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SAVING FISH TO SAVE THE BAY: PUBLIC TRUST DOCTRINE PROTECTION FOR MENHADEN’S FOUNDATIONAL ECOSYSTEM SERVICES IN THE CHESAPEAKE BAY

Patrick J. Connolly*

Abstract: The Chesapeake Bay menhaden population provides a number of ecosystem services that help keep the bay’s waters suitable for marine life, and enjoyable and profitable for the bay’s human users. Overfishing of menhaden within the bay may, however, be eroding the ability of the species to provide these services, which are foundational to rights traditionally secured by the public trust doctrine: fishery, commerce, and navigation. The Virginia courts’ failure to protect these foundational ecosystem services threatens the viability and sustainability of these public trust rights. Given the chance, Virginia courts should protect menhaden by expanding the state’s narrow conception of the public trust doctrine to comport with developments in ecology and state constitutional, statutory, and case law.

Introduction

A system of environmental law based on ecology has been evolving in tandem with the public’s growing understanding of the interdependence of nature’s processes over the past fifty years.¹ During the same period, the state of Virginia has witnessed the collapse of its once-robust menhaden fishery.² An individual menhaden—diminutive, oily, and bone-filled—would not excite the interest of a typical angler or seafood connoisseur.³ This unassuming fish, however, might be the most

ecologically essential creature in the Chesapeake Bay waters that make up part of its natural range.  

Massive schools of menhaden amount to aquatic dynamos, performing the ecosystem functions of pollution control, nutrient fixation, and food web support. These functions provide human users of the Chesapeake Bay ecosystem with the services of clean water, food production, and recreational opportunities. Although a Chesapeake Bay stripped of these and other essential ecosystem services would be a pale shadow of a historic and bountiful water-body, no clear legal theory has emerged to guard people’s interest in them. This Note argues that the foundational ecosystem services provided by menhaden fall beneath the protective cloak of the public trust doctrine without bursting the utilitarian seams of the doctrine’s traditional protection of the public’s right to access navigable waters to engage in fishing, navigation, and commerce.

I. Ecosystem Services

A. Ecosystem Services in General

Ecosystem services “represent the benefits human populations derive, directly or indirectly,” from “the habitat, biological or system properties or processes of ecosystems.” Benefits derived from ecosystem services are fundamental to the health of the global economy and to the survival of humankind. Severe degradation of certain ecosys-

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5 See Franklin, supra note 3, at 7–9.
8 See J.B. Ruhl & James Salzman, Ecosystem Services and the Public Trust Doctrine: Working Change from Within, 15 Southeastern Envtl. L.J. 223, 230 (2006). The authors argue that “[p]rotecting ecosystems . . . is compatible with the [public trust] doctrine even in its sharpest utilitarian projection.” Id.
9 Costanza et al., supra note 6, at 253.
10 See id. at 254–55. “It is trivial to ask what is the value of the atmosphere to humankind, or what is the value of rocks and soil infrastructure as support systems. Their value is infinite in total.” Id. at 255.
tem services would prove catastrophic and irreversible.\textsuperscript{11} For example, a process present in functional rural ecosystems is the movement of pollen from one flower to another; from this process humans derive the ecosystem service of pollination, which is essential to sustaining life on earth.\textsuperscript{12} A less-apparent, but similarly essential ecosystem service is nutrient cycling, that is, the fixation of nitrogen and phosphorus within soils, plants, and animals.\textsuperscript{13} Another example is waste treatment, like that provided by filter-feeding marine animals such as menhaden and mollusks,\textsuperscript{14} and by water filtration within forests.\textsuperscript{15}

Recent natural disasters, including Hurricanes Katrina and Rita and the Asian tsunamis, have brought the essentiality of these services to human survival out of the realm of the theoretical and into stark focus.\textsuperscript{16} Had governments in areas struck by the 2004 tsunami or the 2005 Gulf-Coast hurricanes done more to preserve the ecosystem services of storm mitigation and flood control provided by natural geologic formations and vegetation, the loss of life and physical devastation suffered in those areas could have been significantly lessened.\textsuperscript{17}

\begin{footnotes}
\item[11] See James Salzman, \textit{A Field of Green? The Past and Future of Ecosystem Services}, 21 J. LAND USE & ENVTL. L. 133, 133–34 (2006). Technological advances would likely be of little help in this situation. \textit{Id.} “Biosphere II [failed] to establish biological systems capable of recreating the basic services that support life itself—services such as purification of air and water, pest control, renewal of soil fertility, climate regulation, pollination of crops and vegetation, and waste detoxification and decomposition.” \textit{Id.} at 133.

\item[12] See Costanza et al., \textit{supra} note 6, at 254 tbl.1. Other familiar and essential ecosystem services are the production of food—such as fish and crops—and raw materials, like lumber and fuel. \textit{See id.}

\item[13] \textit{See id.}

\item[14] William J. Hargis, Jr. & Dexter S. Haven, \textit{Chesapeake Oyster Reefs, Their Importance, Destruction and Guidelines for Restoring Them, in Oyster Reef Habitat Restoration: A Synopsis and Synthesis of Approaches} 329, 348 (M.W. Luckenbach et al. eds., 1999). It has taken around 150 years for over-fishing, pollution, and shell mining to reduce the bay’s oyster population to about one percent of its historical peak, leaving menhaden to shoulder a heavy load in terms of purifying the bay’s water. \textit{See id.} at 329, 339; Franklin, \textit{supra} note 3, at 136–37.

\item[15] See Costanza et al., \textit{supra} note 6, at 256 tbl.2. Constructing an exhaustive list of ecosystem services is beyond the scope of this Note and may be impossible. \textit{See id.} at 258.


\item[17] See Woodworth, \textit{supra} note 16, at 39. The author describes how preserving the mangrove forests in Asia and the natural barrier islands in Louisiana could have prevented the most violent harm to infrastructure in those locations. \textit{Id.}
B. Valuing Ecosystem Services

The value of ecosystem services to human populations is generally unrepresented in financial markets. Instead, these essential natural functions are enjoyed as public goods, their value obscured in the economy as positive externalities. It is usually not until an ecosystem service is severely degraded or destroyed that economists and policymakers recognize their value, then quantifiable as the cost of lives lost, communities disrupted, and infrastructure destroyed. The continued effort to repair the social fabric and infrastructure of New Orleans in the wake of the 2005 hurricanes provides a poignant example. Much of the estimated $100 billion reconstruction cost and unquantifiable cost of lives and social capital lost could have been avoided by a $14 billion expenditure to restore the barrier islands that serve as a natural buffer to the Gulf Coast during storms.

Ecological economists have taken on the daunting task of quantifying the value derived by humans from dozens of ecosystem services whose benefits we do not purchase in a marketplace. A controversial initial effort in 1997, led by Robert Costanza, valued these services at $33 trillion, with marine services contributing just under two-thirds of that amount.

While the exact value of worldwide ecosystem services is a matter open to debate—Costanza’s conservative estimate assigned a monetary value greater than combined global GDP—there is little doubt that the human race would cease to exist should certain ecosystem

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18 See Salzman, supra note 11, at 134.
19 See id. at 135.
21 See Salzman, supra note 11, at 135.
24 Costanza et al., supra note 6, at 253.
25 See id. at 259. Moreover, Costanza’s study attributed an annual value of about $2.3 trillion to waste treatment, and $17 trillion to nutrient cycling. Id. Menhaden are key providers of both of these services in the Chesapeake Bay. See Franklin, supra note 3, at 8; Gottlieb, Ecological Role of Atlantic Menhaden, supra note 3, at 73–74.
services become unavailable. To the best of our knowledge, humans are not yet on the brink of extinction, but our depletion of the wealth bestowed upon us by nature has gone far to erode our quality of life and that of future generations. Some costs of ecosystem service degradation are more subtle than those exemplified by the Asian tsunami or the recent Gulf Coast hurricanes, but each such cost amounts to an incremental degradation in local, regional, and global qualities of life and in the economies and traditions that underpin the same.

II. THE CHESAPEAKE BAY MENHADEN FISHERY

A. The Fish: A Classic Overachiever

Adult menhaden weigh less than two pounds and grow to a maximum of about nineteen inches in length. The species is known for plentiful bones and oily flesh, and does not grace the menus of popular seafood restaurants, or even the bun of the plebeian Filet-o-Fish. Millions-strong schools of these unpalatable fish, however, are essential components of the ecosystems in which they swim. Generally speaking, menhaden serve two functions in marine ecology: (1) as filter feeders, they serve to clarify and detoxify the water; and (2) they are an essential part of the diets of numerous predators and scavengers within the food web.

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27 See id.
28 See Costanza et al., supra note 6, at 255. “The chains of effects from ecosystem services to human welfare can range from extremely simple to exceedingly complex. Forests provide timber, but also hold soils and moisture, and create microclimates, all of which contribute to human welfare in complex, and generally nonmarketed ways.” Id. Similarly, the value of a population of a certain species of fish may be quantified in the revenues of the associated commercial fishery, while ignoring the value of the ecosystem services that species provides as fodder for larger species in the food web, or as a water purifier. See id.
30 See, e.g., Franklin, supra note 3, at 5; McDonald’s USA Ingredients Listing for Popular Menu Items, http://nutrition.mcdonalds.com/bagamcmeal/ingredientslist.pdf (last visited Jan. 23, 2009) (listing Hoki and/or Pollock as the main ingredient(s) in the McDonald’s fish patty).
31 See, e.g., Price, supra note 4.
32 See Franklin, supra note 3, at 7–9; Gottlieb, Ecological Role of Atlantic Menhaden, supra note 3, at 3, 7.
1. Menhaden’s Water Purification Role

Historically, a prolific menhaden population along with seemingly endless reefs of filter-feeding oysters on the floor of the Chesapeake served as a dynamic water-purifying tag team. The fish and mollusks combined to keep the Chesapeake’s waters “clear, clean, balanced, and healthy . . . .” Now, with the oyster population of Chesapeake Bay at around one percent of its historic level, menhaden have become the most important filter feeder in the bay.

Filter-feeding serves multiple ecosystem functions. First, menhaden help create suitable conditions for marine life by filtering suspended phytoplankton, zooplankton, and detritus from the water, thereby clarifying the bay and allowing sunlight to nourish aquatic plants which release dissolved oxygen. Second, menhaden consume algae that grow rampant in the bay, preventing decomposition of dead algae from consuming dissolved oxygen that is essential to marine life. Menhaden further help prevent the spread of oxygen-starved dead zones by consuming nitrogen, which stimulates algae growth after being flushed into the bay from agricultural and municipal non-point sources.

Degradation of the menhaden resource will lead to a decrease in the ecosystem functions of water purification and nitrogen fixation which it provides, leading to more frequent toxic algae blooms and ex-

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33 See Franklin, supra note 3, at 136–37.
34 Id. at 9.
36 Price, supra note 4.
37 Franklin, supra note 3, at 43; see Gottlieb, Ecological Role of Atlantic Menhaden, supra note 3, at 1.
38 Dick Russell, Striper Wars 239 (2005). Menhaden feed on these potentially destructive algae, turning it into flesh with which they swim out of the bay as they travel throughout their natural range along the eastern Atlantic seaboard. See Dick Russell, The Beating Heart of the Estuary: Demand for Fish Oil Puts the Chesapeake Under Increasing Pressure, Earth Island J., Winter 2006, at 31, 35 [hereinafter The Beating Heart of the Estuary]; Gottlieb, Ecological Role of Atlantic Menhaden, supra note 3, at 45–46.
39 Price, supra note 4.
40 Brooks, Jones & Virginia, supra note 1, at 271–72; see Committee on Environmental and Natural Resources, National Science and Technology Council, An Assessment of Coastal Hypoxia and Eutrophication in U.S. Waters 1–2 (2003) [hereinafter NSTC Assessment]. “More than 64,000 square miles of land drain into the rivers that feed the [Chesapeake] Bay. . . . [T]he two largest contributors of both nitrogen and phosphorus are agriculture and point sources.” Id. at 42.
pansion of creeping dead zones in the bay. The effect on the humans who exploit the bay’s resources, both in terms of their economic well-being and the stability of their cultures and traditions, could be enormous. Toxic algae and dead zones are already taking their toll on the culturally and economically important traditions of crab- and shell-fishing in the bay.

2. Menhaden’s Role in the Chesapeake’s Complex Food Web

In addition to their role as filter feeders, menhaden are perhaps the most essential link in the Chesapeake Bay’s complex food web, serving as “the dominant prey species for many predatory fish and mammals such as striped bass, bluefish, weakfish, Spanish mackerel, seals, and whales; [and as] a favorite target for the common loon, herons, egrets, ospreys, and eagles.” Sport fishermen and bird watchers point to a dwindling menhaden population in the Chesapeake Bay as a driving factor in the inability of their favorite species to rebound from diminished levels. Wasting disease in Chesapeake Bay striped bass, a popular target for recreational anglers, may be attributable to malnutrition from a lack of menhaden to feed on.

Menhaden’s purification of the Chesapeake’s water and their essential role in the bay’s complex food web are foundational services, crucial to the diverse species who inhabit the bay ecosystem and to

41 See Franklin, supra note 3, at 137–40; NSTC Assessment, supra note 40, at 24–26.
43 See id. (noting that, while the sea scallop industry accounted for $289 million in direct and indirect sales in Virginia in 2005, and the blue crab industry for $46 million, the menhaden industry only generated $33 million in such sales); David A. Fahrenthold, Restoration Push Failing Chesapeake Crabs, BOSTON GLOBE, Nov. 19, 2007, at A2 (citing dead zones as a major obstacle to rebuilding the traditional blue crab fishery throughout the bay); Gottlieb, Ecological Role of Atlantic Menhaden, supra note 3, at 84–85 (noting that “[f]ishery management in the Chesapeake Bay historically has been more crisis management than anything else” and pointing out the long-suffering oyster, striped, and blue crab fisheries).
44 Price, supra note 4.
45 See Russell, supra note 38, at 227.
46 See Franklin, supra note 3, at 144–45; Russell, supra note 38, at 27–30, 230; Gottlieb, Ecological Role of Atlantic Menhaden, supra note 3, at 83. Fish suffering from wasting disease are severely underweight, have skin lesions, and may display damage to internal organs. See Russell, supra note 38, at 202–04.
the people who rely on that ecosystem for its commercial, recreational, and aesthetic bounties.\textsuperscript{47}

B. \textit{Menhaden’s History: Centuries of Providing Ecosystem Services}

1. The Commercial Menhaden Fishery: from Boom to (Almost) Bust

Menhaden have a rich history of facilitating development in North America, dating back to when Native Americans taught the Pilgrims to fertilize their corn with dead fish.\textsuperscript{48} The menhaden fishery evolved from these low-technology beginnings as the fish’s oil became popular for industrial applications in the early nineteenth century.\textsuperscript{49} In the years following the Civil War, menhaden oil fully supplanted whale oil in many of its commercial applications,\textsuperscript{50} and brought riches to the seaside hamlet of Reedville, Virginia, then—as it is today—the hub of the Atlantic coast menhaden fishery.\textsuperscript{51}

The introduction of purse seine nets, used to encircle and scoop entire schools of menhaden out of the water, increased the fishery’s efficiency and had Virginia’s commercial menhaden business booming by the start of the twentieth century.\textsuperscript{52} Whale oil could not compete with the far cheaper menhaden product, and ground fish carcasses replaced other, more expensive forms of fertilizer.\textsuperscript{53} High demand for menhaden products, coupled with the ruthless efficiency of steamships, purse seine netting, and integration with on-shore factories created vast wealth for those at the helm of the industry at ports along the eastern seaboard.\textsuperscript{54}

In addition to applications for their oil and as fertilizer, the early twentieth century saw protein-rich menhaden dried, ground, and sold as feed for land-based livestock.\textsuperscript{55} The Atlantic commercial menhaden

\begin{footnotes}
\item[47] See, e.g., \textsc{Franklin}, supra note 3, at 7. “[M]enhaden play dual roles in marine ecology perhaps unmatched anywhere on the planet.” \textit{Id.}
\item[48] See, e.g., \textsc{Russell}, supra note 38, at 218.
\item[49] See \textit{id.} at 218–19.
\item[50] See \textsc{Franklin}, supra note 3, at 60–61.
\item[51] See \textit{id.} at 56–57, 64.
\item[52] See \textsc{Russell}, supra note 38, at 218–21.
\item[53] See \textsc{Franklin}, supra note 3, at 61–62.
\item[54] See \textit{id.} at 61, 64.
\item[55] See \textsc{Russell}, supra note 38, at 219.
\end{footnotes}
fishery reached its peak in 1956, when 1.6 billion pounds were taken.  
Most of this startling amount was used by the “reduction” industry—\[56\] apparently named without a hint of irony—which extracted the oil from the catch for its industrial applications and sold the carcasses as fertilizer and livestock feed.  
The twentieth century saw a remarkable diversification in the uses of the reduction industry’s products.  
Dick Russell points out that, “[a]s Rachel Carson once put it, ‘Almost every person in the United States has at some time eaten, used, or worn something made from menhaden.’”  
The most important innovation in the fishery, whose history is marked by technological “improvements,” was the post-World War II implementation of spotter planes to find dense schools of menhaden.  
The planes function in largely the same manner today.  
Small, agile boats follow a plane’s directions to a viable school and surround it with a high-capacity nylon purse seine net.  
A larger boat then vacuums the net’s contents—as many as 300,000 menhaden in one haul—into its hold.  
As a result of the reduction industry’s efficient tactics, the menhaden population along the east coast has fallen to about eighty percent below normal.  
Spurred by concerns of over-fishing, most Atlantic states banned the reduction industry’s seining operations from their coastal waters long ago.  
Virginia and North Carolina are the only

56 See Franklin, supra note 3, at 123.
57 Id. at 122–23, 189.
58 See Russell, supra note 38, at 219.
59 Id. Russell highlights the ubiquity of menhaden products in the life of the American consumer:

It’s in Rustoleum and Friskies Fancy Feast and Pepperidge Farm shortcake cookies and Soothing Seas Aromatherapy body cream. The oil has been used in the manufacturing of soap, linoleum, waterproof fabrics, and certain kinds of paint. With its high percentage of polyunsaturated fats, menhaden oil has also been popular for many years in Europe as a cooking oil, as well as to make margarine and shortenings.

Id.
60 See Franklin, supra note 3, at 120–21.
61 See Russell, supra note 38, at 221.
62 See The Beating Heart of the Estuary, supra note 38, at 32.
63 See id.
65 See The Beating Heart of the Estuary, supra note 38, at 32–33.
states that allow the reduction fleet to operate in their inshore waters.66 Even in the states where it is still allowed, the reduction industry has severely contracted along with the declining menhaden population.67

2. The Present-Day Menhaden Reduction Industry

The present-day menhaden reduction industry is monopolized by a single corporation: Omega Protein, Inc.68 The company operates three menhaden processing plants along the Gulf Coast, and one in Reedville, Virginia.69 Omega’s annual menhaden landings at the Reedville plant from 2001 through 2003 averaged 415 million pounds.70 That amount of fish—caught by Omega’s purse-seine reduction fleet—is “equal to five times the amount of seafood that the entire Maryland commercial fishery is able to land—counting oysters, clams, fish, everything.”71

Most of Omega Protein’s catch is dried and ground into fish meal to be sold “as a protein ingredient in animal feed for swine, cattle, aquaculture and household pets.”72 Omega also sells menhaden oil as an industrial component, a food additive, a dietary supplement, and as liquid protein for animal and aquaculture feeds.73 Whatever is left after the fish meal and fish oil are produced might end up in livestock feed, or as “organic” fertilizer.74 Every menhaden that winds up in a

66 Franklin, supra note 3, at 189.
68 Franklin, supra note 3, at 190; Carroll, supra note 35, at A1. Omega is organized under Nevada law and has its principal executive offices in Houston, Texas. Omega Protein Corp., Quarterly Report (Form 10-Q), at 1 (Nov. 11, 2007) [hereinafter Omega Quarterly Report]. For succinct descriptions of the historical oddities, strokes of luck, and cast of characters—including a former U.S. president and a real estate tycoon—that have been involved with Omega’s rise to monopoly, see Franklin, supra note 3, at 126–29 and Russell, supra note 38, at 223–25.
69 Omega Quarterly Report, supra note 68, at 23.
70 See Russell, supra note 38, at 225.
71 Id. (emphasis added).
72 Omega Quarterly Report, supra note 68, at 23. A perverse positive feedback loop results, in which chickens eat menhaden-based feed, then produce nitrogen-rich manure which runs off into the bay, where it stimulates algae growth that can cause hypoxia in the water and disease outbreaks in menhaden. Russell, supra note 38, at 234.
73 See Omega Quarterly Report, supra note 68, at 23.
74 See id.
sack of chicken feed or fertilizer, a vitamin capsule, or a linoleum floor is one less menhaden providing foundational ecosystem services within the Chesapeake Bay, thereby detracting from the bank of natural capital stored in that system.

C. The Reduction Industry Erodes Foundational Ecosystem Services in the Chesapeake Bay

The disappearance of menhaden predators from areas where they were once plentiful, the appearance of sickly striped bass whose stomachs are empty for lack of forage, and biologists who vehemently disagree with the Atlantic States Marine Fisheries Commission (ASMFC) assessment of the menhaden stock as healthy all suggest that menhaden are being over-fished within the Chesapeake Bay. Anecdotal evidence suggests that banning the reduction industry’s boats and planes from the Chesapeake, or at least reducing their operations, could help to restore healthier levels of ecosystem services. New Jersey enjoyed a “remarkable resurgence” of menhaden and associated predators in 2001 following its action to ban Omega’s boats from its waters.

Calls from environmentalists and sport fishermen for a moratorium on purse-seining in Virginia’s Chesapeake waters—in order to allow menhaden to spawn before being vacuumed out of the sea—have met predictably strong opposition from Omega. Omega claims that it is an overabundance of striped bass, not over-fishing, that is

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75 Omega has made substantial investment in OmegaPure, the company’s food grade omega-3 fatty acid product line. See id. at 27. While omega-3 fatty acids are unquestionably beneficial to human health, there are a number of alternatives to squeezing them out of menhaden, perhaps most notably extracting them directly from algae like those in the menhaden’s diet which make their flesh rich in omega-3 fatty acids. Franklin, supra note 3, at 211–13.

76 See generally Woodworth, supra note 16 (making the point that preservation of natural ecosystem functions results in enormous long-term economic benefits).

77 See The Beating Heart of the Estuary, supra note 38, at 35.

78 See, e.g., Gottlieb, Ecological Role of Atlantic Menhaden, supra note 3, at 81–83.

79 See Franklin, supra note 3, at 216–18; Russell, supra note 38, at 29–30; Price, supra note 4.

80 See Franklin, supra note 3, at 99, 218–19.

81 Id. at 99. Similarly, in Maine, some have credited a summer-long ban on midwater trawling for herring—a close relative of menhaden—with the recovery of that species in the Gulf of Maine, along with a marked increase in the presence of whales, dolphins, seabirds, and tuna. Tom Bell, Hip-Deep in Herring, Portland Press Herald, Sept. 11, 2007, at C1.

82 See Russell, supra note 38, at 29–30; Carroll, supra note 37, at A1.
reducing the menhaden population in the Chesapeake.\textsuperscript{83} The industry points to their continued ability to catch millions of pounds of fish as evidence that the stock of menhaden is in fact healthy.\textsuperscript{84}

Assessments of the health of the menhaden population based on landings are meaningless, however.\textsuperscript{85} The efficiency of Omega’s operation—which employs spotter planes to find worthwhile schools and purse seines to corral those schools all at once—ensures that catch levels can be temporarily maintained while the actual stock of fish within the bay continues to plummet.\textsuperscript{86} This phenomenon is called “inverse catchability,” and means that each successive haul of the purse seine removes a larger percentage of the remaining menhaden from the Chesapeake.\textsuperscript{87} Continuing to allow spotter planes to hunt down scarcer schools of menhaden—comprised mostly of juvenile fish that have not yet spawned—could lead to “an all-out population crash.”\textsuperscript{88}

D. Menhaden Management: A Sop to a Floundering Industry

Menhaden are the only saltwater fish in Virginia not managed by the Virginia Marine Resources Commission (VMRC).\textsuperscript{89} Rather, menhaden management seems to be a task that is jealously guarded by the Virginia state legislature.\textsuperscript{90} Mounting pressure from a coalition of environmentalists and recreational fishermen—the latter of which “account for about two-thirds of the total sales generated by Virginia’s $1

\textsuperscript{83} See Russell, supra note 38, at 228.

\textsuperscript{84} See id. at 229. Omega acknowledges that its “business is totally dependent on its annual menhaden harvest[,]” and that its “ability to meet its raw material requirements through its annual menhaden harvest fluctuates from year to year and month to month, \textit{due to natural conditions over which the company has no control},” Omega Quarterly Report, supra note 68, at 42–43 (emphasis added).

\textsuperscript{85} See Russell, supra note 38, at 229.

\textsuperscript{86} See id.

\textsuperscript{87} See id.


\textsuperscript{89} Tolliver, supra note 64, at C11; see Va. Code Ann. §§ 28.2-100 to -103, 28.2-400 to -411 (2007).

\textsuperscript{90} See Va. Code Ann. §§ 28.2-400 to -411; Harper, supra note 88, at A16 (noting that many think “years of political leverage and campaign contributions” from the reduction industry have made meaningful regulation from the legislature very unlikely); Tolliver, supra note 64, at C11.
billion fishing industry”—finally led the legislature to adopt the first ever catch limit on menhaden in 2006.

The measure allows the reduction industry to catch 109,000 metric tons annually through 2010, and up to 122,740 metric tons—over four-hundred million fish—in a year, as long as it shaves the excess off the following year’s cap. The cap was supported by the Omega Corporation. It is likely that the catch limit was palatable to Omega because it preserved management of the menhaden reduction fishery in the industry-friendly state legislature, as opposed to the VMRC, and because the alternative might have been a complete shutdown of the menhaden fishery by the federal government in response to the legislature’s failure to enact ASMFC limits. That the 109,000 metric ton catch limit was determined by averaging the reduction industry’s most recent landing data also may have played a role in winning the company’s support.

III. THE PUBLIC TRUST DOCTRINE

A. Hatching the Public Trust Doctrine

A brief discussion of the public trust doctrine’s roots will help ground the remainder of the discussion. The public trust doctrine, as understood in the United States, is typically traced back to around 530 A.D. and the Roman civil law’s recognition that the general public had inalienable rights to access and use certain resources, namely the sea and seashore, rivers, and the air. These resources were to be held as

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93 See Omega Protein Corp., Annual Report (Form 10-K), at 28 (Mar. 13, 2007). The National Marine Fisheries Service fish catch conversion ratio for menhaden is 670 pounds per 1000 fish. Id.
95 Frozen Fishing, supra note 92.
96 See Carroll, supra note 37, at A1; Frozen Fishing, supra note 92.
97 See Tom Pelton, Menhaden Matter, and They’re in Trouble, Balt. Sun, May 6, 2007, at 5F.
common property, invulnerable to private ownership. These ideals made their way into the laws of most European countries during the Middle Ages and, significantly, into the common law of England. During the thirteenth century, England established that “the shores of the sea [were] ‘common to all’ and inalienable.” Navigation and fishing were the primary public benefits sought to be preserved by giving the public inalienable property rights in the sea, seashore, and land underlying the sea.

**B. The Public Trust Doctrine Jumps the Pond**

The public trust doctrine debuted in the United States in *Martin v. Waddell*, an 1842 Supreme Court case concerning a disputed New Jersey oyster bed. There, the Court ruled that “the great right of dominion and ownership in the rivers, bays and arms of the sea . . . [and] the right of common fishery for the common people” were “immediately and rightfully vested in the state” after independence. These traditional British rights must have been intended to be held in trust for the common benefit of new settlers, otherwise few British subjects could have been convinced to make the trip to establish the new colonies. Therefore, following independence, title to traditional public trust properties formerly held by the English crown or parliament was vested in the state governments, subject to the restraints on alienation inherent in the trust. The ruling stressed the centuries-old policy of preserving the right to take shell- and finfish, among other “benefits and advantages of the navigable waters” for use by the general public.

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100 Id.  
102 Id. at 635.  
105 See *id.* at 416.  
107 See Martin, 41 U.S. at 416; Klass, *supra* note 103, at 703.  
108 See Martin, 41 U.S. at 414. In a statement that turned out to be ahead of its time, the Court even alluded to the impropriety of a decision that would prevent a resident from bathing in public trust waters “without becoming a trespasser upon the rights of another.” *Id.*
Decided fifty years after *Martin v. Waddell*, the guiding case in United States public trust doctrine jurisprudence is *Illinois Central Railroad Co. v. Illinois*.\(^{109}\) There, the Court ruled that a state’s title to lands beneath navigable waters is “held in trust for the people of the state, that they may enjoy the navigation of the waters, carry on commerce over them, and have liberty of fishing therein, freed from the obstruction or interference of private parties.”\(^{110}\) The Court went on to declare that state governments, as trustees of public trust property, cannot relinquish control over such property unless such disposal promotes the interests of the public, and does not “substantial[ly] impair[] . . . the public interest in the lands and waters remaining.”\(^{111}\)

Two years after *Illinois Central*, the Supreme Court ruled in *Shively v. Bowlby* that, as compared to the thirteen original states, “[t]he new states admitted into the Union since the adoption of the constitution have the same rights as the original states in the tide waters, and in the lands under them, within their respective jurisdictions.”\(^{112}\) Strongly endorsing the ruling in *Martin v. Waddell*, the Court recognized the value of these resources to the public for the purposes of “commerce, navigation, and fishery.”\(^{113}\) It followed that new states would hold title and control over public trust resources, “for the benefit of the whole people.”\(^{114}\)

*Illinois Central* and *Shively* do not say whether state or federal law is the source of limitations on what a state can do with its public trust resources.\(^{115}\) Courts and legal scholars have theorized that the decisions rested either solely on state law, solely on federal law of various stripes, or on some interaction of the two.\(^{116}\) While it is unlikely that

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\(^{111}\) Id. at 453. In defining its substantial impairment standard, the court in *Illinois Central* stated that, “[C]ontrol of the state for the purposes of the trust can never be lost, except as to such parcels as are used in promoting the interests of the public therein, or can be disposed of without any substantial impairment of the public interest in the lands and waters remaining.” Id.

\(^{112}\) Shively v. Bowlby, 152 U.S. 1, 57 (1894).

\(^{113}\) Id. at 15–18, 57.

\(^{114}\) Id. at 57.

\(^{115}\) See Klass, *supra* note 103, at 704–05. The author notes that this ambiguity arose in the context of the continued search for “federal general common law,” which was not abandoned until 1938 in Erie R.R. Co. v. Tompkins, 304 U.S. 64 (1938). Id. at 705.

the *Illinois Central* decision rested solely on Illinois state law, the jurisprudence that has emerged gives deference to state law in defining the precise contours of the public trust doctrine. States can define the details of their public trust doctrine—markedly expanding its protections if so desired—as long as they do not afford less protection than that mandated by *Illinois Central* and *Shively*, thereby “abrogating the public trust entirely.”

C. *The Doctrine Walks on Land (and Takes to the Sky?) in the United States*


   In his seminal 1970 article, Joseph L. Sax described his vision for the role of the judiciary in developing the public trust doctrine after tracing the doctrine’s historical roots and evolution within particular states. Sax paid particular attention to the development of the doctrine in Massachusetts, Wisconsin, and California. Sax found that these states’ courts had frequently resorted to public trust principles in the interest of democracy, invalidating actions of state legislatures and agencies which furthered private commercial interests at the expense of public access to resources. Sax saw potential for the doctrine to encourage future democratization of legislative and administrative decisions with a tendency to unduly favor the interests of powerful minorities—such as utilities, developers, or commercial fishing monopolists—at the expense of widely held, though diffuse, public interests in natural resources.

   In *Gould v. Greylock Reservation Commission*, the Supreme Judicial Court of Massachusetts invalidated the grant of 4000 acres of the Greylock State Reservation by the Greylock Reservation Commission for the purpose of building a commercial ski resort. In *Gould*, the

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117 See id. at 460.
118 See id. at 461–62.
119 See Klass, supra note 103, at 705; Wilkinson, supra note 116, at 464.
120 See Sax I, supra note 98, at 551–53.
121 See id. at 491, 509, 524.
122 See id. at 491–92, 513, 540. Sax described the Wisconsin court as having successfully invoked the public trust as a means of “combat[ing] the tendency of the legislature and of administrative agencies to subordinate diffuse public advantages to pressing private interests.” Id. at 513.
123 See id. at 558–59.
court protected the diffuse public interest in continued use of a public park in the face of highly concentrated, well-funded private commercial interests.\textsuperscript{125} By requiring that the grant of park land for a commercial enterprise be subject to explicit legislative authorization, the court ensured that “openness and visibility” in the legislative process would be there to preserve public trust resources from motivated and influential private interests.\textsuperscript{126}

In the late nineteenth and early twentieth centuries, the Supreme Court of Wisconsin invalidated administrative and legislative acts premised on the public utility of draining wetlands in the interest of expanding agriculture.\textsuperscript{127} In \textit{Priewe v. Wisconsin State Land & Improvement Co.}, the court cited favorably to \textit{Illinois Central} and that case’s mandate that navigable waters be held in trust by the state for the public purposes of navigation and fishing.\textsuperscript{128} The court held that “the legislature had no power, under the guise of legislating for the public health, to authorize the destruction of a lake . . . to the great injury of the plaintiff as such riparian owner, for private purposes, and for the sole benefit of private parties.”\textsuperscript{129}

In a later case, the Supreme Court of Wisconsin invalidated the Railroad Commission’s plan for a levee and drainage system affecting navigable tributaries of the Mississippi River.\textsuperscript{130} The court ruled that the “substantial destruction” of the public rights of trapping, hunting, fishing, and navigation was not outweighed by the largely speculative benefits of agricultural reclamation urged by the Railroad Commission.\textsuperscript{131} In these Wisconsin cases, the court refused to defer to the legislature or administrative agencies in situations where diffuse interests in access to public trust resources had been subordinated to concentrated, influential private interests.\textsuperscript{132}

\textsuperscript{125} See Sax I, \textit{supra} note 98, at 494–95.
\textsuperscript{126} See \textit{id.} at 495–96.
\textsuperscript{127} \textit{Id.} at 509–10.
\textsuperscript{128} \textit{Priewe v. Wis. State Land & Improvement Co.}, 67 N.W. 918, 922 (Wis. 1896).
\textsuperscript{129} \textit{Id.}
\textsuperscript{130} \textit{In re Crawford County Levee & Drainage Dist. No. 1}, 196 N.W. 874, 878 (Wis. 1924).
\textsuperscript{131} See \textit{id.}
\textsuperscript{132} See Sax I, \textit{supra} note 98, at 514.

The history of the public trust doctrine in the United States subsequent to Sax’s groundbreaking article has generally been one of expansion with respect to resources and purposes encompassed within the public trust doctrine.133 The doctrine’s evolution in several states seems to have corresponded with Sax’s contention that “protections which the courts have applied in conventional public trust cases would be equally applicable and equally appropriate in controversies involving air pollution, . . . pesticides, the location of rights of way for utilities, and strip mining . . . .”134 Sax’s progressive vision of the public trust doctrine converged with a growing awareness of problems posed by environmental degradation to foster the doctrine’s evolution in the decades following 1970.135

Several state courts in the 1970s, led by the California Supreme Court’s decision in Marks v. Whitney, began acting in accordance with the theory that the public trust doctrine’s protections encompassed more than the public’s interest in the ultimate ends of navigation, commerce, and fishery.136 The court in Marks v. Whitney asserted the flexibility of the doctrine’s purposes and recognized “the preservation of [tidelands] in their natural state, so that they may serve as ecological units for scientific study, as open space, and as environments which provide food and habitat for birds and marine life, and which favorably affect the scenery and climate of an area” as an essential public trust use.137

133 See Smith & Sweeney, supra note 99, at 332 (noting that the public trust doctrine has been used to protect interests in “boating, swimming, fishing, hunting, preserving wildlife habitat, . . . aesthetic beauty, maintaining ecological integrity, and retaining open spaces, which are all seen today as part of ‘legitimate public expectations.’”); see also Lazarus, supra note 101, at 649.

134 Sax I, supra note 98, at 556–57; see Klass, supra note 103, at 706–07. For an explanation of Sax’s idea that the public trust doctrine should evolve to encompass diffuse interests in maintenance of stable ecosystems, see Joseph L. Sax, Liberating the Public Trust Doctrine from Its Historical Shackles, 14 U.C. Davis L. Rev. 185 (1980) [hereinafter Sax II]. Sax later argued that the public trust doctrine’s fundamental purpose is the protection of “expectations held in common but without formal recognition such as title.” Id. at 188. Rapid, destabilizing changes in such expectations have the potential to “provoke crises—social, biological and . . . economic.” Id.

135 See Klass, supra note 103, at 707–08.

136 See id. Many of the interests protected by state courts invoking the public trust doctrine are what ecological economists today would call ecosystem services. See Costanza et al., supra note 6, at 254 tbl.1.

The Wisconsin Supreme Court struck an equally enlightened chord in *Just v. Marinette County* when it announced that, “under the trust doctrine [the state] has a duty to eradicate the present pollution and to prevent further pollution in its navigable waters.”\(^{138}\) The court recognized that healthy ecosystems are foundational to traditional public trust values when it stated of the unremarkable wetlands in question:

Swamps and wetlands were once considered wasteland, undesirable, and not picturesque. But as the people became more sophisticated, an appreciation was acquired that swamps and wetlands serve a vital role in nature, are part of the balance of nature and are essential to the purity of the water in our lakes and streams. Swamps and wetlands are a necessary part of the ecological creation and now, even to the uninitiated, possess their own beauty in nature.\(^{139}\)

In the same year that the Wisconsin Supreme Court decided *Just*, a New York state court declared a number of wetlands-related ecosystem services to be logically protected by the public trust doctrine.\(^{140}\) The court reasoned that “[t]he entire ecological system supporting the waterways is an integral part of them . . . and must necessarily be included within the purview of the trust.”\(^{141}\)

3. Common Law Public Trust Doctrine from 1980 to the Present

Even after the environmental fervor of the 1970s ebbed, California courts continued to lead state efforts to protect diffuse public interests in natural resources through the public trust doctrine.\(^{142}\) The California Supreme Court protected a number of ecosystem services via the public trust doctrine when it decided *National Audubon Society v. Superior Court of Alpine County (Mono Lake)* in 1983.\(^{143}\) The court out-

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138 Just v. Marinette County, 201 N.W.2d 761, 768 (Wis. 1972).
139 Id.
141 Id. at 532. The court recognized that if wetlands were not preserved so as to perform the ecosystem services of acting “as a buffer against the ravages of the sea, cleanser of the incoming tide, a base for the marine food chain, nesting grounds for birds and particularly endangered species and sanctuary to a variety of animals[,]” then efforts to protect more traditional public trust interests like fishing and navigation would be built upon shifting sands. See id. at 533.
142 See Klass, supra note 103, at 710.
lined the ecological and aesthetic harms caused by the drop in water level and rise in salinity of Mono Lake resulting from diversions of fresh water to the city of Los Angeles: disruption of the food chain; extreme stresses on the migratory bird population; and harm to humans’ ability to enjoy the lake’s economic, scenic, and recreational values.\footnote{See id. at 715–16.} The court in Mono Lake required the state to reexamine Los Angeles’ rights to divert fresh water from Mono Lake in light of the damage that practice was causing to the public interest in the ecological and recreational integrity of that unique resource.\footnote{See id. at 732.}

More recently, the Supreme Court of Hawaii recognized that, as public values and needs have evolved, so too have the rights preserved in the public by the public trust doctrine.\footnote{In re Water Use Permit Applications (Waiahole Ditch), 9 P.3d 409, 448 (Haw. 2000).} The Hawaii court ruled in \textit{In re Water Use Permit Applications (Waiahole Ditch)} that a statute regulating diversions of fresh water did not properly account for the public trust purpose of “the exercise of Native Hawaiian and traditional and customary rights[,]” and rejected the idea that preservation of waters in their natural state constitutes waste.\footnote{Id. at 449.} The court went on to expressly reject “private commercial use as among the public purposes \textit{protected} by the trust.”\footnote{Id. at 450.}

Sax’s expansive vision for the public trust doctrine, as developed by the courts of California and Hawaii, would most likely protect the public’s interest in the foundational ecosystem services provided by menhaden.\footnote{See Sax I, supra note 98, at 556–57.} As discussed below, however, the foundational ecosystem services provided by menhaden may be protected by even the most conservative reading of the public trust doctrine.\footnote{See Ruhl & Salzman, supra note 8, at 236–37.}
D. Spawning of the Public Trust Doctrine in Virginia

1. Virginia’s Common Law Public Trust Doctrine

a. Virginia Public Trust Cases From 1900–1932

The common law public trust doctrine was statutorily adopted in Virginia pursuant to section 1-200 of the Code of Virginia, which provides: “The common law of England, insofar as it is not repugnant to the principles of the Bill of Rights and Constitution of this Commonwealth, shall continue in full force within the same, and be the rule of decision, except as altered by the General Assembly.”151

During the early part of the twentieth century, Virginia courts addressed the scope of England’s common law public trust doctrine in a number of conflicts involving rights to use traditional public trust resources, often oyster beds and the waters covering them.152 In *Taylor v. Commonwealth*, the Supreme Court of Appeals of Virginia drew on language from *Illinois Central* and other federal and state precedents to determine that “the navigable waters and the soil under them . . . are the property of the state, to be controlled by the state, in its own discretion, for the benefit of the people of the state . . . .”153 *Taylor* established that a Virginia statute stating:

All the beds of the bays, rivers, creeks, and the shores of the sea within the jurisdiction of this commonwealth . . . shall continue and remain the property of the commonwealth of Virginia, and may be used as a common by all the people of the state for the purpose of fishing and fowling, and of taking or catching oysters and other shellfish, subject to . . . any future laws that may be passed by the General Assembly

had its proper foundation in the common law and merely restated preexisting Virginia common law.154 While *Taylor* restricted the legislature’s use of public trust resources to uses benefitting the public, the

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152 See Taylor v. Commonwealth, 47 S.E. 875, 878 (Va. 1904).
153 Id. at 879.
154 Id. at 877, 879; see also Meredith v. Triple Island Gunning Club, 73 S.E. 721, 723 (Va. 1912) (citing Taylor, 47 S.E. at 875, and noting that county laws governing the taking of game were designed with the good of all state citizens in mind).
Virginia courts were far from consistent in their application of this restriction during the following three decades.\(^\text{155}\)

In 1932 the Supreme Court of Appeals of Virginia decided *Commonwealth v. City of Newport News*, ruling that the Supreme Court of the United States erred in *Martin v. Waddell* and *Illinois Central*, hobbling the public trust doctrine in Virginia.\(^\text{156}\) In *Newport News*, the court narrowed the powers of the public trust doctrine by holding that the State does not act as trustee for the public with respect to fishery resources.\(^\text{157}\) Rather, the court determined that—unlike navigation and commerce—references in *Illinois Central* and forgoing state precedent to fishery as a right held in trust for the people were merely casual dicta.\(^\text{158}\) The court thereby unburdened the Virginia legislature of the need to comply with the *Illinois Central* mandate that states not dispose of public trust resources in such a way as to substantially impair the public interest in the lands and waters remaining.\(^\text{159}\)

The *Newport News* court ruled that, following the American Revolution, the people of each original state came to possess “full and complete dominion for governmental purposes over all the lands and waters within its territorial limits, and the full and complete proprietary right in all [those] lands and waters . . . .”\(^\text{160}\) This interpretation eviscerated the concept of preserving waterways in trust for public use that dates back millennia and is recognized all over the globe.\(^\text{161}\) The court found no limitations within the state or federal constitutions on the rights of the state legislature to allow tidal waters and their bottoms to be used for purposes leading inevitably to the destruction of their usefulness as fish-


\(^{156}\) *See Commonwealth v. City of Newport News*, 164 S.E. 689, 694–96 (Va. 1932); Kelly, *supra* note 155, at 905–06.

\(^{157}\) 164 S.E. at 699; *see* Kelly, *supra* note 155, at 908. Kelly discusses *Newport’s* classification of navigation and commerce as incidents of the *jus publicum* and fishery as an incident of the *jus privatum*. *Id.* The *jus publicum* encompasses those rights which cannot be surrendered to private interests or substantially impaired, while the *jus privatum* refers simply to typical rights of private property. *Id.*

\(^{158}\) *Newport News*, 164 S.E. at 698 n.5.


\(^{160}\) 164 S.E. at 695.

\(^{161}\) *See* Wilkinson, *supra* note 116, at 429–431 (identifying the preservation of waterways for communal use as a thread running not just from the common law of England to the United States, but through societies as diverse and far-flung as medieval Europe; pre-Christian Asia, Africa, and the Middle-East; and most Native American cultures).
eries.

The city of Newport News was allowed to continue putting its coastal waters and underlying oyster beds to use as raw sewage dumps.

Even judged by the standards of 1932, the court in *Newport News* could be considered disingenuous in pleading ignorance as to the havoc their ruling would wreak on affected ecosystems.

Today, however, we know that harms to individual species resonate throughout ecosystems and erode foundational ecosystem services which underpin not just the ability to fish for depleted species, but also the other traditional public trust interests of commerce and navigation.

b. Modern Virginia Public Trust Cases

Modern Virginia courts have declined to explicitly expand the narrow public trust duty imposed on the state in *Newport News*.

Paradoxically, however, some cases cite favorably to pre-*Newport News* cases which construed the trust more broadly, and to treatises describing the doctrine in similar broad terms.

These cases have held that the state, bolstered by constitutional and statutory law, discussed below, has power under the public trust doctrine to govern the construction of wharves and docks over subaqueous lands held in trust for the benefit of the people.

In *Evelyn v. Commonwealth Marine Resources Commission*, the Virginia Court of Appeals dedicated a footnote to the evolution of state constitutional and statutory law after 1932, and an interpretation of the public trust doctrine that seemed critical of the perverse result of *Newport News*.
Stopping short of defining the precise parameters of Virginia’s public trust doctrine, the court in *Evelyn* determined that the VMRC had acted properly in considering “a form of the public trust doctrine” in denying a permit application for a roofed structure built over public water.\(^{170}\)

Similarly, in *Palmer v. Commonwealth Marine Resources Commission*, the Virginia Court of Appeals declared that the state’s definition of the public trust provides:

> [T]he state holds the land lying beneath public waters as trustee for the benefit of all citizens. As trustee, the state is responsible for proper management of the resource to ensure the preservation and protection of all appropriate current and potential future uses, including potentially conflicting uses, by the public.\(^{171}\)

The VMRC properly considered this formulation of the public trust doctrine in its decision to deny a permit to construct a storage shed over public waters.\(^{172}\) These modern cases cast a ray of hope into the morass of menhaden management, hinting that interaction of common, constitutional, and statutory law might provide public trust protection for the foundational ecosystem services menhaden provide.\(^{173}\)

2. The Public Trust Doctrine in Virginia’s Constitution

Article XI, section 1 of the 1970 Virginia State Constitution provides:

> To the end that the people have clean air, pure water, and the use and enjoyment for recreation of adequate public lands, waters, and other natural resources, it shall be the pol-

\(^{169}\) See *Evelyn*, 621 S.E.2d at 137 n.3. “Since . . . 1932, Virginia’s Constitution has been amended to require, *inter alia*, protection of the Commonwealth’s `waters from pollution, impairment, or destruction, for the benefit, enjoyment, and general welfare of the people . . .`” *Id*. The court went on to determine that consideration of the public trust doctrine was appropriate “when interpreting and applying *all* legislative enactments” in light of this constitutional amendment’s interaction with a statute requiring the legislature to consider the public’s interest in the subaqueous lands held in trust by it for the benefit of the public. *Id*.

\(^{170}\) See *id*.

\(^{171}\) 628 S.E.2d at 89 (emphasis added) (alteration in original).

\(^{172}\) See *id*.

\(^{173}\) See Klass, *supra* note 103, at 728–29 (noting that, “as the modern common law public trust doctrine has developed since the 1970s, courts can now rely on that body of law to inform their interpretations of state constitutional law and statutory law”); Kelly, *supra* note 155, at 916–17.
icy of the Commonwealth to conserve, develop, and utilize its natural resources, its public lands, and its historical sites and buildings. Further, it shall be the Commonwealth’s policy to protect its atmosphere, lands, and waters from pollution, impairment, or destruction, for the benefit, enjoyment, and general welfare of the people of the Commonwealth.\textsuperscript{174}

Although courts have used this provision as guidance in determining the scope of the public’s rights to exploit resources and to affirm agency decisions to limit these rights,\textsuperscript{175} the Supreme Court of Virginia has determined that article XI, section 1 is not self-executing.\textsuperscript{176} The General Assembly may enact legislation to bring about the public policy declared in the provision, but absent such legislation courts are powerless to affect the mandate.\textsuperscript{177} It is clear that any legislation enacted to protect the menhaden population of the Chesapeake Bay would be within the authority granted to the General Assembly to bring Article XI’s policy mandate to life.\textsuperscript{178}

3. The Public Trust Doctrine in Virginia Statutory Law

The Virginia legislature adopted the common law of England by statute, subject to alteration by the General Assembly.\textsuperscript{179} Arguably, then, unless explicitly altered by the General Assembly, the public trust doctrine as it existed within the English common law lives on in the laws of Virginia.\textsuperscript{180}

Beyond the general implication that adoption of the common law of England encompassed adoption of the traditional English public trust doctrine, recognizable public trust values do appear in Virginia

\textsuperscript{174}Va. Const. art. XI, § 1.
\textsuperscript{175}See Evelyn, 621 S.E.2d at 137 n.3.
\textsuperscript{177}Shockoe, 324 S.E.2d at 677; Adams et al., supra note 176, at 233 (describing the types of constitutional provisions deemed to be self-executing by Virginia courts); Kelly, supra note 155, at 913.
\textsuperscript{178}Va. Const. art. XI, § 2; see Shockoe, 324 S.E.2d at 677.
\textsuperscript{179}Va. Code Ann. § 1-200 (2007). This code section is often cited as § 1-10, its former location. Id.
\textsuperscript{180}See Evelyn, 621 S.E.2d at 135.
Most notably, title 28.2, section 1200 of the Virginia Code provides:

All the beds of the bays, rivers, creeks and the shores of the sea within the jurisdiction of the Commonwealth, not conveyed by special grant or compact according to law, shall remain the property of the Commonwealth and may be used as a common by all the people of the Commonwealth for the purpose of fishing, fowling, hunting, and taking and catching oysters and other shellfish.

Also, as the court in *Evelyn* pointed out, title 28.2, section 1205(A) of the Virginia Code requires Virginia Marine Resources Commission deliberations regarding permits for the use of state-owned bottomlands to be guided by article XI, section 1 of the constitution, as well as in a manner

[C]onsistent with the public trust doctrine as defined by the common law of the Commonwealth adopted pursuant to § 1-200 in order to protect and safeguard the public right to the use and enjoyment of the subaqueous lands of the Commonwealth held in trust by it for the benefit of the people as conferred by the public trust doctrine and the Constitution of Virginia.

Thus, a nascent conception of the public trust doctrine exists in Virginia’s statutes and constitution, which, if brought to life through judicial action, could protect menhaden-related foundational ecosystem services.

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182 Id.
183 Va. Code Ann. § 28.2-1205 (2007); see *Evelyn*, 621 S.E.2d at 135, 137 n.3. Public trust values are also recognizable in the Chesapeake Bay Preservation Act, which aims to protect the public interest in keeping the waters of the bay healthy, thereby promoting the general welfare of the people. See Va. Code Ann. § 10.1-2100 (2007). “Healthy state and local economies and a healthy Chesapeake Bay are integrally related; balanced economic development and water quality protection are not mutually exclusive.” Id; see also Robert E. Baute, Jr., Note, *Adrift Without a Paddle: The Present and Future of the Chesapeake Bay Preservation Act*, 26 WM. & MARY ENVTL. L. & POL’Y REV. 441, 475–76 (2001) (cautioning that although its aim of correcting harms to the Chesapeake Bay caused by prolonged environmental abuses were noble, lack of funding and lax, inconsistent enforcement could de-claw the Act).
184 See Klass, supra note 103, at 744 (arguing that “[the public trust doctrine] has developed with changing societal needs, and, like other common law doctrines, can look to
IV. Establishing Public Trust Protection for Menhaden’s Foundational Ecosystem Services

A. Historical Public Trust Protection for Ecosystem Services

1. Pre-1970 Case Law

In a sense, the public trust doctrine has always protected ecosystem services. Before the modern concept of the doctrine—and indeed before a scientifically precise understanding of the interrelatedness of ecosystem components—had crystallized, societies recognized public uses of waterways for thousands of years. Even the private property-minded British, from whom we inherited our common law, recognized that a private right to the ecosystem service of food production could not be granted via exclusive fishing rights in navigable waters.

Although the seminal federal public trust cases had the utilitarian purposes of commerce, navigation, and fishing in mind, these purposes are either ecosystem services themselves, or are facilitated by underlying, foundational ecosystem services. The traditional public trust purpose of fishery—which today is inextricably bound up with the traditional public trust purpose of commerce—is the ecosystem service of food production. Fishery also finds essential foundational support in the ecosystem services of refugia, waste treatment, and biological control, among others. The traditional public trust purposes of commerce and navigation—which today are driven partly by recreational users—are built upon a foundation of ecosystem services including pollution control, nutrient cycling, and habitat provi-

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185 See Wilkinson, supra note 116, at 429–30 (discussing the long history of societies protecting the public’s right to water supply and water-related food production).

186 Id.

187 See Martin v. Waddell, 41 U.S. 367, 414 (1842); Sax I, supra note 98, at 475.

188 See, e.g., Shively v. Bowlby, 152 U.S. 1, 49–50 (1894).

189 See Costanza et al., supra note 6, at 254 & tbl.1.

190 See id. at 254 tbl.1.

191 The ecosystem service of refugia is exemplified by the provision of “[n]urseries, habitat for migratory species, [and] regional habitats for locally harvested species . . . .” Id.

192 Biological control includes “[k]eystone predator control of prey species, [and] reduction of herbivory by top predators.” Id. Menhaden’s reduction of hypoxia-generating phytoplankton through filter-feeding is an example of biological control. See Franklin, supra note 3, at 43.

193 See Costanza et al., supra note 6, at 254 & tbl.1.
Recreational and commercial navigation and fishing are unlikely to be popular uses of murky, lifeless waters. The failure to sustain the provision of foundational ecosystem services like those mentioned above erodes the general public’s interest in the traditional public trust purposes of navigation, commerce, and fishery. People’s motivations to navigate, as well as modes of water-based commerce, have evolved and expanded since early settlers used the country’s waterways for exploration, transport, and trade. The formulation of the public trust doctrine laid down in *Illinois Central Railroad v. Illinois* does not, however, discriminate against increasingly recreation- and culture-driven modes and objectives of navigation and commerce in prohibiting substantial impairment of the public’s use and enjoyment of them.

Pre-1970 state court cases added flesh to the *Illinois Central* and *Shively v. Bowlby* public trust doctrine skeleton and protected diffuse public interests in ecosystem services. In *Gould v. Greylock Reservation Commission*, the Supreme Judicial Court of Massachusetts overrode an agency’s grant of land for the purpose of building a ski resort in part because the clearing of land would “[have] ‘a definite effect upon the ecology for some distance back from the edge of the clearing.’” The Massachusetts court did not point to specific forest-related ecosystem services—nutrient cycling, waste treatment, recreation—but it did explicitly mention protection of the forest ecology as a factor in their decision to invalidate the ski resort lease.

Early Wisconsin cases, too, recognized that destruction of ecosystem services by filling or draining wetlands would violate the public

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194 See id.
195 See Franklin, *supra* note 3, at 43 (describing the swamp ecology that can result when a marine ecosystem is subjected to the most extreme deprivation of ecosystem services); NSTC Assessment, *supra* note 40, at 2 (outlining the “wide range of potential negative effects resulting from eutrophication”).
196 See Russell, *supra* note 38, at 226–27; Costanza et al., *supra* note 6, at 254 tbl.1.
197 See Wilkinson, *supra* note 116, at 431–34; see also Costanza et al., *supra* note 6, at 254 tbl.1. Costanza lists “[e]co-tourism, sport fishing, and other outdoor recreational activities” such as, say, whale- or bird-watching, and “[a]esthetic, artistic, educational, spiritual, and/or scientific values of ecosystems” among recreational and cultural ecosystem services, which help support some modern applications of commerce and navigation. Id.
201 Id.
In 1924 the Supreme Court of Wisconsin reaffirmed its stance that navigable waters “should be free to all for commerce, for travel, for recreation, and also for hunting and fishing, which are now mainly certain forms of recreation.”

2. 1970s Case Law

Against the backdrop of the environmentalist movement of the 1970s, state courts broadened the scope of public trust protection. This charge, taken up by several states with California and Wisconsin in the lead, engendered a broadening of resources protected by the public trust doctrine, and reflected a realization that protection of traditional public trust rights would be hollow without protection of the foundational ecosystem services underpinning those rights.

The simple logic of People of the Town of Smithtown v. Poveromo is seen again in the famous California public trust case, Marks v. Whitney. The court there implicitly recognized the value of ecosystem services provided by tidelands preserved in their natural state. The tideland ecosystem service of providing food and habitat for birds and marine life is foundational with respect to the traditional public trust purpose of fishery, and is also the impetus for several types of modern commerce and navigation. Ecosystem services that enhance the scenery and climate of an area are foundational with respect to the traditional public right to navigation in public waters. Failure to protect such foundational ecosystem services could result in there being no useful traditional public trust purposes left to enjoy.

202 See supra notes 131–36 and accompanying text.
203 In re Crawford County Levee & Drainage Dist. No. 1, 196 N.W. 874, 876 (Wis. 1924) (quoting Diana Shooting Club v. Husting, 145 N.W. 816, 820 (Wis. 1914)). Costanza et al. consider “[e]co-tourism, sport fishing, and other outdoor recreational activities” to be part of the ecosystem service of recreation, and hunting and fishing to be part of the ecosystem service of food production. See Costanza et al., supra note 6, at 254 tbl.1.
204 E.g., Klass, supra note 103, at 707–08. The 1970s saw the celebration of the first Earth Day and the development of an increasingly confident community of ecosystem ecologists. See Brooks, Jones & Virginia, supra note 1, at 9.
205 See supra notes 144–45 and accompanying text.
207 See supra notes 140–41 and accompanying text.
208 See Costanza et al., supra note 6, at 254 tbl.1.
209 See id.
210 See McCay, supra note 106, at 155–56 (discussing the collapse of New Jersey’s oyster fishery in the early part of the twentieth century).
The Wisconsin Supreme Court came to a similar conclusion regarding the value of wetlands in *Just v. Marinette County.*\(^{211}\) The court’s forceful ruling in favor of protection of ecosystem services via the public trust doctrine is another example of judicial recognition of those services’ foundational position with respect to traditional public trust resources.\(^{212}\) The court implied that water-purifying wetlands should be protected under the public trust doctrine because without pure water, few people would want to exercise their traditional public rights to fishery and navigation—all the fish being dead or elsewhere, and the water being too foul to enjoy recreational navigation over.\(^{213}\)

3. Mono Lake and Beyond

The Supreme Court of California examined Mono Lake’s ability to continue to provide certain ecosystem services in ruling that diversions of water from the lake to Los Angeles had to be reexamined in light of the public trust doctrine.\(^{214}\) Continued depletion of the lake’s fresh water had to be weighed against degradation of the lake’s ability to provide public trust resources as a fishery and source of great scenic, recreational, and ecological value.\(^{215}\) The court flatly rejected the contention that the state could use the trust resource of the lake as it wished, and to the extent that the ecosystem services that gave it much of its value would inevitably be destroyed.\(^{216}\)

The Supreme Court of Hawaii built on the *National Audubon Society v. Superior Court of Alpine County (Mono Lake)* decision when they prohibited harmful water allocations from being made under the banner of scientific uncertainty.\(^{217}\) By encouraging use of the precautionary principle to govern off-stream water uses, the court recognized the importance of the services provided by the estuary ecosystem.\(^{218}\)

\(^{211}\) Just v. Marinette County, 201 N.W.2d 761, 768 (Wis. 1972).
\(^{212}\) See id. The court focused on the ecosystem service of water purification as provided by swamps and other wetlands. Id.
\(^{213}\) See id.
\(^{214}\) See supra Part III.C.3.
\(^{216}\) Id. at 723–24.
\(^{217}\) See In re Water Use Permit Applications (Wai’ahole Ditch), 9 P.3d 409, 470–71 (Haw. 2000).
\(^{218}\) See id.
B. Bringing Menhaden’s Services Beneath the Public Trust Umbrella

1. Being Eaten

Menhaden have a rich history of contributing foundational ecosystem services in support of public trust resources along the Atlantic coast of the United States.\(^\text{219}\) Menhaden were first recognized for their ability to provide a food source for vast numbers of predators, including fish, birds, and marine mammals.\(^\text{220}\) The species is an essential part of the diets of popular game fish such as striped bass.\(^\text{221}\)

Provision of food to predators is a foundational ecosystem service that supports the traditional public trust purposes of fishing, navigation, and commerce.\(^\text{222}\) That a healthy menhaden population supports fisheries through its role in the food web is obvious. Menhaden are the preferred meal of many favorite seafood species in the wild, as well as being one of the favorite baits of lobster and crab fishermen all along the east coast.\(^\text{223}\) Unsustainable exploitation of the menhaden population in the Chesapeake Bay will result in scarcity of these desirable food fish.\(^\text{224}\)

Beyond supporting healthy fisheries, a population of menhaden capable of providing the ecosystem service of feeding predators contributes to the viability of the traditional public trust resources of commerce and navigation.\(^\text{225}\) Recreational anglers exercise their public trust right to navigation when they fish from boats.\(^\text{226}\) Commercial enterprises, including private fishing charters, communal fishing boats, whale-watching vessels, and certain eco-tourism vessels would have little reason to ply their trades over the navigable waters of the Chesapeake if it weren’t for the foundational ecosystem services pro-

\(^{219}\) See Franklin, supra note 3, at 7–8.
\(^{220}\) See supra Part II.A.2.
\(^{221}\) See Russell, supra note 38, at 226–27.
\(^{222}\) See id. at 29–34.
\(^{223}\) Id. at 29.
\(^{224}\) See Russell, supra note 38, at 213–14; Gottlieb, Ecological Role of Atlantic Menhaden, supra note 3, at 83–84.
\(^{225}\) See Franklin, supra note 3, at 218–19. The author describes the “stunning resurgence” of menhaden and the commercially exploitable species which rely on them in New Jersey waters following a ban on Omega’s operations there. Id.; see also Bell, supra note 81, at C1 (discussing a ban on coastal trawling for herring in Maine that may be responsible for a rebound in the abundance and diversity of sea life in those waters, much to the delight of the coalition of “conservationists, tuna fishermen, lobstermen, charter fishing boats, sport fishermen and whale-watching companies” who supported the ban).
\(^{226}\) See Diana Shooting Club v. Husting, 145 N.W. 816, 820 (Wis. 1914).
vided by menhaden.\footnote{See \textit{Franklin, supra} note 3, at 29, 218–19.} Thus, menhaden’s provision of the essential foundational ecosystem service of food web support allows the traditional public trust rights of fishery, navigation, and commerce to be enjoyed by the public on the Chesapeake Bay.\footnote{See \textit{Russell, supra} note 38, at 215.}

2. Eating

The other foundational ecosystem services menhaden provide stem from their voracious appetites.\footnote{\textit{Supra} Part II.A.1. The average adult menhaden can filter around fifteen liters of water every minute. Sara J. Gottlieb, \textit{Nutrient Removal by Age-0 Atlantic Menhaden (Brevoortia Tyrranus) in Chesapeake Bay and Implications for Seasonal Management of the Fishery}, 112 \textit{Ecological Modeling} 111, 112 (1998). Gottlieb’s study addresses the concern that the reduction fishery is removing too many pre-spawning age fish from the population, thereby compromising the stock’s long-term viability. See \textit{id.} at 112–13.} Filter feeding by menhaden helps to mitigate factors that have led to the expansion of areas where dissolved oxygen has become too scarce to support life—dead zones—within the Chesapeake Bay.\footnote{\textit{NSTC Assessment, supra} note 40, at 24–26.} Expansion of these dead zones lessens public access to traditional public trust purposes whose value is derived from the presence of abundant marine life in those areas.\footnote{\textit{Russell, supra} note 38, at 239. “During the two summer weeks [in 2003] when the ‘dead zone’ was at its greatest extent, watermen spoke of blue crabs dying in their pots, of red tides wiping out oyster beds, of striped bass disappearing from their customary habitats.” \textit{Id.} See \textit{Nat’l Audubon Soc’y v. Super. Ct. of Alpine County (Mono Lake)}, 658 P.2d 709, 724 (Cal. 1983) (recognizing the public’s interest in its “common heritage of streams, lakes, marshlands and tidelands” as being protected by the public trust).}

Thus, menhaden’s ecosystem services are far from being of interest only to environmental “protectionists.”\footnote{See \textit{Brooks, Jones & Virginia, supra} note 1, at 5–6.} Rather, they represent bricks in the growing edifice of public awareness as to the interrelatedness of healthy natural systems and the economic, social, and cultural well-being of the human population.\footnote{See \textit{Franklin, supra} note 3, at 138–39.} Indeed, the ability of the general public to enjoy their rights to fish, navigate, and conduct commerce over the waters of the Chesapeake Bay are contracting along with the expansion of hypoxic and anoxic zones.\footnote{\textit{James Price, Chesapeake Bay Ecological Foundation, Inc., Chesapeake Bay an Undeclared Ecological Disaster}, (2008), http://www.chesbay.org/articles/3.asp.} Protection of menhaden is not a panacea for the complex and daunting stresses the Chesapeake Bay faces.\footnote{See \textit{Franklin, supra} note 3, at 224.} That does not mean, however, that the foundational ecosystem services provided by menhaden in support of
traditional public trust rights should be co-opted by a corporate monopoli

C. Capturing Menhaden’s Ecosystem Services With Virginia’s Ragged Public Trust Net

Virginia courts have largely declined to heed Professor Sax’s suggestion that judicial intervention using the public trust doctrine be used as an instrument of democratization in a broad range of natural resource cases. It would be a mistake, however, to claim that case law in Virginia has not evolved along with the public’s environmental ethos since the Supreme Court of Virginia ruled that using oyster beds “for discharge into them of sewage is a public use.” An understanding of the role that healthy ecosystems play in maintaining human quality of life—including components of quality of life derived from traditional public trust purposes—has developed since the early days of the environmental movement.

The 1932 ruling in Commonwealth v. City of Newport News does not foreclose the possibility of protecting menhaden through use of Virginia’s public trust doctrine. The court in Newport News ruled that the legislature, “in the absence of any constitutional provision on the subject, has the right to . . . authorize, permit, or suffer its tidal waters or their bottoms to be used for purposes which impair or even destroy their use for purposes of fishery[.]” The court did not consider a factor that we are in a much better position to evaluate today with respect to the Chesapeake Bay menhaden population: the extent to which a ruling sanctioning the destruction of the Chesapeake Bay oyster population also undermined the foundational ecosystem services provided by that resource. The court would stand on solid ground today were it to overrule Newport News. Such action would be proper

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236 See Russell, supra note 38, at 230–32.
237 See Kelly, supra note 155, at 916–17.
238 See Commonwealth v. City of Newport News, 164 S.E. 689, 699 (Va. 1932); Brooks, Jones & Virginia, supra note 1, at 6.
239 See Brooks, Jones & Virginia, supra note 1, at 5–6; Gottlieb, Ecological Role of Atlantic Menhaden, supra note 3, at 13–16.
240 See Kelly, supra note 155, at 916–17.
241 Newport News, 164 S.E. at 699.
242 See id. at 700. “[T]he General Assembly has the power to authorize, permit, or suffer sewage to be discharged into Hampton Roads and its estuaries, and to subject the discharge . . . to no restrictions relative to its injury to fishery therein . . . .” Id.
because destruction of fisheries—like those for oysters and menhaden—have resonant effects within ecosystems.\textsuperscript{243} Given the evolution of the science of ecology since \textit{Newport News}, the result in that case is offensive to even the narrowest reading of the public trust doctrine.\textsuperscript{244} \textit{Newport News} sanctions the destruction of foundational ecosystem services by the legislature, in derogation of its duty to protect the public’s diffuse interest in traditional public trust purposes—including commerce, navigation, and fishing—supported by those services.\textsuperscript{245}

Should the court refuse to take the bold step of overruling \textit{Newport News}, remanding the legislature’s illusory cap on the Chesapeake Bay menhaden “harvest” would still be proper.\textsuperscript{246} The court could require reconsideration of the cap based on a finding that, given our understanding of ecology in 2008, the public trust purposes of commerce and navigation—both incidents of the \textit{jus publicum} in Virginia according to \textit{Newport News}—are substantially impaired by allowing their foundation of ecosystem services to crumble.\textsuperscript{247}

Finally, the current prevailing legal assumption in Virginia concerning the public trust doctrine seems to be that evolutions in constitutional and statutory law since 1932 have allowed for application of a doctrine broader than that laid down in \textit{Newport News}.\textsuperscript{248} In 2005, the Court of Appeals of Virginia noted in \textit{Evelyn v. Commonwealth} that \textit{Newport News} dictated that “except as is otherwise expressly or impliedly provided by the Constitution, what is for the benefit of the people is committed to [the legislature’s] discretion free from the control or dictation of the executive or judicial department of the government.”\textsuperscript{249} The court in \textit{Evelyn} recognized that what Virginia’s constitution provides changed between 1932 and 2005.\textsuperscript{250} They examined Article XI, adopted in 1970, and found that it “require[s], \textit{inter alia}, protection of

\begin{itemize}
\item \textsuperscript{243} See Brooks, Jones & Virginia, supra note 1, at 7.
\item \textsuperscript{244} See Ruhl & Salzman, supra note 8, at 230.
\item \textsuperscript{245} See Ruhl & Salzman, supra note 8, at 236–37; Kelly, supra note 155, at 917.
\item \textsuperscript{246} See Kelly, supra note 155, at 911–12 (discussing resource uses that may have become part of the \textit{jus publicum} since 1932, and which would therefore be protected under the \textit{Newport News} standard).
\item \textsuperscript{247} See id.; Ruhl & Salzman, supra note 8, at 232–33, 236–37.
\item \textsuperscript{249} Evelyn, 621 S.E.2d at 137 n.3 (quoting Commonwealth v. City of Newport News, 164 S.E. 689, 697 (Va. 1932)) (alteration in original).
\item \textsuperscript{250} Id.
\end{itemize}
the Commonwealth’s ‘waters from pollution, impairment, or destruction, for the benefit, enjoyment, and general welfare of the people of the Commonwealth.’”251 The court went on to find vested in the legislature an “express duty to ‘safeguard the public right to the use and enjoyment of the subaqueous lands of the Commonwealth held in trust by it for the benefit of the public as conferred by the public trust doctrine and the Constitution of Virginia[].’”252 The court held that it is appropriate for the judiciary to consider that express duty in its interpretation of all legislative enactments.253

The result in Evelyn suggests that—insofar as the reduction industry threatens the ability of menhaden to continue providing foundational ecosystem services essential to the public’s use and enjoyment of public trust resources—the court should remand the illusory cap on the industry’s catch to the legislature for reconsideration in light of the public trust doctrine.254

**Conclusion**

The ecosystem services of nutrient cycling, waste treatment, and food web support provided by menhaden help form the foundation for the traditional public trust interests of commerce, navigation, and fishery across the waters of Chesapeake Bay. Allowing a monopolistic commercial venture to vacuum vast schools of menhaden from the bay impairs the public’s interest in its waters by eroding this foundation.

Scientific understanding of ecology and the interconnectedness of natural systems has grown since 1932, as has the realization that ecosystem services provide humans with irreplaceable social and economic value. Based on this expansion of knowledge, and upon the evolution of Virginia’s public trust jurisprudence, a court would be justified in remanding the non-functioning cap on the menhaden harvest to the legislature for re-examination. Protecting modern iterations of traditional public trust interests requires protection of the ecosystem services upon which those interests are based. The stakes are too high for the legislature to continue hiding behind a dubious cloak of scientific uncertainty.

251 *Id.* (quoting Va. Const. art. XI, § 1).
252 *See id.* (quoting Va. Code Ann. § 28.2-1205(A) (2007)).
253 *Id.*