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Putting the Ocean in Atlantic History: Maritime Communities and Marine Ecology in the Northwest Atlantic, 1500–1800

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No sea but what is vexed by their fisheries.

Edmund Burke, 1775

FEW PLACES HAVE BEEN AS THOROUGHLY EXAMINED by historians as colonial New England, an anomalous corner of the northwest Atlantic. Settled by an extraordinarily literate people and long privileged by the American history establishment, colonial New England's every square inch has been seriously scrutinized. Or so the conventional wisdom has it. Consider this: Scholars have missed only 100,000 square miles, more or less, of terrain known intimately to seventeenth- and eighteenth-century villagers—the coastal ocean and its seafloor. The irony is superb, for the area seaward of the shore was the first part of the northwest Atlantic reconnoitered by Europeans, whether near Newfoundland, Nova Scotia, or New England. Now known by oceanographers as the Northeast Shelf large marine ecosystem (LME), this undersea territory, which overlaps parts of New England and Atlantic Canada, was crucial to the evolution of the Atlantic world. From the perspective of fishermen, the familiar continental shelf on which they plied their trade extended west-southwest from Newfoundland toward Cape Cod as a maze of shallow banks, named basins, submerged ledges, and deep gullies, the jumbled signature of a retreating glacier.¹

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¹ The LME analyzed in this article is similar to the fisheries-based geographical unit explored by D. W. Meinig in *The Shaping of America: A Geographical Perspective on 500 Years of History*, vol. 1: *Atlantic America, 1492–1800* (New Haven, Conn., 1986), 55–58. John J. McCusker and Russell R. Menard described the same area, but from an economic and nationalistic vantage point, arguing that “The

It was an underwater landscape whose physical features were not unlike those ashore, a place at once dangerous and tempting, a place, as the Scriptures said, that in its seasons revealed “the blessings of the deep that lieth under.”²

“The ninth [of May], wee had two and twentie fadome in faire sandie ground, hauing vpon our Lead many glittering Stones,” noted Gabriel Archer in 1602, as the *Concord* entered the Gulf of Maine. “The tenth wee sounded in 27 . . . fadome . . . vpon this banke we saw sculs of fish in great numbers.”³ Archer’s account is part of the documentary record that makes it possible to begin systematically writing the living ocean into history. Although other regions and eras lend themselves to this approach, Atlantic history seems an appropriate place to start. Known for blurring historiographical and disciplinary boundaries, ignoring national boundaries, and probing novel social and cultural interactions, Atlantic history has become a dominant organizing principle for the early modern era.⁴ Recently it has benefited from an unexpected synergy. Proliferating histories of oceans and seas are reorienting conventional geographies and emphasizing oceans as access points for innovative regional histories. For historians, the past has never looked so watery.⁵

major fishing waters frequented by colonial fishermen stretched in a line from Cape Cod to Newfoundland, linking the whole of what we might call ‘greater New England’ in one grand economic region.” My ecological and transnational stance emphasizes a different perspective. The term “greater New England” slights large areas of the northwest Atlantic, such as the Gulf of St. Lawrence during the seventeenth century, in which inhabitants of the United States’ forerunner colonies had minor roles, and it downplays the crucial roles of people other than Americans. McCusker and Menard, *The Economy of British America, 1607–1789* (Chapel Hill, N.C., 1985), 114. For an alternative marine geography that splits the region without regard to the coherence of the LME concept, see Stephen J. Hornsby, *British Atlantic, American Frontier: Spaces of Power in Early Modern British America* (Hanover, N.H., 2005), 7. On LMEs, see Kenneth Sherman and Barry D. Gold, “Large Marine Ecosystems,” in Kenneth Sherman, Lewis M. Alexander, and Barry D. Gold, eds., *Large Marine Ecosystems: Patterns, Processes, and Yields* (Washington, D.C., 1990), vii–xi.

² Genesis 49:25.

³ *The Relation of Captaine Gosnols Voyage to the North part of Virginia, begunne the sixe and twentieth of March, Anno 42. Elizabethae Reginae 1602. and deliuered by Gabriel Archer, a Gentleman of the said Voyage*, in David B. Quinn and Alison M. Quinn, eds., *The English New England Voyages, 1602–1608* (London, 1983), 115.

⁴ For the evolution of Atlantic history, see Alison Games, “Atlantic History: Definitions, Challenges, and Opportunities,” *American Historical Review* 111, no. 3 (June 2006): 741–757; David Armitage and Michael J. Braddick, eds., *The British Atlantic World, 1500–1800* (New York, 2002); Bernard Bailyn, *Atlantic History: Concept and Contours* (Cambridge, Mass., 2005); Elizabeth Mancke and Carole Shammas, eds., *The Creation of the British Atlantic World* (Baltimore, Md., 2005); Jorge Cañizares-Esguerra and Erik R. Seeman, eds., *The Atlantic in Global History, 1500–2000* (Upper Saddle River, N.J., 2007); Paul Gilroy, *The Black Atlantic: Modernity and Double Consciousness* (Cambridge, Mass., 1993). The most provocative recent Atlantic histories include Eliga H. Gould, “Entangled Histories, Entangled Worlds: The English-Speaking Atlantic as a Spanish Periphery,” *American Historical Review* 112, no. 3 (June 2007): 764–786; Joyce E. Chaplin, *Subject Matter: Technology, the Body, and Science on the Anglo-American Frontier, 1500–1676* (Cambridge, Mass., 2001); James Sidbury, *Becoming African in America: Race and Nation in the Early Black Atlantic* (Oxford, 2007); Marcy Norton, “Tasting Empire: Chocolate and the European Internalization of Mesoamerican Aesthetics,” *American Historical Review* 111, no. 3 (June 2006): 660–691; Judith A. Carney, *Black Rice: The African Origins of Rice Cultivation in the Americas* (Cambridge, Mass., 2001); Susan Scott Parrish, *American Curiosity: Cultures of Natural History in the Colonial British Atlantic World* (Chapel Hill, N.C., 2006).

⁵ Recent ocean histories include Paul Butel, *The Atlantic*, trans. Iain Hamilton Grant (London, 1999); Alain Corbin, *The Lure of the Sea: The Discovery of the Seaside in the Western World, 1750–1840*, trans. Jocelyn Phelps (Berkeley, Calif., 1994); David Kirby and Merja-Liisa Hinkkanen, *The Baltic and the North Seas* (London, 2000); Barry Cunliffe, *Facing the Ocean: The Atlantic and Its Peoples, 8000 BC–AD 1500* (Oxford, 2001); Bernhard Klein and Gesa Mackenthun, eds., *Sea Changes: Historicizing the Ocean* (New York, 2004); “Forum: Beyond the Atlantic,” *William and Mary Quarterly*, 3rd. ser., 63

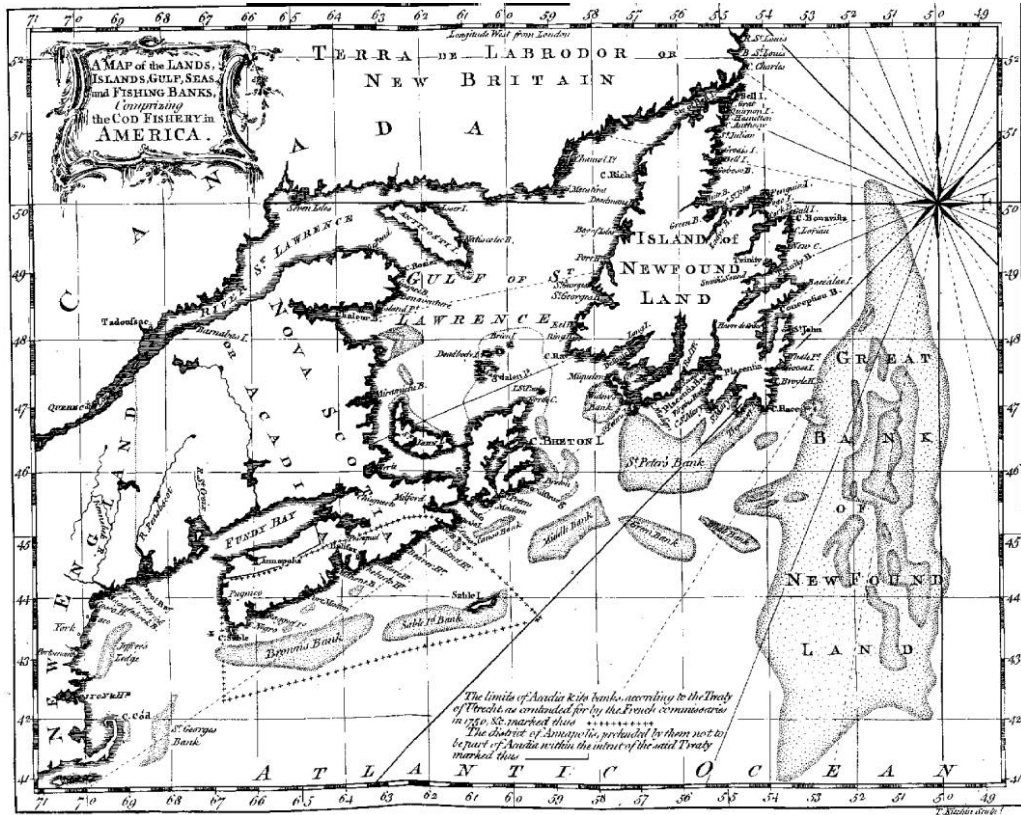


FIGURE 1: A crossroads of the emerging Atlantic world, and a zone of extraordinary economic productivity, the large marine ecosystem stretching from Cape Cod to Newfoundland underwent a fundamental sea-change between 1500 and 1800. From William Bollan, *The Ancient Right of the English Nation to the American Fishery* (London, 1764). Reproduced by permission of the Massachusetts Historical Society.

Despite its emphasis on metageography, its fascination with the culture of curiosity toward the natural world, its self-conscious oceanic orientation, and its attention to the implications of producing, harvesting, and transporting organic commodities, one area of inquiry remains largely absent from Atlantic history: the ocean itself. In their disregard for the ocean as a set of linked ecosystems whose fluctuations had consequences for coastal people, all of whom relied on ecosystem products and services, Atlantic historians have followed traditional maritime historians, who—except for fisheries historians—have also neglected the living sea. While a sizable literature exists on fishing and whaling in the age of sail (still topics of perennial

(October 2006): 675–742; Kenneth McPherson, *The Indian Ocean: A History of People and the Sea* (Delhi, 1998); Sugata Bose, *A Hundred Horizons: The Indian Ocean in the Age of Global Empire* (Cambridge, Mass., 2006); Jerry H. Bentley, Renate Bridenthal, and Kären Wigen, eds., *Seascapes: Maritime Histories, Littoral Cultures, and Transoceanic Exchanges* (Honolulu, 2007). Ocean history was given a boost by a special issue of *Geographical Review*; vol. 89 (April 1999), dedicated to the theme “Oceans Connect,” was inspired by Martin W. Lewis and Kären E. Wigen, *The Myth of Continents: A Critique of Metageography* (Berkeley, Calif., 1997). For sea and ocean history as “more novel than it sounds,” see Peregrine Horden and Nicholas Purcell, “The Mediterranean and ‘the New Thalassology,’” *American Historical Review* 111, no. 3 (June 2006): 722–740.

interest), most traditional fisheries histories were framed around the business, diplomacy, or labor of extracting marine resources. Their authorial vantage points varied significantly from those of contemporary Atlantic or environmental historians.⁶ Within the last decade or so, in what can only be regarded as a promising development, a dedicated cadre of journalists and historians have begun to produce more environmentally sensitive studies of the ocean. Marine ecologists have turned to the past to answer scientific questions. And interdisciplinary research projects and conferences on historic oceans have brought together historians and ecologists committed to investigating questions unanswerable by specialists in one discipline.⁷ As nature becomes more central to scholars' conception of the past, rigid disciplinary boundaries and ossified categories of analysis are crumbling, and the ocean is appearing in a new light in written histories.

Yet despite these developments, most studies of the early modern Atlantic world have slighted nature, whether terrestrial or marine.⁸ Nature is rarely problematized, and it is often assumed to be stable, even though humans are organisms who eat, excrete, and extract, and whose impact on the natural world invariably affects their options. As voices crying from the wilderness, environmental historians have insisted that anthropogenic environmental change and its consequences are worth investigating, and that those consequences are fundamental to human histories in the

⁶ Classic works include Alexander Starbuck, *History of the American Whale Fishery from Its Earliest Inception to the Year 1876* (Waltham, Mass., 1878); Raymond McFarland, *A History of the New England Fisheries* (New York, 1911); Harold A. Innis, *The Cod Fisheries: The History of an International Economy* (Toronto, 1940); Edouard A. Stackpole, *The Sea-Hunters: The New England Whalers during Two Centuries, 1635–1835* (Philadelphia, 1953). The most sophisticated book on labor in the early modern fisheries did not address environmental concerns, although its author subsequently edited a volume of interdisciplinary research on fisheries history. See Daniel Vickers, *Farmers and Fishermen: Two Centuries of Work in Essex County, Massachusetts, 1630–1850* (Chapel Hill, N.C., 1994); Vickers, ed., *Marine Resources and Human Societies in the North Atlantic since 1500: Papers Presented at the Conference Entitled "Marine Resources and Human Societies in the North Atlantic since 1500," October 20–22, 1995* (St. John's, Newfoundland, 1997).

⁷ Journalists' accounts include Mark Kurlansky, *Cod: A Biography of the Fish That Changed the World* (New York, 1997), and Farley Mowat, *Sea of Slaughter* (Boston, 1984). For environmentally informed scholarship, see Peter E. Pope, *Fish into Wine: The Newfoundland Plantation in the Seventeenth Century* (Chapel Hill, N.C., 2004); Daniel Vickers, "Those Damned Shad: Would the River Fisheries of New England Have Survived in the Absence of Industrialization?" *William and Mary Quarterly*, 3rd. ser., 61 (October 2004): 685–712; David J. Starkey and James E. Candow, eds., *The North Atlantic Fisheries: Supply, Marketing and Consumption, 1560–1990* (Hull, 2006), vol. 8 in the *Studia Atlantica* series. The North Atlantic Fisheries History Association has organized conferences and published papers in this series since 1995. For a review of classic and contemporary literature in marine environmental history, see W. Jeffrey Bolster, "Opportunities in Marine Environmental History," *Environmental History* 11 (July 2006): 567–597. Collaborative work by historians and ecologists studying oceans past has been pioneered by the interdisciplinary History of Marine Animal Populations (HMAP) project, an arm of the international Census of Marine Life. See <http://www.hmapcoml.org/>. Other interdisciplinary collaborative work includes Jeremy Jackson, Enrique Sala, and Karen Alexander, eds., *Marine Biodiversity: Using the Past to Inform the Future* (working title; Chicago, forthcoming 2008).

⁸ Exceptions include Alfred W. Crosby, Jr., *The Columbian Exchange: Biological and Cultural Consequences of 1492* (Westport, Conn., 1972); William Cronon, *Changes in the Land: Indians, Colonists, and the Ecology of New England* (New York, 1983); Carolyn Merchant, *Ecological Revolutions: Nature, Gender, and Science in New England* (Chapel Hill, N.C., 1989); Timothy Silver, *A New Face on the Countryside: Indians, Colonists, and Slaves in South Atlantic Forests, 1500–1800* (Cambridge, 1990); Mart A. Stewart, "What Nature Suffers to Groe": *Life, Labor, and Landscape on the Georgia Coast, 1680–1920* (Athens, Ga., 1996); Richard H. Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens, and the Origins of Environmentalism, 1600–1860* (Cambridge, 1995); Virginia DeJohn Anderson, *Creatures of Empire: How Domestic Animals Transformed Early America* (Oxford, 2004).

realms of production, culture, and the asymmetries of social power.⁹ For all that, if environmental historians generally have a blind spot, it is the 70 percent of the globe covered by salt water.¹⁰ With most historians ignoring the environment, and most environmental historians ignoring marine ecosystems, the living ocean's role in history remains shrouded in fog, despite the growing prominence of oceanic histories and the Atlantic paradigm.¹¹

The interactions of human maritime communities with the marine biological communities on which they depended seem to have remained largely uninvestigated because of the enduring assumption that the ocean exists outside of history.¹² Relegated to the role of narrative device, packaged as a sublime scene or means of conveyance, and shorn of its genuine mysteries and capacity for change, the ocean appears in most histories as a two-dimensional air-sea interface—a zone for vessel operations and a means of cultural interactions. Apparently having never succumbed to humans' attempts to tame its primeval wildness, as did continental and island landscapes, the living ocean has remained beyond the pale of most historians' concerns, even though familiarity with the ocean and the changing nature of its resources was at the heart of indigenous peoples' and colonizers' success.

As the notion that "oceans connect" gains currency among historians and geographers, we would do well to remember that in the Age of the Ocean, circa 1500 to 1800, people not only crossed oceans and used them to stitch together empires of commerce and meaning, but also relied on ocean products and services as never before. The salient connections were not only *across* oceans, but *between* people and the sea. It has long been known that western Europeans' adaptation to the late medieval and early modern commercial revolution included searches for distant sources of whale oil and merchantable fish.¹³ Other relationships between people and the sea

⁹ Cogent arguments for including nature in history can be found in Donald Worster et al., "A Roundtable: Environmental History," *Journal of American History* 74, no. 4 (March 1990): 1087–1147; William Cronon, "The Uses of Environmental History," *Environmental History Review* 17 (Fall 1993): 1–22; Alfred W. Crosby, "The Past and Present of Environmental History," *American Historical Review* 100, no. 4 (October 1995): 1177–1189; Ted Steinberg, "Down to Earth: Nature, Agency, and Power in History," *American Historical Review* 107, no. 3 (June 2002): 798–820.

¹⁰ Highly regarded environmental histories that essentially ignore the marine environment include J. Donald Hughes, *An Environmental History of the World: Humankind's Changing Role in the Community of Life* (London, 2001); John Opie, *Nature's Nation: An Environmental History of the United States* (Fort Worth, Tex., 1998); Ted Steinberg, *Down to Earth: Nature's Role in American History* (New York, 2002); and Carolyn Merchant, *The Columbia Guide to American Environmental History* (New York, 2002). I. G. Simmons, *Environmental History: A Concise Introduction* (Oxford, 1993), covers the entire ocean in three pages. The best treatment of marine topics is found in J. R. McNeill, *Something New under the Sun: An Environmental History of the Twentieth-Century World* (New York, 2000), which includes a section on "Whaling and Fishing." John F. Richards, *The Unending Frontier: An Environmental History of the Early Modern World* (Berkeley, Calif., 2003), contains chapters on fishing and whaling, but they ignore non-human nature and ecological relationships, and come across as a variant of traditional fisheries history.

¹¹ This point is made eloquently by Kären Wigen in her introduction to the *AHR* Forum "Oceans of History," *American Historical Review* 111, no. 3 (June 2006): 721. For the "Atlantic paradigm," see Cãnizares-Esguerra and Seeman, *The Atlantic in Global History*, xxiii.

¹² Individuals have always been puny in the face of the mighty sea, but collectively humankind has exerted profound influence on it. See Heike Lotze et al., "Depletion, Degradation, and Recovery Potential of Estuaries and Coastal Seas," *Science* 312 (June 23, 2006): 1806–1809; Lotze, "Rise and Fall of Fishing and Marine Resource Use in the Wadden Sea, Southern North Sea," *Fisheries Research* 87 (November 2007): 208–218; J. B. C. Jackson et al., "Historical Overfishing and the Recent Collapse of Coastal Ecosystems," *Science* 293 (July 2001): 629–638.

¹³ Escalating European demands for fish are covered in Richard W. Unger, *The Ship in the Medieval Economy, 600–1600* (Montreal, 1980); E. M. Carrus Wilson, "The Iceland Trade," in Eileen Power and

have received far less attention. Tides in the Thames River and elsewhere, for instance, were harnessed to make possible enclosed docks for ships. That riparian engineering affected not only the flow and siltation of estuarine rivers, but their tidal range, their biological productivity, and ultimately the magnitude of flooding endured by coastal residents. Psychologically, the seaside was recast (at least for people in the Western tradition) from the repulsive edge of the abyss to a sublime and desirable space. The impact on littoral resources was immediate and profound.¹⁴

Probing connections between such apparently disparate subjects, ocean history invites scholars to reconceptualize geographic and sociological boundaries, and to imagine multiple timescales, multiple chronologies, and multiple topics within a single historical interpretation. Meanwhile, its marine environmental history variant is drawing on conceptual advances in marine ecology to illuminate documentary and archaeological records of past maritime communities, and to incorporate that entwined analysis into larger histories about the Atlantic world and other regions. Oceanic approaches hold considerable potential for the fast-growing field of global history, with the caveat that regional histories have yet to fully capitalize on the promise of marine environmental history to redefine significant spatial units, and to integrate marine ecosystems into historical narratives. Global histories will need to incorporate monographic studies of historic marine environments. Focusing on the boreal North Atlantic in the early modern era, for instance, encourages analysis of the Atlantic as a single oceanic unit, a huge bioregion differentiated by human activities at different rates in specific subregions. It also raises difficult questions about the cultural implications of ecological change, and reminds us that relationships between nature and culture are anything but linear, even though ecological constraints affect human society and agency.¹⁵

Between 1500 and 1800, the large marine ecosystem between Cape Cod and Newfoundland became an Atlantic crossroads, a hot spot of interactions between Natives, itinerant Europeans, and settlers in search of marine resources.¹⁶ The question that

M. M. Postan, eds., *Studies in English Trade in the Fifteenth Century* (New York, 1933), 155–183; Kenneth R. Andrews, *Trade, Plunder and Settlement: Maritime Enterprise and the Genesis of the British Empire, 1480–1630* (Cambridge, 1984); Brian Fagan, *The Little Ice Age: How Climate Made History, 1300–1850* (New York, 2000).

¹⁴ Michael S. Reidy, *Tides of History: Ocean Science and Her Majesty's Navy* (Chicago, forthcoming, 2008); Corbin, *The Lure of the Sea*. For the origins of marine science, see Margaret Deacon, *Scientists and the Sea, 1650–1900: A Study of Marine Science* (London, 1971). Land reclamation and the transformation of the Low Countries' coastal ecosystems are treated in J. A. van Houte, *An Economic History of the Low Countries, 800–1800* (New York, 1977); Jan de Vries and Ad van der Woude, *The First Modern Economy: Success, Failure, and Perseverance of the Dutch Economy, 1500–1815* (Cambridge, 1997). Between 1680 and 1755, Nova Scotia's Acadian settlers built elaborate dikes to transform thousands of acres of tidal marsh meadows on the Bay of Fundy into extremely productive arable lands. Their story is told in J. Sherman Bleakney, *Sods, Soil, and Spades: The Acadians at Grand Pré and their Dykeland Legacy* (Montreal, 2004).

¹⁵ In biogeography, "boreal" refers to ecosystems or species found in the sub-Arctic region of the Northern Hemisphere.

¹⁶ Large marine ecosystems are "characterized by unique bathymetry, hydrography, and productivity, within which marine populations have adapted reproductive, growth, and feeding strategies." The region between Cape Cod and Newfoundland is sometimes referred to as the Northeast Shelf LME, although oceanographers do not assume that the boundaries of such systems are precise. See Sherman and Gold, "Large Marine Ecosystems," vii–xi, quotation vii; Lewis M. Alexander, "Geographic Perspectives in the Management of Large Marine Ecosystems," in Sherman, Alexander, and Gold, *Large Marine Ecosystems*, 220–223. The classic, though now outdated, work on northwest Atlantic cod fisheries in the contest of

has gone begging concerns consequences. The Puritan historian Edward Johnson regarded among New England's providential wonders the fact that a "remote, rocky, barren, bushy, wild-woody wilderness, a receptacle for Lions, Wolves, [and] Bears," had been transformed within a generation into "a second England for fertility." Colonists celebrated those "improvements," while generally remaining blind to the implications of their ecological experiment on the land, much less in the coastal ocean and its estuaries. Along with deforestation, plow agriculture, river fishing, and the construction of milldams on hundreds of river sites, all of which affected estuaries, the relentless ocean harvest led not only to depletion of some marine resources, but to a restructuring of marine environments. It changed the sea.¹⁷

By 1800, the marine ecosystem between Cape Cod and Newfoundland had been reshaped by localized depletions, range contractions, extinctions, near-extinctions, and diminished estuarine productivity. Systemic ecological change may have included qualitative changes in oceanic and estuarine structure and function. Those changes, in turn, shaped the possibilities open to coastal people. Financial loss, technological innovation, geographic exploration, and refashioning of social identities followed changes in the sea. The myth of the timeless ocean as backdrop for history just won't do. Presented in light of Old World seas, New World actions, and Atlantic imperatives, the story of the coastal ocean between Cape Cod and Newfoundland after 1500 may inspire related work in Atlantic history, and challenge historians with other spatial and temporal specializations to historicize the ocean as part of human histories.

FROM A BIOLOGICAL AND GEOLOGICAL STANDPOINT, the northwest Atlantic was not all that different from the northeast Atlantic. Sculpted by the Pleistocene glaciations, and populated by boreal fish including herring, cod, and salmon, the cold gray seas of Banquereau, east of Nova Scotia, were remarkably similar to those of the Dogger Bank, east of Whitby. This was a far cry from the American tropics, where Spanish newcomers such as Christopher Columbus startled readers with depictions of fish "so unlike ours that it is amazing."¹⁸ When Basque, Breton, Portuguese, and West Coun-

empires is Innis, *The Cod Fisheries*. More recent work includes D. B. Quinn, *North America from Earliest Discovery to First Settlements: The Norse Voyages to 1612* (New York, 1977); Quinn, ed., *New American World: A Documentary History of North America to 1612*, 5 vols. (New York, 1979), esp. vols. 1 and 4; John Robert McNeill, *Atlantic Empires of France and Spain: Louisbourg and Havana, 1700–1763* (Chapel Hill, N.C., 1985); Laurier Turgeon, "Bordeaux and the Newfoundland Trade during the Sixteenth Century," *International Journal of Maritime History* 9, no. 2 (1997): 1–28; Pope, *Fish into Wine*; Peter E. Pope, "The Scale of the Early Modern Newfoundland Cod Fishery," in Starkey and Candow, *The North Atlantic Fisheries*, 9–28. On Native people in the region between the St. Lawrence River and Massachusetts, see Bruce J. Bourque, *Twelve Thousand Years: American Indians in Maine* (Lincoln, Neb., 2001); Colin G. Calloway, comp. and ed., *Dawnland Encounters: Indians and Europeans in Northern New England* (Hanover, N.H., 1991); Kathleen J. Bragdon, *Native People of Southern New England, 1500–1650* (Norman, Okla., 1996); Merchant, *Ecological Revolutions*; Nicolas Denys, *The Description and Natural History of the Coasts of North America (Acadia)*, trans. and ed. William F. Ganong (1672; repr., Toronto, 1908); Marc Lescarbot, *The History of New France*, 3 vols. (1618; repr., Toronto, 1907–1914).

¹⁷ Edward Johnson, *Wonder-Working Providence of Sions Saviour in New England (1654) and Good News From New England (1648)*, ed. Edward J. Gallagher (Delmar, N.Y., 1974), 173. As this paragraph indicates, my approach has been influenced significantly by Cronon, *Changes in the Land*.

¹⁸ Oviedo's *Natural History of the West Indies*, available in London in English translation as early as

try fishermen began regularly to cross the Atlantic, the ecosystem they encountered was “new” only in its abundance: it had not been harvested systematically for centuries by legions of fishermen using the most sophisticated technologies then available to catch, preserve, and market sea fish.¹⁹

European fishermen familiar with the North Sea, the English Channel, and the Irish Sea had learned their trade in one of the world’s most productive fishing grounds. Nutrient-rich polar water flowing southward toward the British Isles mixes with the eastern extremity of the Gulf Stream on a multitude of named fishing grounds, including Ballynahinch Bank, Fastnet Ground, and the Patch. The resultant upwelling provides ideal conditions for phytoplankton, which in turn nourishes the entire food web: benthic invertebrates such as polychaete worms and brittle stars; vast schools of bottom-dwelling hake, plaice, and cod; pelagic fish, including herring, pilchards, and mackerel; and crustaceans such as cockles and mussels. As in New England and the Canadian Atlantic Provinces, the European littoral was rife with estuaries and a complex suite of intertidal habitats. Flowing into the coastal ocean were rivers rich in fish, ranging from Scottish salmon streams like the Spey to the mighty Rhine. These aquatic and marine microenvironments contributed to the remarkable overall productivity of Europe’s Atlantic coastal fisheries from the Bay of Biscay to Scandinavia. Primary productivity in the sea is based on phytoplankton abundance. Ecologists express primary productivity as milligrams of carbon per square meter. Measurements of primary productivity are remarkably similar along the coastline of northern Europe and that of New England and the Canadian Atlantic Provinces. In other words, the ability of the coastal ocean to produce biomass, ranging from plankton to whales, was not appreciably greater in the New World, although early modern fishermen agreed that codfish were larger and more numerous in America.²⁰

Yet early accounts of the northwest Atlantic’s coastal seas described a marine ecosystem whose structure and function, though not its suite of species, made it *very* different from the one in Europe. These descriptions, which sometimes have been dismissed as overly promotional, cannot be overlooked so easily. To begin with, they are numerous, and they corroborate each other, although they were written by dif-

1555, introduced “manatee and murene and many other fishes which have no names in our language.” See Gonzalo Fernández de Oviedo y Valdés, *The Natural History of the West Indies* (1526), in John C. Pearson, ed., *The Fish and Fisheries of Colonial North America: A Documentary History of the Fishery Resources of the United States and Canada*, pt. 6: *The Gulf States and West Indies*, NOAA Report No. 72040301 (Rockville, Md., 1972), 1103; Christopher Columbus, *The Log of Christopher Columbus*, trans. Robert H. Fuson (Camden, Maine, 1987), 84.

¹⁹ Representative early accounts include Martin Pring, *A Voyage set out from the Citie of Bristoll at the charge of the chiefest Merchants and Inhabitants of the said Citie with a small Ship and a Barke for the discoverie of the North part of Virginia, in the yeere 1603. Vnder the command of me Martin Pringe*, in Quinn and Quinn, *The English New England Voyages*, 226; James Rosier, *A True Relation of the most prosperous voyage made this present yeere 1605, by Captain George Waymouth, in the Discoverie of the land of Virginia . . .*, *ibid.*, 287; Lescarbot, *The History of New France*.

²⁰ Benthic species live on the bottom of the sea. Pelagic species live in the water column, or are associated with the open sea, such as pelagic birds. Polychaetes are a class of segmented marine worms, including the sand worms often sold to anglers as bait. On primary productivity, see T. Laevastu, “Natural Bases of Fisheries in the Atlantic Ocean: Their Past and Present Characteristics and Possibilities for Future Expansion,” in Georg Borgstrom and Arthur J. Heighway, eds., *Atlantic Ocean Fisheries* (London, 1961), 18–39, esp. 19–20; Lotze et al., “Depletion, Degradation, and Recovery Potential,” Table 1; Simon Jennings, Michael J. Kaiser, and John D. Reynolds, *Marine Fisheries Ecology* (Oxford, 2001), 21–38.

ferent authors, with different agendas, over more than a century and a half. Landsmen wrote some, but many were the work of seamen with considerable experience in European marine systems.²¹ These men had come of age knowing that “the fishing for cod upon the coasts of Lanchshire begenithe at East[er] and contyneth til mydsommer,” that hake were found “in the deeps betwixt Wales and Ireland,” and that the best fishing for herring “beginith at Bartholomewe tyde at Scarborough.” George Waymouth, for instance, who made a “most prosperous voyage” to Maine in 1605, was from a family that had fished for generations in his home parish of Cockington, as well as in Ireland and Newfoundland. Confronting a familiar retinue of fish, sea-birds, and marine mammals, men such as Waymouth framed New World abundance in light of the shopworn European ecosystems they knew firsthand.²²

Europe’s aquatic systems, estuaries, and coastal seas had already suffered significant ecological depletion by the time sixteenth-century mariners arrived in America. Ancient and early medieval inhabitants of the British Isles and the Continent had concentrated their efforts on freshwater fish, essentially ignoring plentiful schools of sea fish in close proximity to their shores. Zooarchaeological and documentary evidence indicates that until about A.D. 1000, most fish consumed were locally available freshwater species such as pike, perch, trout, and members of the carp family, in addition to anadromous and catadromous species.²³ Anadromous fish such as salmon, sturgeon, and shad are born in freshwater rivers or streams but migrate to the ocean, where they spend most of their lives before returning to rivers to spawn. Eels, still something of a biological mystery as late as the seventeenth century, also were eaten regularly in ancient and medieval Europe. Eels are catadromous fish. Born in the Sargasso Sea, they ascend rivers as tiny, translucent “elvers” (juveniles) to spend their lives in fresh or brackish water until it is time to return to the sea for their once-in-a-lifetime spawning. These marine species all shared a moment in their life cycles during which they could be easily trapped by people fishing from the safety of riverbanks.

While a Scots herring fishery existed in the mid-900s, exporting herring to the Netherlands, the beginning of relatively large-scale sea fishing in England, notably for herring and gadoids (cod, haddock, hake, etc.), did not begin in earnest until around the year 1000. The Anglo-Saxon language of pre-Norman England did not

²¹ These chroniclers include, but are not limited to, Jacques Cartier (1534–1541), Anthony Parkhurst (1578), Charles Leigh (1597), Gabriel Archer (1602), John Brereton (1602), Martin Pring (1603), Samuel de Champlain (1603–1632), James Rosier (1605), Marc Lescarbot (1612), Captain John Smith (1614), William Bradford (1620–1650), Richard Whitbourne (1620), Francis Higginson (1630), John Winthrop (1630–1649), Thomas Morton (1632), William Hammond (1633), William Wood (1634), Roger Williams (1643), John Josselyn (1638–1671), Samuel Maverick (1660), Nicholas Denys (1672), and Chrestien LeClerq (1691).

²² Quotations from a survey of English fisheries, 1580, reproduced as Appendix 3.1 in Todd Gray, “Devon’s Coastal and Overseas Fisheries and New England Migration, 1597–1642” (Ph.D. diss., University of Exeter, 1988), 357–358. For George Waymouth’s fishing lineage, see *ibid.*, 27, and David R. Ransome, “Waymouth, George (fl. 1587–1611),” in *Oxford Dictionary of National Biography* (Oxford, 2004), <http://www.oxforddnb.com/view/article/29155> (accessed December 5, 2007).

²³ Lotze et al., “Depletion, Degradation, and Recovery Potential,” 1806–1809; Richard C. Hoffman, “Economic Development and Aquatic Ecosystems in Medieval Europe,” *American Historical Review* 101, no. 3 (June 1996): 631–669; James H. Barrett, Alison M. Locker, and Callum M. Roberts, “The Origins of Intensive Marine Fishing in Medieval Europe: The English Evidence,” *Proceedings of the Royal Society of London B* 271 (2004): 2417–2421; Inge Bødker Enghoff, “Fishing in the Southern North Sea Region from the 1st to the 16th Century AD: Evidence from Fish Bones,” *Archeofauna* 9 (2000): 59–132.

even have a word for “cod.” By 1300, however, as historian Wendy Childs points out, “the fisheries of England’s east coast constituted a complex and widely dispersed business activity, the scale of which was immense by medieval standards.” During the fourteenth and fifteenth centuries, the Dutch herring fishery developed exponentially. Large-scale sea fishing began as freshwater fisheries across Europe decayed. During the late Middle Ages, growing human populations exerted pressure on fish stocks in lakes, streams, and rivers. Deforestation, dams, and disposal into water-courses of sewage, domestic animal waste, and industrial effluent combined to degrade freshwater fish habitats. Milldams stopped migratory fish and slowed running water. As agricultural silt settled and waters warmed, streams became unsuitable for some species’ spawning. Yet fishing pressure continued. King Philip IV of France lamented in 1289 that “every river and waterside of our realm, large and small, yields nothing due to the evil of the fishers and the devices of [their] contriving.” Unable to consume meat during approximately one-third of each year, medieval Catholics turned to sea fish only after freshwater fishes, which could be caught more easily and safely, had been depleted by overfishing and habitat degradation.²⁴

Catholics and Protestants alike turned to sea fish with a vengeance. The European-dominated Atlantic world originated, to no small degree, from insatiable demands placed upon marine ecosystems in the Bay of Biscay, the English Channel, and the North Sea. Like every ecosystem, those were constantly being reshaped by natural changes. “Fluctuations,” as contemporary ecologists point out, are “the very essence of ecosystems,” and the populations of many species sought by humans, including mackerel, herring, and pilchards, fluctuate dramatically. The Devon pilchard catch, for example, was poor in 1587, low again in 1593, and virtually nonexistent in 1594. Irish herring were scarce in 1592. Faeroes Island cod fisheries collapsed in 1625 and again in 1629. Perceived “shortages” such as these—in other words, the inability of the ecosystem to produce the volume desired by harvesters—prompted fishing merchants to seek other stocks. Cooling temperatures may have contributed to the geographic expansion of the fishery. Scientists now know that seawater below a certain temperature inhibits the ability of cod to reproduce. As formerly reliable fishing grounds off Norway failed during the 1400s, at the outset of the Little Ice Age, well-capitalized English fishermen began to sail west instead of north, first to Iceland, then to Newfoundland and Maine. Whether northern Europe’s once-abundant waters were being depleted by “the long continuance of fishing and some abuse in the taking,” as one sixteenth-century document attested, or whether the ecosystem could no longer produce enough to satisfy heightened demand, perhaps because of climate change, is not clear. It is clear, however, that European fishermen wanted more fish than they could catch in home waters.²⁵

²⁴ Wendy Childs, “Fishing and Fisheries in the Middle Ages: The Eastern Fisheries,” in David J. Starkey, Chris Reid, and Neil Ashcroft, eds., *England’s Sea Fisheries: The Commercial Sea Fisheries of England and Wales since 1300* (London, 2000), 19; Richard W. Unger, “The Netherlands Herring Fishery in the Late Middle Ages: The False Legend of William Beukels of Biervliet,” in Unger, *Ships and Shipping in the North Sea and Atlantic, 1400–1800* (Aldershot, 1997), 335–356; Hoffman, “Economic Development and Aquatic Ecosystems,” 648. For the intensification of estuarine and coastal fisheries in the west country of England during the late Middle Ages, see Harold Fox, *The Evolution of the Fishing Village: Landscape and Society along the South Devon Coast, 1086–1550* (Oxford, 2001).

²⁵ Tim D. Smith, *Scaling Fisheries: The Science of Measuring the Effects of Fishing, 1855–1955* (Cambridge, 1994), 8–37, quotation 8; Gray, “Devon’s Coastal and Overseas Fisheries,” 126–127; Fagan, *The*



FIGURE 2: By the time Pieter Bruegel the Elder created *Big Fish Eat Little Fish* (1557), his fantastic illustration of a maxim from Dutch life, Europeans had been putting pressure on coastal and estuarine ecosystems for centuries. Early modern voyages to Iceland, Newfoundland, and New England were inspired by the inability of European marine ecosystems to produce enough for European appetites. The Metropolitan Museum of Art, Harris Brisbane Dick Fund, 1917 (17.3.859). Image © The Metropolitan Museum of Art.

Meanwhile, “pernicious *Trinker-men*,” as Edward Sharpe called them, worked from small boats to “destroye the River of Thames, by killing the Fry and small Fish there, even all that comes to the Net, before it bee eyther meate or Marketable.” It is clear that late medieval and early modern fisheries were depleting estuarine and river systems, including the Rhine and the Thames. The more open-ended question concerns the impact of northern European fisheries on stocks of cod, ling, herring, and other sea fish. Reliable quantitative data simply do not exist. However, biologists today understand that, among many stocks subject to fishing, the largest fish are caught first. Continued fishing reduces the size of average individuals because they are prevented from maturing, which can impede reproduction.²⁶

Little Ice Age, 69–78; Wilson, “The Iceland Trade,” 155–183. For the complicated relationship between climate fluctuations and marine ecology, see Jean M. Grove, *The Little Ice Age* (London, 1988), 379–421; Geir Ottersen, Jürgen Alheit, Ken Drinkwater, Kevin Friedland, Eberhard Hagen, and Nils Chr. Stenseth, “The Responses of Fish Populations to Ocean Climate Fluctuations,” in Nils Chr. Stenseth, Geir Ottersen, James W. Hurrell, and Andrea Belgrano, eds., *Marine Ecosystems and Climate Variation: The North Atlantic—A Comparative Perspective* (Oxford, 2004), 73–94; Holger Hovgård and Erik Buch, “Fluctuation in the Cod Biomass of the West Greenland Sea Ecosystem in Relation to Climate,” in Sherman, Alexander, and Gold, *Large Marine Ecosystems*, 36–43.

²⁶ Edward Sharpe, *England’s Royall Fishing Revived; or, A Computation as Well of the Charge of a Busse*

Whalers and fishermen became shock troops pushing west, inspiring chroniclers such as Richard Hakluyt to promote overseas expansion. As Europeans established outposts around the Atlantic rim, ecological changes followed. Commodities harvested from American ecosystems were routinely transported from New World centers of production to Old World sites of consumption. The rapid intensification of long-distance bulk trading in organic products, notably foodstuffs, timber, tobacco, and whale oil, constituted barely recognized ecological revolutions. By the seventeenth century, for instance, as much as 200,000 to 250,000 metric tons of cod per year (live weight) was leaving Newfoundland for Europe, an amount close to that landed in Newfoundland around the turn of the twentieth century, when Rudyard Kipling immortalized the fleet in his novel *Captains Courageous*. During the century prior to the American Revolution, striking improvements in shipping efficiency reduced the cost per ton/mile required to transport bulk goods. The story typically has been told as one of accounts payable, commodities transported, and fortunes made and lost. Silenced in that telling, however, is an account of biomass and energy being transferred from one ecosystem to another. Vast numbers of European consumers were then eating, as Richard C. Hoffman puts it, “beyond the bounds of natural local ecosystems,” and as a result, refashioning distant environments.²⁷ The ocean was not immune. Pressured by commercial capitalism and cornucopian fantasies, the northwestern Atlantic’s coastal ocean rapidly became an extension of Europe’s diminished seas, a sea-change comprehensible only in transatlantic perspective.

Case studies add an ecological twist to the evolution of the Atlantic world by reconstructing stories of prominent prey species, the people who killed them, and the consequences. An ecosystem is considerably more than a group of isolated units; nevertheless, northwest Atlantic populations of marine mammals, anadromous fish, and seabirds, all of which declined precipitously after 1600, serve as indicators of a changing sea. This remade ocean could not help but shape the subsequent lives of the maritime communities that relied on it, whether aboriginal, settler, or European.

“EVERY DAY WE SAW WHALES PLAYING HARD BY US,” observed several Pilgrims after the *Mayflower* anchored in the lee of Cape Cod in 1620. Lamenting their lack of “instruments & meanes” for whaling, they noted that “Our master and his mate, and others experienced in fishing, professed we might have made three or four thousand pounds worth of Oyle.” A scouting party from the *Mayflower* came across “ten or twelve Indians” on the beach “cutting up a great fish like a grampus,” and later

or *Herring-Fishing Ship* (London, 1630), E 3; Jennings, Kaiser, and Reynolds, *Marine Fisheries Ecology*, 242–243; Tony J. Pitcher, “Fisheries Managed to Rebuild Ecosystems? Reconstructing the Past to Salvage the Future,” *Ecological Applications* 11, no. 2 (2001): 601–617.

²⁷ John Brewer and Roy Porter, eds., *Consumption and the World of Goods* (London, 1993), otherwise a magisterial work on early modern consumption, suspends attention to the environmental impact of globalization and consumer culture. For catch statistics, see Pope, *Fish into Wine*, 19–20; Pope, “The Scale of the Early Modern Newfoundland Cod Fishery,” 27–28. For improvements in shipping efficiency, see Gary Shepherd and James Walton, *Shipping, Maritime Trade, and the Economic Development of Colonial North America* (Cambridge, 1972), 3. Richard C. Hoffman, “Frontier Foods for Late Medieval Consumers: Culture, Economy, Ecology,” *Environment and History* 7 (May 2001): 131–167, quotation 133.

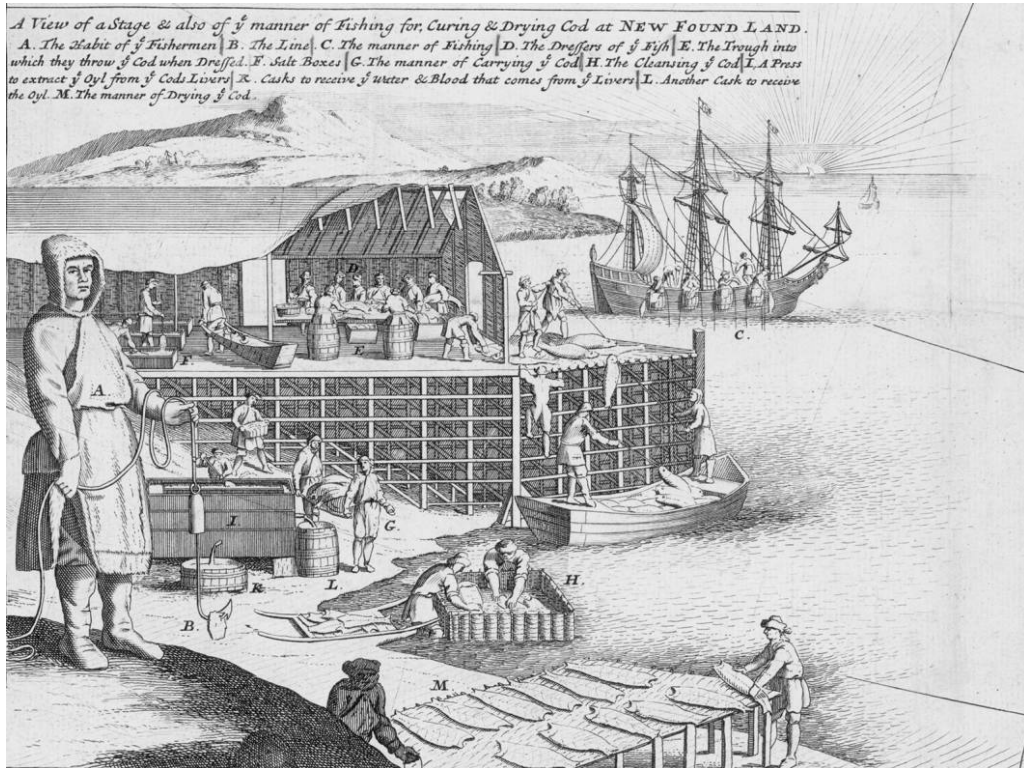


FIGURE 3: The exportation of marine biomass from North America to Europe and the resulting changes to American ecosystems have not received as much attention from Atlantic historians as they deserve. Thirteen steps detailing the method preferred by the English for catching and processing cod are shown here. Herman Moll, “A View of a Stage and Also the Manner of Fishing for, Curing, and Drying Cod at New Found Land” (1720). Reproduced by permission of the John Carter Brown Library.

“found two more of these” blackfish or pilot whales “dead on the sands,” according to William Bradford, “a thing usual after storms in that place.”²⁸

Whales were everywhere, in contrast to coastal Europe, where they already had been overfished. Basques had been killing whales in the Bay of Biscay since the eleventh century, and possibly longer. Perceptions that stocks were decreasing caused King Alfonso XI of Castile to reduce his tax on Lekeitio whalers in 1334. A survey of English fisheries compiled in 1580 made no mention of local whales, but indicated that Englishmen routinely traveled to “the coast of Rushe towards Muskovie and St. nycolas” for summer whaling. The International Whaling Commission has reported that by “the first half of the 17th century . . . the local [European] population of *E. glacialis* [the right whale] was already severely affected.” Even landsmen noticed the difference. Closing with the American coast in 1635, the Reverend Richard Mather delighted in the “multitude of great whales, which now was grown

²⁸ Mourt’s Relation; or, Journall of the beginning and proceeding of the English Plantation settled at Plimoth in New England (London, 1622), 2. Most scholars agree that William Bradford and Edward Winslow were the authors of this anonymous work. William Bradford, *Of Plymouth Plantation, 1620–1647*, ed. Samuel Eliot Morison (New York, 1953), 68.

ordinary and usual to behold.”²⁹ Experienced mariners could not help but observe that the ecosystem in the western Atlantic was organized differently because of the presence of great whales.³⁰

Indians from Cape Cod to the Gulf of St. Lawrence may have occasionally hunted large whales during the pre-contact period, but the archaeological evidence is inconclusive, as are the early ethnographies. Nevertheless, Natives treasured whales. Mi'kmaq's "greatest liking," according to Nicolas Denys, a fisherman and early settler in Acadia, was "grease [which] they eat . . . as one does bread." According to Denys, Mi'kmaqs in Acadia relished the blubber from whales, "which frequently came ashore on the coast." Along with hunting pilot whales and porpoise, all Native people from Nantucket eastward routinely availed themselves of drift whales—stranded live whales or dead whales that washed up on the beach. As Elizabeth A. Little and J. Clinton Andrews point out, along certain sections of the coast, "drift whales were so numerous that no need had arisen to go to sea to kill them."³¹

"Pristine" is a loaded term in environmental history. It conveys the outdated notion of a static state or climax ecosystem, overshadowing the scientifically more defensible position that ecosystems fluctuate constantly. It channels ensuing arguments into a declension model: changes to "pristine" cannot be anything but degradation. And from Native American perspectives, assertions that an inhabited ecosystem was "pristine" appear to elide the people who lived there, reducing their humanity and agency.³² All of these criticisms notwithstanding, the fact that Natives

²⁹ A. Rallo and Á. Borja, "Marine Research in the Basque Country: An Historical Perspective," in Á. Borja and M. Collins, eds., *Oceanography and Marine Environment of the Basque Country* (Amsterdam, 2004), 3–26, esp. 5; "Survey of Fisheries, 1580," reproduced as Appendix 3.1 in Gray, "Devon's Coastal and Overseas Fisheries," 357–358; Alex Aguilar, "A Review of Old Basque Whaling and Its Effect on the Right Whales (*Eubalaena glacialis*) of the North Atlantic," Special Issue, *Reports of the International Whaling Commission* 10 (1986): 191–199, quotation 194; Richard Mather, *Journal of Richard Mather* (Boston, 1850), quoted in Joe Roman and Stephen R. Palumbi, "Whales before Whaling in the North Atlantic," *Science* 301 (July 25, 2003): 508–510. For an alternative but less convincing view that Basque whalers probably did not diminish stocks in the Bay of Biscay, see Jean-Pierre Proulx, *Basque Whaling in Labrador in the 16th Century* (Ottawa, 1993), 12–13; Roger Collins, *The Basques* (Cambridge, Mass., 1986), 234–235.

³⁰ Scientists today are in the midst of a fractious dispute about just how many whales lived in the North Atlantic before widespread hunting began. Geneticists claim more than a million. Historically derived estimates are much smaller—nearly an order of magnitude smaller. But whether that population was closer to 100,000 or to a million, whales were prominent in the structure and function of the ecosystem. See Roman and Palumbi, "Whales before Whaling"; C. Scott Baker and Phillip J. Clapham, "Modelling the Past and Future of Whales and Whaling," *Trends in Ecology and Evolution* 19 (July 2004): 365–371.

³¹ Archaeologists point out that "the interpretation of data on . . . large whales [at Native sites is] poorly understood." See Arthur E. Spiess and Robert A. Lewis, *The Turner Farm Fauna: 5000 Years of Hunting and Fishing in Penobscot Bay, Maine* (Augusta, Maine, 2001), 141, 154, 157–159, quotation 141. Russel Lawrence Barsh, "Netukulimk Past and Present: Mikmaq Ethics and the Atlantic Fishery," *Journal of Canadian Studies* 37, no. 1 (Spring 2002): 15–42; Bernard Gilbert Hoffman, "The Historical Ethnography of the Micmac of the Sixteenth and Seventeenth Centuries" (Ph.D. diss., University of California, 1955); Elizabeth A. Little and J. Clinton Andrews, "Drift Whales at Nantucket: The Kindness of Moshup," *Man in the Northeast* 23 (Spring 1982): 19; Denys, *The Description & Natural History of the Coasts of North America*, 403. Marc Lescarbot and Chrestien LeClerq referred in passing to Mi'kmaq whaling from seagoing canoes during the seventeenth century. The single reference to Natives hunting whales in New England is found in Rosier's *A True Relation*, describing Maine in 1605.

³² For ongoing debates over the extent to which Native Americans affected their natural surroundings, and the contexts in which those changes occurred, see Calvin Martin, *Keepers of the Game: Indian-Animal Relationships and the Fur Trade* (Berkeley, Calif., 1978); Shepard Krech III, ed., *Indians, Animals, and the Fur Trade* (Athens, Ga., 1981); Krech, *The Ecological Indian: Myth and History* (New York, 1999);

rarely or never hunted great whales suggests that northwest Atlantic whale populations were virtually unexploited during the era of European contact. Robust whale stocks and relatively low aboriginal population densities prior to contact meant that Natives' opportunistic reliance on drift whales sufficed for their needs.

Following permanent English settlement, Natives' right to appropriate drift whales was lost rather quickly on Martha's Vineyard and Long Island. On Nantucket, however, that right was codified into law in 1673. "The Court do order that . . . all the whal fish or Other drift fish belong to the Indian sachems." Purchasing shore frontage from Nantucket sachems in a series of transactions between 1684 and 1701, English buyers always agreed to the caveat "except drift whales." And on Nantucket and eastern Long Island, at least, because "Indian ownership of drift whales preempted the crown's rights . . . whale oil from Indian drift whales may have been exported tax-free." The exact steps by which settlers proceeded from scavenging beached whales to pursuing whales from the beach are lost to time, but the significance of whales is not. In 1635, Governor John Winthrop noted that "Some of our people went to Cape Cod, and made some oil of a whale which was cast on shore." The Plymouth Colony began to tax the enterprise in 1652. The Reverend Cotton Mather called whale oil "a staple commodity of the colony."³³ Shore whaling began in Massachusetts during the 1650s or 1660s, but very few years were required to deplete the abundant stock of near-shore whales. As early as 1720, the *Boston News-Letter* reported: "We hear from the towns on the Cape that the Whale Fishery among them has failed much this Winter, as it has done for several winters past." Contemporaries claimed that the near-shore whaling grounds had been "fished out" by 1740. The economic consequences were dire: capital equipment sat idle, and expected earnings did not materialize. Minor political consequences followed, too. In 1754, Selectman John Hallet petitioned the province to excuse the town of Yarmouth from sending a representative to the legislature because of the failure of inshore whaling.³⁴

Merchant, *Ecological Revolutions*. Natives' exploitation of marine resources has drawn less attention, although sophisticated work posed in light of climate change, boat technology, and marine resource abundance is currently being conducted for the prehistoric period by archaeologists. See Arthur Spiess, Kristin Sobolik, Diana Crader, John Mosher, and Deborah Wilson, "Cod, Clams and Deer: The Food Remains from Indiantown Island," *Archeology of Eastern North America* 34 (2006): 141–187; Spiess and Lewis, *The Turner Farm Fauna*.

³³ Little and Andrews, "Drift Whales at Nantucket," 33–35, 21, 29; John A. Strong, *The Montaukett Indians of Eastern Long Island* (Syracuse, N.Y., 2001), 25–26. Mather quoted in Glover M. Allen, "The Whalebone Whales of New England," *Memoirs of the Boston Society of Natural History* 8 (1916): 105–322, quotation 154.

³⁴ Some controversy exists about exactly when shore whaling began on Cape Cod and Long Island. It may have been as early as the 1650s, and certainly by the 1670s. On its origins, see Little and Andrews, "Drift Whales at Nantucket," 17–38; Daniel Vickers, "The First Whalers of Nantucket," *William and Mary Quarterly*, 3rd. ser., 40 (October 1983): 560–583; Starbuck, *History of the American Whale Fishery*, 1–36; Stackpole, *The Sea-Hunters*, 15–47. Charting the transition from shore whaling to deep-sea whaling, Stackpole ignored depletion of inshore stocks as the cause, and emphasized whalers' pioneering spirit. For contemporaries' observations of depletion, see William Douglass, *A Summary, Historical and Political, of the First Planting, Progressive Improvements, and Present State of the British Settlements in North America*, 2 vols. (Boston, 1755), 1: 58–62. For a useful chronology of the decline of shore whaling, constructed from excerpts of eighteenth-century documents, see John Braginton-Smith and Duncan Oliver, *Cape Cod Shore Whaling: America's First Whalers* (Yarmouth Port, Mass., 2004), 143–146. Hallet quoted *ibid.*, 145.

According to one conservative study, colonists killed a minimum of 2,459 to 3,025 right whales between 1696 and 1734 from Delaware Bay to Maine. Other respected estimates suggest a much larger harvest. In 1794, the Reverend John Mellen of Barnstable, Massachusetts, noted, "Seventy or eighty years ago the whale bay fishery . . . employed nearly two hundred men for three months of the year . . . But few whales now come into the bay, and this kind of fishery has for a long time (by this town at least) been given up." The killing of northwest Atlantic whales had begun in earnest about a century before the *Mayflower* sailed. Basque whalers killed tens of thousands of right whales and bowheads in the straits between Newfoundland and Labrador from 1530 to 1620. Then, while coastal New Englanders were exploiting local stocks, Dutch and Basque whalers in the western Arctic harpooned 35,000 to 40,000 whales between 1660 and 1701, depleting populations considerably and affecting the whales' migration patterns.³⁵

Once inshore stocks were depleted, sachems' possession of drift whales became a rather hollow "right." Lookout masts, whalemens' taverns, and try yards (the boiling facilities where whale blubber was rendered) were abandoned on Cape Cod and Nantucket. Merchants in towns on the north shore of Massachusetts Bay, such as Ipswich, that formerly had dabbled in shore whaling turned their attention entirely to fishing and sea trading. This took time. Whalemens did not give up all at once. But by the early eighteenth century, the number of whales being killed, getting stranded, or washing up dead was decreasing dramatically. By mid-century, shore whaling was no longer a source of reliable seasonal income. An air of desolation hung over facilities that not long before had been bustling and profitable. By the 1760s, well-capitalized Cape Cod vessels were voyaging to Labrador and Newfoundland to hunt for whales. As the biomass of the coastal ecosystem shifted to include fewer whales, Nantucket's remnant Indian population shipped as "men before the mast" aboard whaling vessels.³⁶

The consequences of shore whaling were not limited to the expansion of deep-sea whaling, much less to the depletion of town coffers, the abandonment of once-productive whaling installations, or the redefinition of Native life on Nantucket and Long Island. The destruction of huge numbers of whales within a relatively short

³⁵ For conservative estimates of whale kills, see Randall R. Reeves, Jeffrey M. Breiwick, and Edward D. Mitchell, "History of Whaling and Estimated Kill of Right Whales, *Balaena glacialis*, in the Northeastern United States, 1620–1924," *Marine Fisheries Review* 61 (1999): 1–36. For more expansive estimates, see Spencer Apollonio, *Hierarchical Perspectives on Marine Complexities: Searching for Systems in the Gulf of Maine* (New York, 2002), 60–61. Mellen quoted in Braginton-Smith and Oliver, *Cape Cod Shore Whaling*, 146. For seventeenth-century Dutch and Basque whaling in the Arctic, see Laurier Turgeon, "Fluctuations in Cod and Whale Stocks in the North Atlantic during the Eighteenth Century," in Vickers, *Marine Resources and Human Societies*, 87–122; Richards, *The Unending Frontier*, 584–589.

³⁶ Braginton-Smith and Oliver, *Cape Cod Shore Whaling*, 145. Occasional references to shore whaling and whaleboats occur in Ipswich records as late as 1707, but not thereafter. See Thomas Franklin Waters, *Ipswich in the Massachusetts Bay Colony: A History of the Town from 1700 to 1917*, 2 vols. (Ipswich, Mass., 1917), 2: 235–236. For the abandonment of a Cape Cod whalers' tavern in Wellfleet, probably because of the failure of the inshore whale fishery, see Eric Ekholm and James Deetz, "Wellfleet Tavern," *Natural History* 80, no. 7 (August–September 1971): 48–56. On Indian whalemens, see Vickers, "The First Whalemens of Nantucket"; Daniel Vickers, "Nantucket Whalemens in the Deep-Sea Fishery: The Changing Anatomy of an Early American Labor Force," *Journal of American History* 72 (September 1985): 277–296. As Vickers makes clear, white whalemens' ideas about labor control, credit, and race were essential to the social relations of whaling, including Natives' dispossession.

period removed their qualitative contribution to ecosystem stability. Baleen whales are not apex predators. As large, long-lived creatures, however, whales embody vast biomass in stable form. Before commercial harvesting began, naturally occurring populations of whales concentrated hundreds of thousands of tons of biomass in continental shelf ecosystems, imposing constraints on variability. Overharvesting of baleen whales liberated considerable prey from capture, which may have allowed prey populations to oscillate more dramatically than previously.³⁷

Obed Macy's *The History of Nantucket* claims that the first whale killed in Nantucket was a "scragg." Paul Dudley explained in 1725 that "The Scrag whale is near-akin to the Fin-back, but . . . his Back is scragged with a half Dozen Knobs or Knuckles." Dudley's "scrag whale" appears to have been an Atlantic gray whale. Subfossil specimens of gray whales have been found along European shores, and from Florida to eastern Long Island. Radiocarbon dating has established that this species disappeared around 1675.³⁸ Evidence suggests that a population of Atlantic gray whales lived on both sides of the Atlantic; that those whales, like others, were hunted; and that the population became extinct during the early eighteenth century. Whether human hunters caused this extinction, accelerated it, or had nothing to do with it is unknowable. Given the rate at which whales were being killed then, however, it appears likely that this extinction of a North Atlantic marine mammal—the first of the post-Pleistocene era—resulted from the intensified whaling associated with the Age of the Ocean.

Shortly before the outbreak of the American Revolution, products from marine mammals—primarily whales—constituted 15 percent of the value of New England's exports and 8.5 percent of the combined value of exports from Quebec, Nova Scotia, and Newfoundland. Although prosecuted far from home, whaling was still Atlantic-based: not until the nineteenth century would Yankee whalers round the great capes to hunt in the Pacific and Indian oceans. But the size of whale and walrus populations, their geographic distribution in the Atlantic, their role in stabilizing coastal ecosystems, and the nature of northwest Atlantic whaling had all changed significantly during the previous half-century.³⁹ English New Englanders' relatively short-term accumulation of wealth, their knowledge of whales' seasonal migration and

³⁷ On whales as constraints in ecosystems, see Apollonio, *Hierarchical Perspectives on Marine Complexities*, 14–15, 53–71. For a similar ripple effect from whaling in the Svalbard archipelago, see Louwrens Hacquebord, "The Hunting of the Greenland Right Whale in Svalbard, Its Interaction with Climate and Its Impact on the Marine Ecosystem," *Polar Research* 18 (1999): 375–382; Hacquebord, "Three Centuries of Whaling and Walrus Hunting in Svalbard and Its Impact on the Arctic Ecosystem," *Environment and History* 7 (2001): 169–185.

³⁸ Obed Macy, *The History of Nantucket: Being a Compendious Account of the First Settlement of the Island by the English, Together with the Rise and Progress of the Whale Fishery; And Other Historical Facts Relative to Said Island and Its Inhabitants* (Boston, 1835), 28; Paul Dudley, "An Essay upon the Natural History of Whales, with a Particular Account of the Ambergris Found in the *Sperma Ceti* Whale," Royal Society of London, *Philosophical Transactions* 33 (1725): 256–269; James G. Mead and Edward D. Mitchell, "Atlantic Gray Whales," in Mary Lou Jones, Steven L. Swartz, and Stephen Leatherwood, eds., *The Gray Whale* (Orlando, Fla., 1984), 33–53; P. J. Bryant, "Dating Remains of Gray Whales from the Eastern North Atlantic," *Journal of Mammalogy* 76, no. 3 (1995): 857–861.

³⁹ McCusker and Menard, *The Economy of British North America*, 108, 115. Walruses in the Gulf of St. Lawrence were hunted systematically from the middle of the sixteenth century. The great gregarious herds that formerly hauled out on beaches from Sable Island to Labrador were on the path to extermination by 1800. By the nineteenth century, remnant populations of walruses inhabited a much-reduced range, limited largely to the Arctic and immediate sub-Arctic. E. W. Born, I. Gjertz, and R. Reeves, *Population Assessment of Atlantic Walrus* (Oslo, 1995), 7–8, 31–32.

feeding habits, and their development of technologies appropriate for pursuing, killing, rendering, and marketing whales all came at the cost of downward trends in bio-complexity and ecosystem resiliency.

NO SIXTEENTH- OR SEVENTEENTH-CENTURY EUROPEAN COMMUNITY relied on the sea as much as the Mi'kmaq and Malecite hunter-gatherers of New Brunswick and Nova Scotia, who may have secured as much as 90 percent of their annual caloric intake from marine resources. Seal hunters, seabird egg collectors, scavengers of drift whales, weir builders, hook fishers, and harpooners, Mi'kmaqs and Malecites studied the tides and remained alert for ecological signals from the neighboring sea. Not only did they know the sea; they felt it. Imagining themselves as descended from animal ancestors, including marine creatures such as eels and sturgeon, Natives along the Bay of Fundy and Nova Scotian coasts inhabited a totemic universe in which humans participated in the natural world without considering themselves separate from it. This was true in southern Maine and along Massachusetts Bay, too, where Native agriculturalists were also expert fishermen "experienced in the knowledge of all baits," and, as William Wood elaborated, knowledgeable of "when to fish rivers and when at rocks, when in bays, and when at seas." Accomplished Native harvesters understood the ocean differently than did European newcomers, but both knew that, like the land, it was biologically productive only in specific places and in its seasons.⁴⁰

Archaeological evidence indicates that prehistoric Native inhabitants relied on Atlantic sturgeon in their seasonal eating strategy. Each year as the ice broke, and the annual springtime bloom of phytoplankton turned coastal waters murky brown, the return of spawning fish such as sturgeon, salmon, and alewives signaled Natives' season of plenty. Malecites and Mi'kmaqs relied so much on anadromous fish that they named several months for their return. One Englishman observed that Natives made "very strong sturgeon nets" of "their own hemp." As early as the 1630s, according to William Hammond, Indians were capturing a "great store of sturgeon" in the Merrimack River for English buyers. "The sturgeons be all over the country," noted Wood, "but the best catching of them is upon the shoals of Cape Cod and in the river of Merrimac, where much is taken, pickled, and brought for England. Some of these be twelve, fourteen, eighteen foot long." A twelve-foot sturgeon could weigh six hundred pounds.⁴¹

Giant, toothless, and armored with rows of bony shields along their sides and back, bottom-feeding sturgeon—with peculiar little barbells under their snouts—could be mistaken for no other fish. John Josselyn, who lived on the mid-coast of

⁴⁰ Hoffman, "The Historical Ethnography of the Micmac," 151–171, 235; Merchant, *Ecological Revolutions*, 44–50; Bragdon, *Native People of Southern New England*; Harald E. L. Prins, *The Mi'kmaq: Resistance, Accommodation, and Cultural Survival* (Belmont, Calif., 2002); William Wood, *New England's Prospect* (1634; repr., Amherst, Mass., 1977), 107.

⁴¹ William Hammond to Sir Simonds D'Ewes, September 26, 1633, in Everett Emerson, ed., *Letters from New England: The Massachusetts Bay Colony, 1629–1638* (Amherst, Mass., 1976), 111; Spiess and Lewis, *The Turner Farm Fauna*, 135–136, 155; Wood, *New England's Prospect*, 55, 107; Henry B. Bigelow and William C. Schroeder, *Fishes of the Gulf of Maine* (Washington, D.C., 1953), 82–83. Bigelow and Schroeder note that mature sturgeon up to 12 feet long and 600 pounds were occasionally landed in the Gulf of Maine during the early twentieth century, "but 18 feet, reported for New England many years ago, may not have been an exaggeration." For Natives' month names, see Hoffman, "The Historical Ethnography of the Micmac," 243–246.

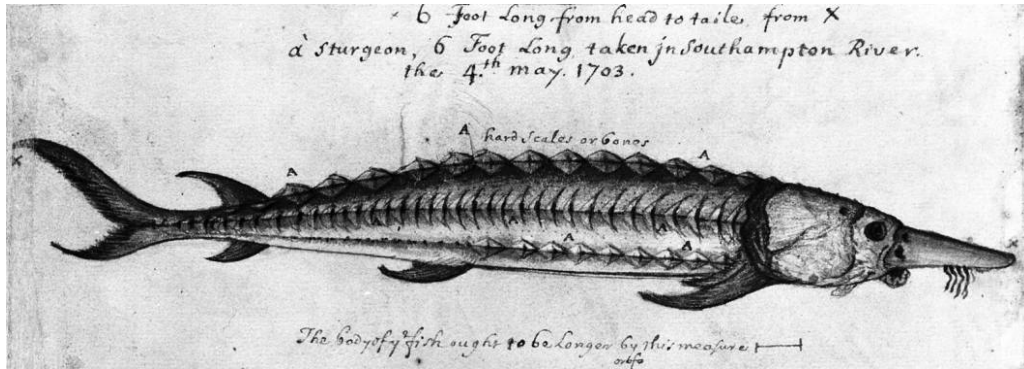


FIGURE 4: By 1703, Atlantic sturgeon was quite rare in western European ecosystems. Its status as a delicacy, however, promoted a robust sturgeon fishery in the rivers of northern New England. Overfishing rapidly led to localized depletion, and by the mid-eighteenth century, Atlantic sturgeon was the first fish pushed to commercial extinction in some areas of the northwest Atlantic. Drawing by Jean Barbot. By permission of The National Archives of the UK, ref. ADM 7/830 A&B.

Maine in 1638–1639, depicted the Pechipscut River (now the Androscoggin) as “famous for multitudes of mighty large *Sturgeon*.” Settlers in the Piscataqua estuary named one of its tributaries Sturgeon Creek. Few settlers had ever seen sturgeon in Old England, where an eight-hundred-year fishing spree had almost eradicated them. Every Englishman, however, shared Thomas Morton’s understanding of sturgeon as a “regal fish.” In France and England, sturgeon was kings’ fare. In New England, as Morton pointed out in 1632, every man “may catch what hee will, there are multitudes of them.”⁴²

The value of commodities exists in light of historically contingent meanings. During the mid-seventeenth century, sturgeon linked resourceful Native fishers, colonial settlers, London fishmongers, and highbrow English consumers because of the degraded state of European aquatic ecosystems. By the fourteenth century, chefs in France and England, according to historian Richard Hoffmann, “were circulating a recipe to ‘make sturgeon’ from veal, a distinct mark of the prestige and favor still attached to an almost extinct food fish.”⁴³ Sturgeon were low-hanging fruit in the arbor of marine resources, and they were plucked quite quickly in all of northern New England’s major rivers. They could be trapped in weirs, netted, or lanced—all

⁴² Paul J. Lindholdt, ed., *John Josselyn, Colonial Traveler: A Critical Edition of “Two Voyages to New England”* (Hanover, N.H., 1988), 140; *York Deeds*, 18 vols. (Portland, Maine, 1887), 1: f. 13. Thomas Morton, *New English Canaan* (Amsterdam, 1637), 88. For an identical mention of sturgeon as “regal,” see Lindholdt, *John Josselyn*, 76.

⁴³ Excavations in Gdansk, Poland, reveal a downward trend in sturgeon size from the tenth to the thirteenth centuries. In the Low Countries, sturgeon size declined from the eleventh to the fourteenth centuries. See Hoffmann, “Economic Development and Aquatic Ecosystems,” 649. For more on settlers’ exports of sturgeon, see Captain John Smith, *Advertisements for the Unexperienced Planters of New England, or Anywhere*, in Philip L. Barbour, ed., *The Complete Works of Captain John Smith (1580–1631)*, 3 vols. (Chapel Hill, N.C., 1986), 3: 294; Edward Everett Hale, Jr., *Note-book Kept by Thomas Lechford, Esq., Lawyer, in Boston, Massachusetts Bay, from June 27, 1638 to July 29, 1641* (1885; repr., Camden, Maine, 1988), 377; *A Volume Relating to the Early History of Boston Containing the Aspinwall Notarial Records from 1644 to 1651* (Boston, 1903), 423–424; Wood, *New England’s Prospect*, 55. For the sturgeon fishery that began on the Pejepscot River in Brunswick, Maine, in 1628 and lasted until 1676, see George Augustus Wheeler and Henry Warren Wheeler, *History of Brunswick, Topsham and Harpswell, Maine* (1878; repr., Somersworth, N.H., 1974), 552.

by part-time shore-based fishermen. Englishmen learned successful techniques from Indians. As Josselyn explained: “in dark evenings when they are upon the fishing grounds near a Bar of Sand (where the *Sturgeon* feeds upon small fishes . . .) the *Indian* lights a piece of dry *Birch-Bark* which breaks out into flame & holds it over the side of his *Canow*, the *Sturgeon* seeing this glaring light mounts to the Surface of the water where he is slain and taken with a fis[h]gig.”⁴⁴

By 1673, less than fifty years after Morton had written that “every man in New England may catch what he will,” men from the Merrimack River towns determined that insufficient sturgeon remained for an open fishery. William Thomas of Newbury petitioned the General Court to prohibit the pickling or preserving of sturgeon for transport (i.e., other than for personal consumption) by anyone “except by such lawful authoritie shall be licensed thereto.” Thomas successfully arranged a partial monopoly: thenceforth the Merrimack River sturgeon fishery was limited to those “able and fit persons” whom the General Court licensed for “the art of boyling and pickling of sturgeon.” Inspectors (each of whom was dubbed a “searcher and sealer of sturgeon”) were employed to maintain quality. Licensed townsmen in Newbury and Salisbury then conducted an extensive sturgeon-packing business. An act passed in Boston in 1687 mandated that “all sorts of Greene Dry Salted or Pickled ffish Sturgeon fflesh or Butter That shall be put up for Transportac’on to a fforaigne Market shall be searched and Surveyed.” A similar regulation for “Preventing Deceit in Packing,” which specifically mentioned sturgeon, passed in New Hampshire in 1719. At that point, when permanent English settlement had existed in New Hampshire and Massachusetts for approximately a century, and when the total population of the two provinces was only about 100,000, roughly the same size as the pre-contact Native population, the ancient sturgeon stock was headed for trouble. On July 6, 1761, when Matthew Patten caught a six-footer at the Merrimack’s Amoskeag Falls, it created a stir. By then, sturgeon were relatively rare in the Merrimack, the Piscataqua, and the other rivers of northern New England.⁴⁵

Atlantic sturgeon must grow about four feet long to reach sexual maturity. Their survival as a species was predicated on their longevity: as large armored fish with few natural enemies, they could afford the luxury of low reproductive rates. Throughout the first century and a half of English settlement in New England, nearly every river and creek was flanked each spring by eager fishermen with weirs, seines, and spears. Towns sold rights for the best places or for annual hauls, and seining companies pooled capital for rope, twine, lead, and boats. Immature sturgeon packed and sold as well as older fish, and all were captured indiscriminately. Neither regulation nor

⁴⁴ Lindholdt, *John Josselyn*, 100; Faith Harrington, “Sea Tenure in Seventeenth-Century New Hampshire: Native Americans and Englishmen in the Sphere of Coastal Resources,” *Historical New Hampshire* 40 (Spring/Summer 1985): 18–33.

⁴⁵ Petition of William Thomas to the General Court, May 7, 1673, Massachusetts Archives, vol. 61:3, Massachusetts State Archives; John J. Currier, *History of Newbury, Mass., 1635–1902* (Boston, 1902), 282; Joshua Coffin, *A Sketch of the History of Newbury, Newburyport, and West Newbury* (Boston, 1845), 113–114; George W. Chase, *The History of Haverhill, Massachusetts* (Haverhill, Mass., 1861), 118–119; Jack Noon, *Fishing in New Hampshire: A History* (Warner, N.H., 2003), 61–64, 152–154; Matthew Patten, *The Diary of Matthew Patten of Bedford, N.H. from Seventeen Hundred Fifty-Four to Seventeen Hundred Eighty-Eight* (Concord, N.H., 1903), 96. An accomplished fisherman and diarist, Patten had neither caught a sturgeon nor noted anyone else catching one during the six years he had kept his diary. Yet as late as 1774, the Merrimac River was labeled “the Merrimak or Sturgeon R.” on Thomas Jefferys’s “Map of the most inhabited part of New England.”

custom impeded colonial fishermen from taking all they could. By the end of the eighteenth century, the combination of overfishing and sturgeon's naturally low reproductive rate essentially had doomed this "regal fish" in the estuaries of northern New England. In 1793, for instance, when the Massachusetts General Court passed an act "to enable the town of Newbury to regulate and order the taking of Fish called Shad, Bass, and Alewives in the River Parker," sturgeon were already a distant memory, not even mentioned.⁴⁶

Sturgeon would not be virtually exterminated in Chesapeake and Delaware bays and in the Hudson River until the caviar craze between 1870 and 1900. But in northern New England, where competitiveness in the emerging Atlantic economy depended on fishing and trade, only two centuries were necessary to accomplish what had taken a millennium in Europe—the severe reduction of a huge fish that in a natural state was likely to die of old age. Ecologically speaking, we do not know the exact qualities or contributions of sturgeon, or how the presence of many year-classes, with individuals of different sizes and ages, functioned in the ecosystem. Those difficult questions, pertinent to many species, remain to be answered by ecologists. Yet clearly the system had been perturbed by sturgeon removal. The eminent biologist E. O. Wilson reminds us that "The power of living Nature lies in sustainability through complexity." Each reduction in complexity contributes to degradation. It makes the overall system qualitatively different, and less sustainable. As long-living, large animals, sturgeon, like whales, had contributed stability to coastal ecosystems in North America. Moreover, they had contributed to the cultural and aesthetic values through which Natives and the first generations of English knew themselves and the region. For Natives, the abundance of sturgeon and other marine species affirmed their traditional consciousness of themselves as descendants from the totemic creatures on whom they depended, and with whom they coexisted. For English settlers, the presence of sturgeon conveyed security, prosperity, and upward mobility. By the outbreak of the American Revolution, sturgeon's contribution to resident identity and ecosystem stability was largely gone in New England, as was the once-thriving fishing and packing industry in old towns such as Newbury.⁴⁷

Like sturgeon, striped bass spawned in fresh water beyond the tide. William Hubbard's seventeenth-century *A General History of New England* explained that the starving Pilgrims netted "a multitude of bass, which was their livelihood all that [first] summer. It is a fish not inferior to a salmon, that comes upon the coast every summer pressing into most of the great creeks every tide . . . Sometimes 1500 of them have been stopped in a creek." Such robust landings spelled trouble. By 1639, Massa-

⁴⁶ Currier, *History of Newbury, Mass.*, 283; Noon, *Fishing in New Hampshire*, 5–10, 61–64.

⁴⁷ This is not to say that Atlantic sturgeon were extinct in New England's rivers, just that their populations had plummeted. Sturgeon were still being caught in rivers in Maine and New Brunswick occasionally at the end of the nineteenth century. See U.S. Commission of Fish and Fisheries, *Report of the Commissioner for the Year Ending June 30, 1898* (Washington, D.C., 1899), clxvi–clxvii; Theodore I. J. Smith, "The Fishery, Biology, and Management of Atlantic Sturgeon, *Acipenser oxyrinchus*, in North America," *Environmental Biology of Fishes* 14 (1985): 61–72; Inga Saffron, "Introduction: The Decline of the North American Species," in Greg T. O. LeBreton, F. William H. Beamish, and R. Scott McKinley, eds., *Sturgeons and Paddlefish of North America* (Dordrecht, 2004), 1–21. Saffron unfortunately ignores the history of the northern New England fishery in her account. Apollonio, *Hierarchical Perspectives on Marine Complexities*, 46–51; E. O. Wilson, *The Creation: An Appeal to Save Life on Earth* (New York, 2006), 32; Merchant, *Ecological Revolutions*, 50–58.

chusetts Bay authorities recognized the specter of waste and the threat of depletion. In what appears to have been New England's first fishery regulation, magistrates forbade the use of bass and cod for fertilizing fields. But the pressure on that fine, fat fish persisted. Josselyn noted that settlers in southern Maine were still taking bass "in Rivers where they spawn," and that he had seen "3000 Bass taken" with one set of the net.⁴⁸

Unlike cod or whale oil, the cornerstones of New England's long-distance commerce, bass became part of the local exchange economy. Part-time fishermen put up bass for their own families, exchanged fresh-caught or barreled bass to square their debts, and sold the fish when they could. As town populations swelled in places such as Boston and Portsmouth, part-time fishermen peddled fish directly or vended it to consumers through fishmongers. When nets strained to the breaking point, surplus striped bass ended up as "manure" in tilled fields. In the heart of New England, overfishing threatened householders' livelihoods. On the periphery, it threatened the peace. During the 1680s, Cotton Mather attributed rising tensions between settlers and Abenakis in southern Maine to nets that prevented anadromous fish in the Saco River from reaching Native fishers.⁴⁹

By 1770, according to the government of New Hampshire, fishing had "Almost extirpated the bass and blue fish" in the Piscataqua River. The Reverend Jeremy Belknap elaborated during the 1790s: "The bass was formerly taken in great plenty in the river Pascataqua; but by the injudicious use of nets . . . this fishery was almost destroyed." So, too, in Massachusetts: In 1771, petitioners from Newbury lamented the decline of striped bass in the Parker River, and implored the Massachusetts General Court to preserve them. The court obliged with regulations, but they were ignored or unenforceable, and stocks did not rebound. In 1793, town fathers in Newbury outlawed putting "a seine, hedge, weir or drag into the river Parker at any season" for "catching Bass." The regulations were too little too late. By the presidency of George Washington, the providentially abundant fish that had saved William Bradford and the Pilgrims during their starving time teetered on the verge of commercial extinction between Cape Cod and southern Maine. Residents lamented the loss. "Formerly large fish such as salmon, bass and shad came up the river in plenty," wrote Judge Benjamin Chadbourne from South Berwick, Maine, about 1797, "but they have forsook it and now there remains only Tom Cods, or what we call Frost fish which come in the month of December, smelts in the month of April, alewives in the months of June and July, and eels in about all seasons of the year."⁵⁰

⁴⁸ William Hubbard, *A General History of New England, from the Discovery to MDCLXXX* (1815; repr., New York, 1972), 80; Nathaniel B. Shurtleff, ed., *Records of the Governor and Company of the Massachusetts Bay in New England*, 5 vols. (Boston, 1853), 1: 258. While striped bass can weigh more than 100 pounds, schooling fish are considerably smaller, averaging about 10 pounds. See Bigelow and Schroeder, *Fishes of the Gulf of Maine*, 390. If Hubbard was correct, gaunt, half-starved Pilgrims were occasionally stop-seining 15,000 pounds of bass in a single set. Wood corroborated Hubbard's observations on bass landings, noting that "sometimes two or three thousand" bass were taken in one set of a net. Wood, *New England's Prospect*, 55; Lindholdt, *John Josselyn*, 78.

⁴⁹ For tension between Abenaki and settler fishers, see Bourque, *Twelve Thousand Years*, 157.

⁵⁰ *Laws of New Hampshire: Including Public and Private Acts and Resolves and the Royal Commissions and Instructions with Historical and Descriptive Notes*, 10 vols. (Manchester, N.H., 1904–1922), 3: 537; Jeremy Belknap, *The History of New Hampshire*, 3 vols. (Boston, 1791–1792), 3: 130–131; Currier, *History of Newbury, Mass.*, 283–284; Judge Benjamin Chadbourne, "A Description of the Town and Village," c. 1797, ms. transcription, Old Berwick Historical Society, South Berwick, Maine.

Chadbourne revealed how fishing had altered the composition of fish species, and thus the structure of his estuarine ecosystem. River fish were a crucial component of most families' livelihoods, too valuable to be stewarded effectively. Striving to secure a "competence," which they defined as financial independence and security for themselves and their dependents, householders targeted spawning runs each spring. Chadbourne ignored sturgeon, which he had never known, even though Sturgeon Creek (named prior to 1649) was just a few miles south of his home. He personally witnessed the disappearance of salmon, shad, and bass—long-lived, valuable fish—and his plaintive assessment reflected an estuary diminished by human population pressure and ineffectual regulation since its insertion into the Atlantic economy. The nature of the place, and of people's relationship to it, had changed significantly.⁵¹

CONCERNS ABOUT DEPLETING OCEAN FISH (not just estuarine species) appeared in America quite early. In 1668, the Massachusetts General Court ordered "that no man shall henceforth kill any codfish, hake, haddock, or pollock, to be dried for sale in the month of December or January, because of their spawning time." The same court, "being informed, that the taking of mackerel at unseasonable times do greatly diminish their increase," imposed fishing restrictions. Although no minutes of those deliberations survive, it appears that credible individuals convinced the magistrates that stocks were not infinite, and that precautionary measures were in order. This may have reflected consciousness of Old World depletions, or of natural fluctuations such as those in 1621 and 1651, when cod were in short supply.⁵²

Assessed over the *longue durée*, the northwest Atlantic ecosystem seemed able to produce the approximately 250,000 tons of cod per year that fishermen extracted between the seventeenth and nineteenth centuries. Yet that overall sustainability may have masked localized depletions. By the middle of the eighteenth century, Newfoundlanders began to shift their fishing efforts from areas of declining catch to relatively unexploited grounds such as eastern Labrador, a distant and inhospitable place requiring arduous seasonal migrations. The case is far from conclusive. But as biologist Jeffrey A. Hutchings puts it, "Fishing mortality rates may have exceeded sustainable levels as early as the early nineteenth century. If the northern cod stock is in fact comprised of many sub-stocks (e.g. bay stocks), then fishing mor-

⁵¹ Vickers, "Those Damned Shad"; Pitcher, "Fisheries Managed to Rebuild Ecosystems?" 604–605.

⁵² *The Charters and General Laws of the Colony and Province of Massachusetts Bay: Carefully Collected from the Public Records and Ancient Printed Books* (Boston, 1814), chap. 46, sec. 4, 114–115. On cod shortages in Newfoundland, including "the very bad season of 1592," the scarcity of fish in 1621, and the "poor or bad years . . . frequently remarked" on between 1657 and 1675, see Peter Pope, "Early Estimates: Assessment of Catches in the Newfoundland Cod Fishery, 1660–1690," in Vickers, *Marine Resources and Human Societies*, 11–14; Pope, *Fish into Wine*, 33–39. The failure of the Dorchester Company to develop fisheries near Cape Ann may have been connected to a poor year-class of cod in 1621, although this is speculative. See Bernard Bailyn, *The New England Merchants of the Seventeenth Century* (Cambridge, Mass., 1955), 14. After a thorough discussion of fishing licenses and the politics of access, framed in light of a possible downturn in fisheries, Bailyn notes that "It is impossible to measure the decline, if there was any, in the New England fisheries during the 1620's." Pope's work has raised the possibility that natural fluctuations in the cod population were a factor. *Ibid.*, 200–201 n. 20. On cod shortages at Boston in 1651, see *A Volume Relating to the Early History of Boston*, 390–391; William B. Leavenworth, "Fishermen, Merchants and New England's Maritime Environment, 1630–1651," forthcoming, *International Journal of Maritime History*.

talities on such inshore stocks could have been very high relative to mortalities imposed on offshore stocks.”⁵³

The early impact of the cod fishery, however, came on seabird populations, whose depletion triggered ripples throughout human and non-human natural communities. At least eighty-five species of birds were likely to have been seen on salt water between Newfoundland and Cape Cod, including wading shorebirds (such as sandpipers); sea ducks (such as eiders); dabbling ducks, geese, and swans (such as teal); and genuine seabirds (such as puffins), which lived on land each year only long enough to nest. Marine birds exhibited a wide variety of ranges, migration patterns, and reproductive strategies. Some, including Double-Crested Cormorants, bred locally and roosted each night on sandbars, rocks, or trees. Others, including fishermen’s favorite avian bait source, the Greater Shearwater, nested in the remote South Atlantic and appeared on northwest Atlantic waters only during the summer, where they stayed offshore and foraged for squid and fish. Seabirds ranged in size from the Northern Gannet, a magnificent white plunge-diver with a six-foot wingspan, to the diminutive Wilson’s Storm-Petrel, smaller than a robin. Fundamental to the large marine ecosystem of which they were a part, seabirds were not particularly susceptible to its vagaries. Their relatively stable populations consisted of long-lived individuals relying on food supplies that were generally sufficient for reproduction, even in lean years.⁵⁴

Although Natives had long relied on birds for eggs, meat, and feathers, the sheer numbers of birds, especially in offshore island rookeries, flabbergasted the first generations of European seamen. In 1535, Jacques Cartier noted that Newfoundland’s Funk Island was “so exceeding full of birds that all the ships of France might load a cargo of them without any one perceiving that any had been removed.” This augured well for commercial fisheries. Cod were not fastidious about what they ate, and along with capelin and herring, birds made fine bait. All of the Alcidae family (guillemots, murre, puffins, razorbills, and auks) nested in vast colonies on remote rocky islands. Those numerous Bird Islands and Egg Rocks between Cape Cod and Newfoundland had been outposts of safety in a cold, dark sea. With the rise of commercial fishing, island sanctuaries became slaughterhouses. Prized for their eggs, feathers, oil, and flesh, seabirds were decimated by fishermen and their dependents. From the late 1500s on, most crews fishing in the northwest Atlantic killed vast numbers of birds for bait during at least part of the season. A veteran noted in 1620 that “the Fishermen doe bait their hooks with the quarters of Sea-fowle.”⁵⁵

⁵³ Jeffrey A. Hutchings, “Spatial and Temporal Variation in the Exploitation of Northern Cod, *Gadus morhua*: A Historical Perspective from 1500 to the Present,” in Vickers, *Marine Resources and Human Societies*, 43–68, esp. 48, 53, 55; Henry Lear, “History of the Fisheries in the Northwest Atlantic: The 500-Year Perspective,” *Journal of Northwest Atlantic Fishery Science* 23 (1998): 41–73; Jeffrey A. Hutchings and Ransome A. Myers, “The Biological Collapse of Atlantic Cod off Newfoundland and Labrador: An Exploration of Historical Changes in Exploitation, Harvesting Technology, and Management,” in Ragnar Arnason and Lawrence Felt, eds., *The North Atlantic Fisheries: Successes, Failures, and Challenges* (Charlottetown, Prince Edward Island, 1995), 37–92.

⁵⁴ David Allen Sibley, *The Sibley Field Guide to Birds of Eastern North America* (New York, 2003); Apollonio, *Hierarchical Perspectives on Marine Complexities*, 71–77.

⁵⁵ For Natives’ reliance on seabirds and their eggs, see Lescarbot, *The History of New France*, 3: 172, 231; Pierre Biard, *Relation de la Nouvelle France*, in Reuben Gold Thwaites, ed., *The Jesuit Relations and Allied Documents: Travels and Explorations of the Jesuit Missionaries in New France, 1610–1791*, 73 vols. (Cleveland, 1896–1901), 3: 81. Jacques Cartier, *The Voyages of Jacques Cartier*, ed. Ramsay Cook (To-

No bird had become better suited to fishermen's needs through thirty million years of evolution than the Great Auk, which early writers called "penguin." Standing two and a half feet tall, with solid bones and stubby vestigial wings, auks had evolved into superb swimmers and divers. Great Auks could not fly away from pursuers because, unlike every other North Atlantic bird species, they had sacrificed flying for underwater swimming as they evolved. They even migrated by paddling, traveling in vast rafts from Newfoundland to Cape Cod, and occasionally as far south as Carolina, before returning to the relative safety of rocky outposts near Newfoundland to nest. Anthony Parkhurst recounted in 1578 that sailors at Newfoundland's Funk Island drove "penguins" on "a planke into our ship as many as shall lade her."⁵⁶

Great Auks, like Passenger Pigeons, could thrive only in huge, gregarious groups. Flightless, colonial, and adapted to living in the midst of rich fishing grounds, they collided headlong with commercial fishermen. As late as 1833, John James Audubon was assured by fishermen in Labrador that Great Auks nested "on a low rocky island to the south-east of Newfoundland, where they [the fishermen] destroy great numbers of the young for bait." Those fishermen were wrong. By then, Great Auks were nearly gone. By the end of the eighteenth century, only occasional stragglers were seen in the western Atlantic.⁵⁷ Extinction of their species came at Eldey, off Iceland, in 1844.

Other seabirds that had adapted to incubating their eggs relatively free from molestation were also susceptible to bait-seeking fishermen who invaded nesting colonies with clubs and sacks. Cliff-nesters such as Northern Gannets were not immune: ladders and lines provided access to hunters, who relished the sport, whether seeking eggs or birds. Even the tiny Wilson's Storm-Petrel, which nested in the sub-Antarctic, was not safe from bait hunters. Fishermen made whips from lengths of stiff cod line. As a fisherman remembered, the petrels were attracted with codfish liver: "when they had gathered in a dense mass, swish went the thongs of the whip cutting their way through the crowded flock and killing or maiming a score or more at a single sweep." Moreover, each spring, coastal folk in communities from Massachusetts to Newfoundland sought eggs in the wild. Colossal quantities were gathered: one year, four men from Halifax collected nearly 40,000 eggs, and scores of crews were at work. By the 1830s, eggers were sailing to Labrador, in part because rookeries between Cape Cod and Newfoundland already had been significantly depleted. John James Audubon then observed, "This war of extermination cannot last many more years. The eggers themselves will be the first to repent the entire disappearance of the myriads of birds."⁵⁸

ronto, 1993), 4–5, 13–14, 40, quotation 40; Richard Whitbourne, *A Discourse and Discovery of Newfoundland* (London, 1620), 9.

⁵⁶ "A letter written to M. Richard Hakluyt of the middle Temple, containing a report of the true state and commodities of Newfoundland, by M. Anthonie Parkhurst Gentleman, 1578," in Ernest Rhys, ed., *Hakluyt's Voyages*, 8 vols. (London, 1907), 5: 347; Jeremy Gaskell, *Who Killed the Great Auk?* (New York, 2000), 39, 52–53.

⁵⁷ John James Audubon, *The Complete Audubon: A Precise Replica of the Complete Works of John James Audubon Comprising the Birds of America (1840–44) and the Quadrupeds of North America (1851–54) in Their Entirety*, 5 vols. (Kent, 1979), 4: 245. On the extermination of Great Auks, see Errol Fuller, *The Great Auk* (Southborough, Kent, 1999), 60–77; Gaskell, *Who Killed the Great Auk?*

⁵⁸ Anthony J. Gaston, *Seabirds: A Natural History* (New Haven, Conn., 2004). Seabirds killed for bait included shearwaters, gannets, murre, gulls, puffins, terns, guillemots, auks, and cormorants. While



FIGURE 5: Some evidence suggests that seabirds' long life spans, low reproductive rates, and place in the food chain help to stabilize marine ecosystems. Fishermen valued seabirds, however, as a source of bait, eggs, feathers, oil, and meat. By 1800, relentless depredation had reduced the once-vast population of Great Auks to a tiny remnant; by 1844, the species was extinct. Aquatint by John James Audubon and Robert Havell from Audubon's *The Birds of America* (London, 1827–1838). Courtesy of Errol Fuller.

Gunning probably wreaked less havoc on waterfowl and seabirds before 1800 than baiting and eggging, but it also depleted flocks whose numbers had stunned early visitors. Swans, noted Thomas Morton in 1632, could be found in “greate store at the seasons of the yeare.” Geese “of three sortes” existed in “great abundance”: “I have often had 1000 before the mouth of my gun.” Ducks, teals, widgeons, cranes, sanderlings—all were available. As Wood observed of shorebirds, “one may drive them on a heap like so many sheep, and seeing a fit time shoot them.” As early as 1710, Massachusetts legislators observed that shorebirds were diminishing because of gunners using canoes or floats “disguised with hay, sedge, seaweed” and the like “to shoot them . . . upon the flatts and feeding ground.” An act that year outlawed such methods, but no evidence suggests that it was effective.⁵⁹

John James Audubon did not witness seabirds being slaughtered for bait until the 1830s, his vivid accounts of a long-standing practice illuminate its impact on the ecosystem. See Audubon, *The Complete Audubon*, 4: 45–47, 156, 163–164, 176, 238–241; Maria R. Audubon, *Audubon and His Journals*, 2 vols. (New York, 1897), 1: 361–362. On eggging, see *ibid.*, 1: 374, 383; 2: 406–411, 423; Philip W. Conkling, *Islands in Time: A Natural and Cultural History of the Islands in the Gulf of Maine* (Rockland, Maine, 1999), 134. The quotation about killing petrels was by a nineteenth-century fisherman. See Captain J. W. Collins, “Notes on the Habits and Methods of Capture of Various Species of Sea Birds That Occur on the Fishing Banks off the Eastern Coast of North America, and Which Are Used as Bait for Catching Codfish by New England Fishermen,” in United States Commission of Fish and Fisheries, *Report of the Commissioner for 1882* (Washington, 1884), 311–335, quotation 334.

⁵⁹ Morton, *New English Canaan*, 67–69; Wood, *New England's Prospect*, 48–53, quotation 52–53. See also Bradford, *Of Plymouth Plantation*, 90; John Pory to the Earl of Southampton, January 16, 1622/1623, in Sydney V. James, Jr., ed., *Three Visitors to Early Plymouth: Letters about the Pilgrim Settlement in New*

Natural characteristics made some bird species particularly vulnerable. Samuel Penhallow reported that in 1717, at Arrowsic, Maine, Abenakis in canoes drove eider ducks “like a flock of sheep before them into the creeks.” Most seabirds shed their feathers one at a time, replacing worn ones in rotation. Eiders molt all at once, which renders them flightless for several weeks in August, during which time they raft in vast numbers. “Without powder or shot they killed at one time four thousand six hundred,” Penhallow noted. Killing eiders with paddles and sticks, Abenakis sold “a great number of them to the English for a penny a dozen, which is their practice yearly.” Maine island residents capitalized on eiders’ flightlessness during molting as long as eiders lasted. Each August, a flotilla assembled to drive the ducks into previously selected killing grounds. Duck Harbor, on the southwest side of Isle au Haut, was a choice spot. Its narrow mouth and steep walls trapped the birds. Naturalist Philip Conkling points out that “A single drive on Vinalhaven took 2,100 birds, which may have been half the nesting population of eiders for the west [Penobscot] bay that year. After the 1790s, the drives became less and less successful as the eider population declined.” When the Reverend Jonathan Cogswell published his history of coastal Freeport in 1816, he observed “that birds of no kind abound in Maine.” The maritime economy had virtually destroyed seabirds and shorebirds in the Gulf of Maine, and made serious inroads into their populations all the way to Newfoundland.⁶⁰

True seabirds, such as shearwaters, petrels, and gannets, which had baited the cod hooks of several empires, actually share many similarities with marine mammals. As one ecologist explains, both have “long lives, late maturity, low reproductive rates,” and “well-developed social behavior.” Both are “highly migratory,” and neither is “at the top of the food chain.” Moreover, the small fish on which birds and most whales prey have high reproductive rates, meaning that birds consume juveniles “surplus to the supply needed to maintain the populations.” Seabirds thus may function in an ecosystem similarly to marine mammals, stabilizing it and dampening dramatic oscillations. If that is the case, “an abundance of seabirds could in fact contribute some stability to the fisheries.”⁶¹ Ecological interactions are much more complicated than linear cause and effect. The systematic seabird slaughter not only restructured the

England during Its First Seven Years by John Pory, Emmanuel Altham, and Issack De Rasieres (Plymouth, Mass., 1963), 10. Yasuhide Kawashima and Ruth Tone, “Environmental Policy in Early America: A Survey of Colonial Statutes,” *Journal of Forest History* 27 (October 1983): 176. *Acts and Resolves, Public and Private, of the Province of Massachusetts Bay*, 21 vols. (Boston, 1869–1922), 1: 667–669, quoted by Kawashima and Tone.

⁶⁰ Samuel Penhallow, *The History of the Wars of New England, with the Eastern Indians; or, A Narrative of Their Continued Perfidy and Cruelty, from the 10th of August, 1703. To the Peace Renewed 13th of July, 1713. And from the 25th of July, 1722. To their Submission 15th December, 1725. Which was Ratified August 5th, 1726* (1726; repr., Boston, 1924), 80–84; George L. Hosmer, *An Historical Sketch of the Town of Deer Isle, Maine, with Notices of Its Settlers and Early Inhabitants* (Boston, 1886), 16–18; Conkling, *Islands in Time*, 133–134. On Indians slaughtering molting eider ducks in the Bay of Fundy, see Audubon, *Audubon and His Journals*, 434–435. Rev. Jonathan Cogswell, “Topographical and Historical Sketch of Freeport, Maine,” *Collections of the Massachusetts Historical Society*, 2nd ser., 4 (1816): 184–189. Looking for gulls, guillemots, cormorants, and other species in the Gulf of Maine in August of 1832, John James Audubon wrote despondently to Dr. Richard Harlan from Eastport, Maine, “Birds are very, very few and far between.” See Alexander B. Adams, *John James Audubon: A Biography* (New York, 1966), 400.

⁶¹ Apollonio, *Hierarchical Perspectives on Marine Complexities*, 71–77, quotations 76–77. The impact on fish stocks of destroying seabird colonies is mentioned in Ernst Mayr, *This Is Biology: The Science of the Living World* (Cambridge, Mass., 1997), 225.

marine ecosystem by depleting populations of seabirds, but may have destabilized the fisheries that were the cornerstone of the northwest Atlantic economy, in addition to drastically reducing a resource that could have been eternally renewable. The reputation that coastal residents cultivated as skilled gunners or persistent eggers came at a cost, as did fishermen's opportunistic slaughter of seabirds for bait.

WHEN EDMUND BURKE ROSE IN THE HOUSE OF COMMONS in 1775 to salute the not-inconsequential accomplishments of His Majesty's subjects in North America, he attested to American whalers' ingenuity and work ethic. As Burke put it, there exists "no sea but what is vexed by their fisheries."⁶² It was an apt turn of phrase by a masterful orator. New Englanders not only harvested the sea, Burke suggested; they troubled it. It is unlikely that he intended a point about ecological change. His word choice, however, reveals the link between hard physical labor in extractive industries and the toll that such labor takes on the environment. We know now that marine ecosystems could not be assaulted systematically over centuries by people wielding harpoons, hooks, seines, weirs, pots, guns, and eggers' baskets without consequences, both ecological and cultural.

The notion of "traditional fisheries," often shorthand for preindustrial activity, remains a mythic trope obscuring historic changes in marine ecosystems. It plays to the indefensible but commonplace assumption that the ocean has existed outside of history. Yet just as early modern people modified the terrestrial environments in which they lived, so, too, did they modify the marine ecosystems on which they increasingly relied. Partnering with marine scientists, or at least relying on their work, historians have an opportunity to explore those interactions in the Cape Verdean archipelago, Chesapeake Bay, the Caribbean, and other seas transformed by Atlantic connections. Increasing intimacy with the marine environment during the Age of the Ocean promoted commercial opportunities, curiosity about nature, new cultural forms—and changed ecosystems. Yet the relationship between that historical ocean and Atlantic history, much less other histories, is just beginning to emerge. It is a beckoning path, if one beset by cautions. Cause-and-effect relationships in ecosystems often are not immediate, not linear, and not obvious: so, too, with the interactions between ecosystems and human systems. While the economic implications of ecological constraints can sometimes be tracked relatively clearly (for instance, Newbury's sturgeon-packing establishments closed after eighteenth-century sturgeon stocks plummeted), reconstructing subtle cultural shifts triggered by changes in the sea—especially in the early modern era—will require careful interdisciplinary study of maritime communities and marine environments, and attention to linked phenomena occurring on widely varying timescales. That is the promise of ocean history.

By 1800, the northwest Atlantic was beginning to resemble European seas. Seventeenth-century impacts, in keeping with the small population, were modest. But during the eighteenth century, each human generation confronted fewer whales,

⁶² Edmund Burke, "Speech on Conciliation with America," in Burke, *The Beauties of the Late Right Hon. Edmund Burke, Selected from the Writings, &c. of that Extraordinary Man*, 2 vols. (London, 1798), 1: 20.

bass, sturgeon, and seabirds. With but few exceptions, this diminished ecological capital became regarded as the norm. Ecologists call this the “shifting baseline syndrome”: it appears to have been well under way in the northwest Atlantic by 1800.⁶³ Downward trends in the coastal ocean’s faunal populations and ecological resiliency during the eighteenth century are just as obvious as the lack of reliable statistics that rigid quantifiers claim necessary to make such a case. Attentive to those trends, and their implications, historians reconstructing the increasingly integrated Atlantic economy have the chance to imagine the ocean historically, and the opportunity to write it into history. The Age of the Ocean deserves nothing less.

⁶³ Daniel Pauly, “Anecdotes and the Shifting Baseline Syndrome of Fisheries,” *Trends in Ecology and Evolution* 10 (October 1995): 430.

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