delay in getting permit approval.²⁰¹ The experiments were supposed to begin in the late spring, but work was delayed until mid-summer because it took longer to receive the

¹⁹² *Id.*

¹⁹³ *Id.* Fourteen pages of explanation follow the list of conditions.

¹⁹⁴ *Overview, supra* note 155.

¹⁹⁵ *Id.*

¹⁹⁶ *Id.*

¹⁹⁷ *Id.*

¹⁹⁸ *Id.*

¹⁹⁹ *Id.*

²⁰⁰ *Id.*

²⁰¹ *Twist, supra* note 99.

permits than originally anticipated.²⁰² Unfortunately, the crabs had eaten all of the clams before the nets and fences were erected.²⁰³ Following the Freeport experiment, the Maine Clammers Association published the following on its website:

The MCA looks forward to working with agencies such as Army Corps of Engineers (ACOE) and National Marine Fisheries Service (NMFS) so they can better understand the need for adaptive application of certain regulations. For example, in Freeport's recent application to the ACOE, it was clear during that process that the federal regulators had no true on the ground understanding of the ecosystem. Requiring a high number of vents (breaches) to protect sturgeon that all the fishermen know don't frequent or in habitat [sic] the bays of Freeport is a good example of the absurdity of inflexible rules. The problem is that federal rules require protection of certain species, but to just protect one species at the expense and health of all the others is irresponsible.²⁰⁴

The Maine Clammers Association referred to one of the conditions in the permit that required a 2 foot wide gap for every 150 feet of fencing and one 10 foot wide gap to allow safe passage for the threatened Atlantic sturgeon and the endangered short-nosed sturgeon.²⁰⁵ The project coordinators reported that the gaps in the fencing were difficult to manage and maintain.²⁰⁶ They placed crab traps around the openings, but green crabs were found inside the fencing.²⁰⁷ The Corps required project coordinators, as a condition of receiving the permit, to check the fenced plot every forty-eight hours for evidence of sturgeon, and to submit a findings report every two weeks.²⁰⁸ Arguably, this requirement was a misuse of resources in terms of time, money, and effort, considering there was no evidence of sturgeon for the entire duration of the project which lasted from April to December.²⁰⁹

As mentioned, the Corps is one of the rare federal agencies that primarily operates in a decentralized manner. One of the purposes for having a regionalized system is to be accessible and responsive to the local districts. Nevertheless, the Corps must balance many competing interests when making its permitting decisions. For example, the Corps must consider the Atlantic sturgeons' place on the endangered species list against the declining numbers of soft-shell clams. Although there are means available to protect soft-shell clams, they cannot be fully employed because sturgeon are endangered. Despite no evidence of sturgeon near fenced-in clam beds, soft-shell clams are left unprotected to face predation. It is, literally, a vicious cycle.

B. Fencing Does Not Have To Be a Foregone Conclusion

²⁰² *Id.*

²⁰³ *Id.*

²⁰⁴ MCA, *supra* note 80.

²⁰⁵ DEI, *supra* note 48.

²⁰⁶ *Id.*

²⁰⁷ *Id.*

²⁰⁸ Telephone interview with Dr. Brian F. Beal (Jan. 27, 2015).

²⁰⁹ *Id.*

Given the Corps' broad discretion in granting permits, there may be room for more flexibility in permit conditions. The Corps' regional permit for Maine requires applicants to account for "aquatic life movements and management of water flow."²¹⁰ Specifically, activities may not substantially disrupt life cycle movements of indigenous and migrating aquatic species, like the sturgeon.²¹¹ This was the one of the issues in the Freeport fencing project. However, consider the examples below.

In 2013, the Corps completed the Draft Feasibility Study/Environmental Assessment for the Searsport Harbor dredging project in Searsport, Maine.²¹² The purpose of the project is to both deepen and widen the entrance channel and turning basin to accommodate deep draft vessels and reduce transportation costs.²¹³ Nearly 1,000,000 cubic yards of material will be dredged throughout the course of the project.²¹⁴ After a lengthy assessment process, the Corps acknowledged that there would be temporary negative impacts to essential fish habitats as a result of the dredging.²¹⁵ The Corps proposed that the project take place during the winter months to protect the endangered migrating Atlantic salmon, endangered short-nosed sturgeon, and threatened Atlantic sturgeon.²¹⁶ The Corps' final determination was that "the project will have no known positive or negative impacts on any State or Federal threatened or endangered species."²¹⁷

In 2014, the Corps initiated a formal consultation with the National Marine Fisheries Service pursuant to the Endangered Species Act when it considered establishing two new nationwide permits that would authorize the discharge of dredged or fill material into waters of the United States through 2017.²¹⁸ The Endangered Species Act requires federal agencies to ensure that any action they authorize will not jeopardize the existence of any endangered or threatened species or result in the destruction or adverse modification of their habitats.²¹⁹ When a federal agency's action "may affect" a protected species, that agency is required to consult formally with the National Marine Fisheries Service or the U.S. Fish and Wildlife Service.²²⁰ The federal agency is exempt if the action "may affect, but is not likely to adversely affect" any endangered or threatened species or their habitats.²²¹ The Service's opinion determined that dredging constitutes a threat to Atlantic sturgeon in the Gulf of Maine because that activity has a tendency to displace

²¹⁰ GENERAL PERMIT, *supra* note 188.

²¹¹ *Id.*

²¹² U.S. ARMY CORPS OF ENGINEERS, SEARSPORT HARBOR, SEARSPORT, MAINE NAVIGATION IMPROVEMENT PROJECT: DRAFT FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT (Apr. 2013), *available at* http://www.nae.usace.army.mil/Portals/74/docs/Topics/Searsport/DRAFT_FSEA.pdf [hereinafter ENVIRONMENTAL ASSESSMENT].

²¹³ *See id.*

²¹⁴ *Id.* at ii.

²¹⁵ *See id.*

²¹⁶ *Id.* at EA-59.

²¹⁷ *Id.* at Fonsi-2.

²¹⁸ 16 U.S.C. § 1536(a)(2) (2012); NATIONAL MARINE FISHERIES SERVICE, Endangered Species Act Section 7 Consultation, Biological Opinion 1-2 (Nov. 24, 2014).

²¹⁹ *Id.* at 1.

²²⁰ *Id.*

²²¹ *Id.*

sturgeon and alter their habitat and spawning grounds.²²² The opinion noted that there were some positive signs that the Atlantic sturgeon may be recolonizing rivers suitable for spawning, but there was not enough data; therefore, the threatened Atlantic sturgeon was still at risk of becoming endangered.²²³

The key phrase is “may affect, but is not likely to adversely affect.” Clearly, dredging the Searsport Harbor is a major undertaking covering a wide area of the ocean for a lengthy period of time.²²⁴ Yet, this project was approved despite the National Marine Fisheries Service’s determination in a separate matter that dredging projects threaten sturgeon in the Gulf of Maine. The fencing that protects soft-shell clams is insignificant in comparison to the Searsport Harbor dredging project, and is unlikely to adversely affect migrating sturgeon because the plots are small and sporadic. Therefore, because fencing *may affect, but is not likely to adversely affect* sturgeon, any condition that compromises the integrity of the fences, such as the 2 foot gaps, may be an unnecessary requirement for the Section 10 permit.

To bolster this argument, in 2005, the Corps released a report on invasive animal species in aquatic environments.²²⁵ In the report, the Corps acknowledged that some invasive species “have the potential for serious disruption of local ecosystems, fisheries, and human infrastructure.”²²⁶ Moreover, “such invasions directly impact the mission of the [Corps], through its responsibilities in construction and maintenance of our nation’s harbors, ports and waterways, erosion control, management of water resources, and wetland and coastal habitat restoration.”²²⁷ The report identified the European green crab as an “obvious concern” to shellfish habitat restoration, and admitted that control measures have generally been unsuccessful.²²⁸ The Corps recognized the need for streamlining the process for green crab fencing by establishing an application specifically tailored to “green crab predator fencing or other structures below the mean highwater line.”²²⁹ However, the application is still cumbersome with fifteen categories of mandatory information and requirements as well as review from several other governmental bodies.²³⁰ Lessening some of the constraints imposed by the fencing application ought to be considered.

C. Netting Negotiations, Anyone?

Although netting alone does not solve the problem of green crab predation, it is an invaluable tool that is easy to employ and relatively successful. Currently, there is a disagreement between the Corps and fishermen on the classification of “nets” within the meaning of Section 10.

²²² *Id.* at 222.

²²³ *Id.*

²²⁴ ENVIRONMENTAL ASSESSMENT, *supra* note 212.

²²⁵ See Gary L. Ray, U.S. ARMY CORPS OF ENGINEERS, *Invasive Animal Species in Marine and Estuarine Ecosystems* (Jan. 2005).

²²⁶ *Id.*

²²⁷ *Id.*

²²⁸ *Id.*

²²⁹ U.S. ARMY CORPS OF ENGINEERS, *Green Crab Predator Fencing or Other Structures Below the Mean Highwater Line, Permit Application*, www.maine.gov/dmr/greencrabs/ArmyCorpsinfo.pdf.

²³⁰ *Id.*

Recall that an obstruction to a navigable water requires a permit, and “obstruction” includes things like wharves, piers, jetties, and other “structures.” Nets are not specifically listed in the statute, nor do they share the characteristics of the expressly listed obstructions. Thus far, case law has not reached the subject of netting. In fact, the only cases that have interpreted the term “structure” relate to houseboats. Although houseboats and netting are not analogous, the cases may be predictive if the matter is ever litigated.

In January 1988, the Corps sent cease and desist orders to the owners of forty-eight houseboat owners who were moored in navigable waters off the coast of Puerto Rico without authorization.²³¹ The houseboat owners applied for after-the-fact mooring permits.²³² Because the waters provided a habitat for the endangered yellow-shouldered blackbird, several federal agencies, including the U.S. Fish and Wildlife Service, the Environmental Protection Agency, and the National Marine Fisheries Service, objected to the presence of the houseboats.²³³ The Fish and Wildlife Service issued a biological opinion that explained the negative impact the moored houseboats had on the endangered bird.²³⁴ The Corps conducted an inspection of the boats and subsequently denied forty-one of the permit applications.²³⁵ The inspection considered factors such as the intended use, navigability, and condition of the boats, as well as their means of mooring.²³⁶ The remaining houseboat owners were not required to have permits because their boats were found to be either temporarily moored vessels or were moored in permitted marinas.²³⁷ In 1993, after the *Seda Perez* case, the Corps sent letters to all of the houseboat owners asking them to remove their houseboats, which they declined to do and a lawsuit followed.²³⁸ The Corps contended that the houseboats were structures requiring a Section 10 permit, and the houseboat owners argued that they were not.²³⁹ The Court looked to the purpose of Section 10 and acknowledged the Corps’ broad regulatory discretion.²⁴⁰ Relying on *Seda Perez*, the Court found that “what constitutes a structure or an obstruction is for the [Corps] to define,” and the court’s standard of review is limited to whether or not the decision was arbitrary and capricious.²⁴¹ The determination under the arbitrary and capricious standard is “whether the [agency] has considered the relevant factors and articulated a rational connection between the facts found and the choice made.”²⁴² As long as the agency considered the relevant factors and did not make a clear error of judgment, then the

²³¹ U.S. v. Hernandez, 979 F. Supp. 70, 73 (D.P.R. 1997) *aff’d*, 187 F.3d 623 (1st Cir. 1998).

²³² *Id.*

²³³ *Id.* at 74.

²³⁴ *Id.*

²³⁵ *Id.*

²³⁶ *Id.*

²³⁷ *Id.*

²³⁸ *Id.* In *U.S. v. Seda Perez*, the District Court found that the Corps’ decision that permanently-moored houseboats were structures and obstructions to navigable waters was not arbitrary and capricious, and the decision was affirmed by the First Circuit Court of Appeals. 825 F. Supp. 447, 451 (D.P.R. 1993) *aff’d sub nom.* U.S. v. Members of Est. of Boothby, 16 F.3d 19 (1st Cir. 1994).

²³⁹ *Id.*

²⁴⁰ *Id.* at 75-76.

²⁴¹ *Id.* at 76.

²⁴² *Id.* (citing *Baltimore Gas & Elec. v. Natural Resources Defense Council*, 462 U.S. 87, 105 (1983)).

agency's decision will stand.²⁴³ The Court determined that the Corps had sufficiently relied on the relevant factors including intended use, navigability, construction and environmental impact; thus, the Corps' decision was not arbitrary and capricious.²⁴⁴ The houseboat owners had credible expert witness testimony and the Court noted that if the standard of review was one other than the narrow arbitrary and capricious standard, then the outcome might have been different.²⁴⁵

Although overcoming the deferential arbitrary and capricious standard is difficult, it is not impossible. Not only are the qualities of netting distinguishable from the characteristics of houseboats, but the factors considered by the Corps and the Court would likely lead to a favorable result for anyone challenging a permit requirement for netting. First, nets lay flat on the bottom of the ocean as opposed to the large construction of houseboats resting on the surface of the water. Nets that are equipped with floats or toggles only rise a few inches off the floor during high tide, and thus do not obstruct navigation. When netting becomes loose, even small boat propellers easily slice through it without a hindrance. Second, nets are affixed to the ocean floor with mud or stakes unlike the temporarily or permanently secured houseboats. Third, the netting's intended use serves an ecological function of protecting soft-shell clams from green crab predation. A federal agency, including the Corps, would likely determine that netting not only has a positive environmental effect, but has no negative impact. Finally, unlike the negative effects of the houseboats on the endangered species in the *Hernandez* case, there is no evidence that netting negatively affects sturgeon or any other threatened or endangered species. Therefore, a Court would likely conclude that netting is not a structure or obstruction to navigation within the meaning of Section 10, and a Corps' decision requiring a permit would fail even under the deferential arbitrary and capricious standard.

IV: CONCLUSION

Green crab predation will persist, so soft-shell clammers must carefully consider their options in order to sustain their livelihood. The future of Maine's third most lucrative fishery is uncertain. Clammers may have to switch from clam harvesting to clam farming, the Maine Legislature may revive the statute allotting \$25,000 to municipal fencing projects, and municipalities may begin leasing one-quarter of their clam flats to fishermen for private clam farms. There is one certainty: clammers and Corpsmen must work together to promote fencing and netting in order to keep green crabs out of soft-shell clam beds. If clammers are willing to respect the Corps' need to balance competing interests, and if the Corps is willing to loosen restrictions to meet regional conditions, then there will be plenty of clams for future clam bakes.

²⁴³ U.S. v. Hernandez, 979 F. Supp. 70, 76 (D.P.R. 1997) *aff'd*, 187 F.3d 623 (1st Cir. 1998) (citing Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43(1983)).

²⁴⁴ *Id.* at 77.

²⁴⁵ *Id.* at 78.