NARRAGANSETT BAY WATERSHED ECONOMY

The ebb and flow of natural capital

Commercial Fishing Overview

Due to the plentiful and healthy coastline of the Narragansett Bay watershed (NBW), commercial fishing is a flourishing industry—one that is directly dependent on the Bay. Commercial fishing provides considerable economic value and supports many jobs in the watershed region, not only for those directly involved in the commercial fishing industry, but also for those indirectly involved as well; restaurants and distributors that purchase finfish, shellfish, and crustacea for culinary uses or resale rely on commercial fishing, as do companies that use commercially caught fish for industrial purposes, such as bait or animal food production. In addition, households that buy fish for nourishment are dependent upon commercial fishermen.

In the U.S. over the last decade, the commercial fishing industry has been relatively steady in volume (weight), although landings have fluctuated over the years. Annual landings ranged from a low of 8.0 million pounds of shellfish and fish in 2009 to a high of 9.9 million pounds in 2011, with the remainder of years between 2006 and 2015 fluctuating between these values. Between 2006 and 2015, annual landings increased 2% in volume and 30% in value.[1] On the other hand, despite fluctuations in volume, the increase in landing value has increased relatively steadily. With the exception of 2003, value has increased every year from 2006 to 2015, from $4.0 million in 2006 to $5.2 million in 2015. Between 2006 and 2015, despite only a 2% change in landing volume, there was an 11% increase in value. Data from two of the three major ports in the NBW, Point Judith and Narragansett, indicates that while landing volume decreased only 3% from 2006 to 2015, landing value decreased 34%.[2]

The total economic value of commercial fish landings at NBW ports in 2015 amounted to nearly $65 million (in 2016 dollars).[3] In the same year, there were 155 commercial fishing establishments in the watershed, which employed over 700 individuals with $85 million (in 2016 dollars) in annual wages.[4]

History

Commercial fishing has existed in the NBW for hundreds of years, with origins dating back to colonial trade in the 17th century. Due to variations in coastal geomorphology and ecosystems of the region, many types of gear, species, and vessels have been used over the course of history.[5]

The first commercial fishermen used uncomplicated gear, such as hook, line, and floating traps. In 1867, beach seining—the use of a large vertical fishing net—became popular for seasonal fishing groups living on the beach.[6] In the late 1800s, pound and heart traps were widespread, followed by bottom trawls in the mid-1900s. As methods became more advanced and efficient, fishing moved from inshore to offshore resulting in greater landings.[7]

Over the past century, not only has fishing technology changed, but the abundancy of species found within the NBW has as well. Considerable declines in fish stocks have occurred due to changes in the environment, including changing water temperatures, predation, fishing pressures, and pollution. Since 1898, fish yields have decreased by 81%. In the late 1800s, alewife, shad, smelt, and menhaden were abundant and no longer are today. Changes in wild shellfish include the disappearance of soft-shell clam, oyster, and scallop, which were replaced by quahog.[8]

Despite the changing availability of fish types, the commercial fishing industry has experienced success in the NBW throughout history and is still a prominent industry today; in RI alone, there are more than 1,500 vessels that are commercially declared.[9]

Data Sources and Limitations

Estimates of establishments, employees, wages, and landings are provided for the economic impact of commercial fishing within the NBW. These data are derived from the Bureau of Labor Statistics (BLS), the National Ocean Economics Program (NOEP), and the National Marine Fisheries Service (NMFS). The BLS reported on the total number of commercial fishing establishments, employees, and wages for the counties within the NBW. NOEP reported on total landings in weight and value for commercial fishing in all principle ports in the NBW. NMFS reported data for specific species of fish landed.

The economic impact of recreational fishing is estimated for the NBW based on several assumptions and limitations. To estimate the commercial fishing activity within the NBW using published data at the county level, county figures were adjusted by the share of the land area in the watershed, assuming data is consistent in watershed and non-watershed areas (please refer to the "Geography" section of this report for a map of the NBW). Middlesex county is excluded, as less than 1% of it resides within the NBW. In addition, numbers are rounded to the nearest full number for establishments and employees.

To estimate the commercial fishing activity within the NBW using ports data, only the ports located within the NBW (Narragansett and North Kingstown) and Point Judith are included, all of which are in RI. While Point Judith is not within the watershed boundaries, it is included because it is an important landing port for fish caught in the Bay. There are no commercial fishing ports in the Massachusetts portion of the NBW due to the lack of marine coastline in the MA portion of the NBW (most of Massachusetts's coastline falls along Cape Cod). Data for Point Judith and Narragansett both date back to at least 2006, while North Kingstown landing data is available for 2011 onward.

It should be noted that all finfish, shellfish, and crustacea data are largely dependent upon a voluntary system of self-reporting by fishermen and buyers. These data are therefore susceptible to bias and inaccuracy and may underestimate the level of commercial fishing activity in the NBW. Additionally, the NMFS does not provide data for fish categories separated by port. Therefore, some landings captured could have been caught outside the NBW.

For additional information on methodology used in this report, please refer to the "Methodology" section.

Current Status and Trends

Commercial fishing remains a prominent industry in the NBW today despite historical fluctuations. Based on previously stated assumptions, in 2015 there were 155 commercial fishing establishments in the watershed (Table 1). These establishments employed over 700 individuals with $85 million (in 2016 dollars) in annual wages.

Table 1: Commercial Fishing Establishments, Employees, and Wages in the NBW (2015) (in 2016 dollars) [i]

County	Establishments	Employees	Wages ($1000s)
	Rhode Island		
Bristol	2	0*	0*
Kent	1	0*	0*
Newport	9	14	$611
Providence	N/A**	N/A**	N/A**
Washington	1	9	$795
	Massachusetts		
Bristol	138	692	$83,305
Norfolk	0	0	0
Plymouth	4	7	$414
Worcester	N/A	N/A	N/A
Total	**155**	**722**	**$85,125**

Source: BLS

Note: These figures are from the 1411 NAICS code ("Fishing")

*indicates the BLS had 0 recorded for these values, despite there being establishments

**indicates that commercial fishing was not present in the BLS report for this county

As a complement to the BLS data, the NOEP reports landings data for commercial fishing ports within the NBW. Data include total landings weight and value (Table 2).

For landing weight in 2016, the Point Judith, North Kingstown, and Newport ports were the 18th, 34rd, and 75th top ranked commercial fishing ports in the U.S. out of 131 ports (Table 2). Combined, these three NBW ports total over 77 million pounds. This would make them 13th top ranked commercial

[i] Scaled by ratio of NBW area to county land area: Bristol RI (100%), Kent RI (74.44%), Newport RI (82%), Providence RI (95.57%), Washington RI (16.47%), Bristol MA (71.93%), Norfolk MA (19%), Plymouth MA (36.45%).

fishing port in landing weight pounds in the U.S. Both the Point Judith and North Kingstown ports made considerable gains in the ranking from 2015, with Point Judith rising six spots and North Kingstown gaining nine, while Newport fell 11 spots. Point Judith has, by far, the most productive landing, with 53.4 million pounds of shellfish and fish in 2016, compared to 17.6 in North Kingstown and 6.6 in Newport.[10]

Concerning landing value, the Point Judith, North Kingstown, and Newport ports were the 15th, 74th, and 92nd most economically valuable commercial fishing ports in the U.S. out of 131 ports. Combined, these three NBW ports total over $78 million (this would make them the 10th most valuable commercial fishing port in the U.S. for annual fish landings). Compared to 2015, Point Judith rose nine spots, North Kingstown one spot, and Newport seven spots. Again, Point Judith had the most productive landing, with a value of $55.7 million, compared with $13.7 in North Kingstown and $8.9 in Newport. [11]

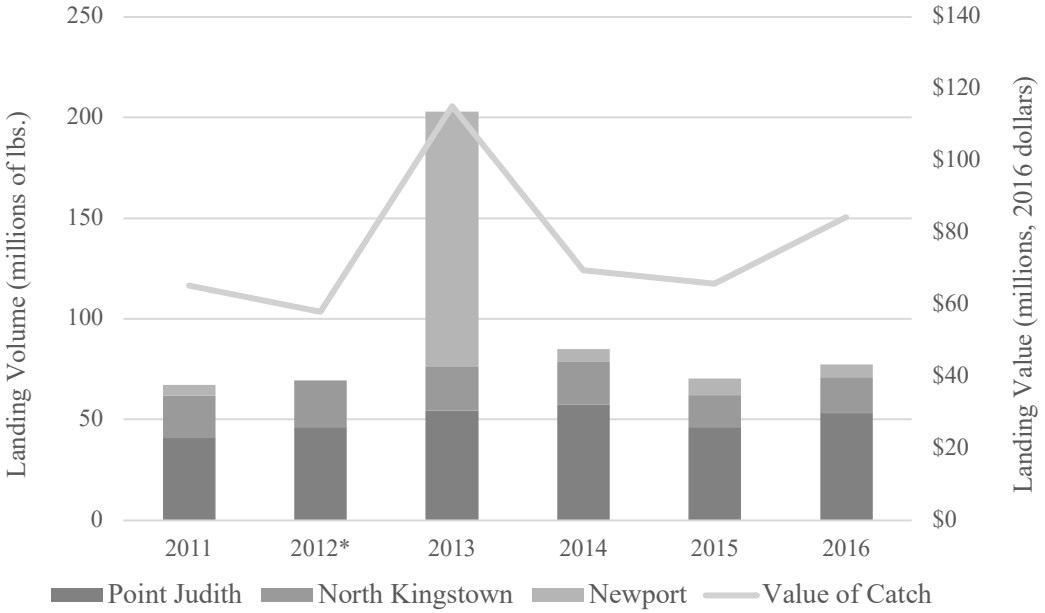
Table 2: Commercial Fishing Ports Rankings by Landing Weight and Value, NBW (2016) (2016 dollars)

Port	Weight (lbs.) (1000s)	Rank	Landed Value (millions)	Rank
Point Judith, RI	53,400	18	$55,700	15
North Kingstown, RI	17,600	38	$13,700	74
Newport, RI	6,600	75	$8,000	92

Source: NOEP, 2016

Data for landings history are also available for NBW ports, which can be used to investigate trends over time. During the last few years, landings have fluctuated in both weight and value (Figure 1).

At the Point Judith port, landing volume (weight) has increased, although not consistently, in the past decade. During this same time, despite an increase of 16% in landing weight from 2006 to 2016, there was almost no change in landing value. Conversely, the Newport port volume decreased 56% during this time, and value fell 68%. There was, however, an unusually productive year in 2013, where landing weight was nearly 20 times what it was in 2016, and value was over seven times what it was in 2016. Comparing this to national rates, commercial landing volume increased 2% from 2006 to 2015, while value increased 11%. During this same time, for Point Judith and Narragansett, landing volume decreased 3% from 2006 to 2012, but landing value decreased 34%.[12]



*no landing data for Newport in 2012

Figure 1: Commercial Fishery Landings, Narragansett Bay Watershed Ports, 2011-2016 (in 2016 dollars)

Source: NOEP, 2011-2016

Note: Graph starts in 2011 because that is when data became available for all three ports – data was not available for previous years in North Kingstown. 2012 is missing because there is no Newport data reported for this year.

Table 3: Landing Weight and Value of Point Judith, Narragansett, and North Kingstown Ports, 2006-2016 (2016 dollars)

	Point Judith		Newport		North Kingstown	
Year	**Weight (lbs.) (1000s)**	**Value ($1000s)**	**Weight (lbs.) (1000s)**	**Value ($1000s)**	**Weight (lbs.) (1000s)**	**Value ($1000s)**
2016	53,400	$55,700	6,600	$8,000	17,600	$13,700
2015	46,200	$45,954	8,300	$7,460	16,100	$11,041
2014	57,300	$51,130	6,400	$6,899	21,300	$11,362
2013	54,600	$48,162	126,800	$56,825	21,700	$10,004
2012	46,400	$44,591	--	--	23,000	$13,293
2011	40,800	$43,069	5,600	$8,015	21,000	$14,000
2010	35,600	$35,496	7,500	$7,606	--	--
2009	39,900	$36,288	7,600	$7,840	--	--
2008	37,600	$41,163	6,700	$7,251	--	--
2007	37,600	$42,551	8,700	$14,377	--	--
2006	46,000	$55,762	10,300	$24,783	--	--

Source: NOEP, 2006-2016

Certain species of fish account for higher landing value than others. This is especially true within the NBW. The species of fish that accounted for much of landing values at NBW ports in 2015 were longfin squid, American lobster, and sea scallop. Although less valuable than shellfish and crustacea, the most valuable finfish species landed were summer flounder, scup, and goosefish (Table 4).[13]

Table 4: Highest Value Shellfish, Crustacea, and Finfish Species Landed in the NBW (2015) (in 2016 dollars)

Species Name	Value ($1000s)
Longfin Squid	$19,123.3
American Lobster	$12,514.0
Sea Scallop	$7,993.6
Summer Flounder	$6,190.9
Scup	$4,337.0
Goosefish	$2,767.6

Source: NMFS, 2015

Given the highly variable nature of production of commercial fishing landings, it is difficult to establish trends over the past ten years. Despite this fluctuation, commercial fishing has a considerable economic impact: in 2016, the annual value of catches was over $77 million for these three ports combined, and in all of the NBW, commercial fishing establishments in 2015 employed over 700 people with wages over $85 million.[14]

Future Threats and Opportunities

Temperature | Estuarine fish communities | Water quality for aquatic life

Currently, the commercial fishing industry faces numerous threats and stressors, including overfishing, water pollution, and destruction of habitat, but perhaps the most pressing threats will arise from the effects of climate change. Climate change is expected to impact the Northeast Atlantic at a greater rate than the global average: the Narragansett Bay water temperature increased by 2.5 to 3° F from 1960 to 2012, while water temperature is projected to increase 3.6 to 5.4° F increase within the next century.[15] Many fish are already surviving at the upper limits of their temperature tolerance, and a further increase in temperature could lead to species migrating further north where temperature is comparable to that of the modern-day NBW. This could lead to less cool-cold water species, such as winter flounder and American lobster in the NBW, and an increase in the population of warmer water fish, such as scup, summer flounder, butterfish, and black sea bass, residing in the NBW. This shift in species present in the NBW presents a change in direction of the commercial fishing industry and what types of fish they harvest.

Furthermore, increasing water temperatures, aside from the direct impact they have on fish species diversity in NBW, will also affect many other aspects of marine life that impact fish populations. For example, this increase in water temperature will affect habitats that are critical to marine life, such as

seagrass. Seagrass is stressed by higher temperatures, leading to alterations in its reproduction patterns. A decline in seagrass would mean a decline in critical habitat, breeding ground, and nurseries for scallops, striped bass, flounder, and other species.[16] Additionally, issues such as nutrient loading, stormwater runoff, and wastewater runoff may increase in coming years due to increased precipitation as a result of climate change, as well as increased impervious cover from urbanization. This may cause issues such as increased prevalence of algal blooms and decreased levels of dissolved oxygen, which both negatively impact the health of fish populations.[17]

Overall, a culmination of issues, such as the effects of urbanization and climate change, will impact the future of commercial fishing in the NBW. These issues pose threats to the health and status of current fish species, but also opportunities to harvest new species that previously were not prevalent in the area. Efforts to control water quality and to mitigate and adapt to the effects of climate change are important steps to ensure the future of the commercial fishing industry and its economic impact in the watershed.

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[1] Source: NMFS U.S. Commercial Landings, 2015.
[2] Source: NMFS U.S. Rhode Island Landings, n.d.
[3] Source: NOEP, n.d.
[4] Source: BLS, 2015.
[5] Source: Hall-Arber et al., n.d.
[6] Source: Hall-Arber et al., n.d.
[7] Source: Oviatt et al., 2003.
[8] Source: Oviatt et al., 2003.
[9] Source: McGrath, 2016.
[10] Source: NOEP, n.d.
[11] Source: NOEP, n.d.
[12] Source: NMFS U.S. Rhode Island Landings, n.d.
[13] Source: NMFS, n.d.
[14] Source: NOEP, n.d.
[15] Source: NBEP "Temperature," 2017.
[16] Source: NBEP "Sea Grass," 2017.
[17] Source: NBEP "Water Quality for Aquatic Life," 2017.

Appendix

Table A1: Establishments, Employees, and Wages in RI and MA NBW Counties (2015)

County	Establishments	Employees	Wages ($1000s)
Bristol (MA)	192	962	$114,246
Bristol (RI)	2	0*	0*
Kent (RI)	2	0*	0*
Newport (RI)	11	18	$735
Norfolk (MA)	1	0*	0*
Plymouth (MA)	12	20	$1,121
Providence (RI)	N/A**	N/A**	N/A**
Washington (RI)	11	57	$4,759
Worcester (MA)	N/A**	N/A**	N/A**

Source: BLS, 2015

Note: *indicates the BLS had 0 recorded for these values, despite there being establishments
**indicates that commercial fishing was not present in the BLS report for this county

Table A2: Top Commercial Fishing Ports in the United States (2015) (in 2009 dollars)

Rank	Port	Weight	Port	Landed Value
1	Dutch Harbor-Unalaska, AK	787,400,000	New Bedford, MA	$321,900,000
2	Kodiak, AK	513,900,000	Dutch Harbor-Unalaska, AK	$218,200,000
3	Aleutian Islands (Other), AK	467,400,000	Kodiak, AK	$137,500,000
4	Intracoastal City, LA	427,500,000	Aleutian Islands (Other), AK	$111,300,000
5	Empire-Venice, LA	379,200,000	Empire-Venice, LA	$110,900,000
6	Reedville, VA	350,000,000	Honolulu, HI	$96,800,000
7	Pascagoula-Moss Point, MS	294,800,000	Alaska Penninsula (Other), AK	$90,300,000
8	Alaska Penninsula (Other), AK	268,000,000	Bristol Bay (Other), AK	$90,100,000
9	Naknek-King Salmon, AK	175,500,000	Cape May-Wildwood, NJ	$71,600,000
10	Cordova, AK	162,000,000	Key West, FL	$71,200,000
11	New Bedford, MA	123,800,000	Naknek-King Salmon, AK	$68,500,000
12	Seward, AK	94,400,000	Westport, WA	$65,000,000
13	Astoria, OR	91,500,000	Cordova, AK	$64,500,000

14	Sitka, AK	87,400,000	Stonington, ME	$63,800,000
15	Ketchikan, AK	84,300,000	Sitka, AK	$59,400,000
16	Westport, WA	83,500,000	Seward, AK	$59,300,000
17	Cape May-Wildwood, NJ	77,200,000	Hampton Roads Area, VA	$56,400,000
18	Bristol Bay (Other), AK	69,600,000	Brownsville-Port Isabel, TX	$55,100,000
19	Petersburg, AK	69,600,000	Pascagoula-Moss Point, MS	$53,900,000
20	Gloucester, MA	67,700,000	Point Judith, RI	$46,200,000
21	Newport, OR	65,000,000	Dulac-Chauvin, LA	$45,400,000
22	Portland, ME	62,400,000	Gloucester, MA	$44,400,000
23	Kenai, AK	49,600,000	Galveston, TX	$42,400,000
24	Point Judith, RI	46,200,000	Vinalhaven, ME	$39,700,000
25	Moss Landing, CA	45,100,000	Ketchikan, AK	$39,600,000
26	Port Hueneme-Oxnard-Ventura, CA	43,500,000	Petersburg, AK	$39,300,000
27	Honolulu, HI	32,299,999	Astoria, OR	$38,200,000
28	Rockland, ME	31,000,000	Bayou La Batre, AL	$37,200,000
29	Dulac-Chauvin, LA	30,500,000	Portland, ME	$34,600,000
30	Monterey, CA	28,400,000	Shelton, WA	$34,200,000
31	Grand Isle, LA	25,900,000	Reedville, VA	$33,100,000
32	Atlantic City, NJ	25,900,000	Newport, OR	$32,900,000
33	Brownsville-Port Isabel, TX	24,700,000	Intracoastal City, LA	$32,800,000
34	Point Pleasant, NJ	24,400,000	Grand Isle, LA	$32,600,000
35	Provincetown-Chatham, MA	21,200,000	Kenai, AK	$32,500,000
36	Coos Bay-Charleston, OR	20,600,000	Palacios, TX	$31,200,000
37	Bayou La Batre, AL	20,200,000	Provincetown-Chatham, MA	$30,600,000
38	Stonington, ME	19,100,000	Point Pleasant, NJ	$28,200,000
39	Wanchese-Stumpy Point, NC	18,200,000	Port Arthur, TX	$26,900,000
40	Key West, FL	17,300,000	Wanchese-Stumpy Point, NC	$26,600,000
41	Juneau, AK	16,700,000	Delacroix-Yscloskey, LA	$26,300,000
42	Galveston, TX	16,399,999	Long Beach-Barnegat, NJ	$25,400,000
43	North Kingstown, RI	16,100,000	Bellingham, WA	$25,400,000
44	Golden Meadow-Leeville, LA	16,000,000	Tampa Bay-St. Petersburg, FL	$24,700,000
45	Palacios, TX	15,400,000	Seattle, WA	$24,500,000
46	Los Angeles, CA	14,700,000	Golden Meadow-Leeville, LA	$23,800,000
47	Ilwaco-Chinook, WA	14,600,000	Juneau, AK	$22,500,000
48	Boston, MA	14,000,000	Friendship, ME	$21,800,000
49	Tampa Bay-St. Petersburg, FL	13,600,000	Coos Bay-Charleston, OR	$21,500,000
50	Port Arthur, TX	13,600,000	Beals Island, ME	$20,700,000
51	Delacroix-Yscloskey, LA	13,500,000	Port Hueneme-Oxnard-Ventura, CA	$20,700,000
52	Bellingham, WA	13,300,000	Anacortes-La Conner, WA	$20,600,000
53	Montauk, NY	11,600,000	Beaufort-Morehead City, NC	$20,300,000
54	Hampton Roads Area, VA	11,500,000	Atlantic City, NJ	$19,600,000
55	Princeton, CA	10,700,000	Homer, AK	$18,100,000
56	Anchorage, AK	10,400,000	Rockland, ME	$17,800,000
57	Brookings, OR	9,800,000	Fairhaven, MA	$17,800,000

58	Vinalhaven, ME	9,700,000	Olympia, WA	$17,200,000
59	Shelton, WA	9,600,000	Newington, NH	$17,100,000
60	Gulfport-Biloxi, MS	9,300,000	Fort Myers, FL	$16,800,000
61	Beaufort-Morehead City, NC	8,600,000	Spruce Head, ME	$16,500,000
62	Eureka, CA	8,400,000	Boston, MA	$16,200,000
63	Accomac, VA	8,300,000	Montauk, NY	$15,900,000
64	Newport, RI	8,300,000	Gulfport-Biloxi, MS	$15,000,000
65	Fort Myers, FL	7,300,000	Ilwaco-Chinook, WA	$14,500,000
66	Crescent City, CA	7,000,000	Jonesport, ME	$14,100,000
67	Homer, AK	6,700,000	Santa Barbara, CA	$13,900,000
68	Engelhard-Swanquarter, NC	6,600,000	Engelhard-Swanquarter, NC	$13,600,000
69	Columbia, NC	6,500,000	Accomac, VA	$13,000,000
70	Fort Bragg, CA	6,500,000	Yakutat, AK	$12,200,000
71	Morgan City-Berwick, LA	6,400,000	Mayport, FL	$12,100,000
72	Seattle, WA	6,400,000	Columbia, NC	$11,400,000
73	Long Beach-Barnegat, NJ	6,300,000	Swans Island, ME	$11,200,000
74	Santa Barbara, CA	6,200,000	Milbridge, ME	$11,200,000
75	New London, CT	6,100,000	North Kingstown, RI	$11,100,000
76	Beals Island, ME	6,000,000	Southwest Harbor, ME	$11,000,000
77	Slidell-Covington, LA	5,900,000	Bass Harbor, ME	$10,800,000
78	Portsmouth, NH	5,900,000	Port Clyde, ME	$10,800,000
79	Anacortes-La Conner, WA	5,900,000	Wrangell, AK	$10,700,000
80	Fairhaven, MA	5,800,000	Fort Bragg, CA	$10,600,000
81	Jonesport, ME	5,800,000	Slidell-Covington, LA	$10,600,000
82	Mayport, FL	5,700,000	Owls Head, ME	$10,100,000
83	Neah Bay, WA	5,600,000	Panama City, FL	$9,800,000
84	Port St. Joe, FL	5,400,000	Oriental-Vandemere, NC	$9,700,000
85	San Francisco Area, CA	5,200,000	Willapa Bay, WA	$9,700,000
86	Wrangell, AK	5,200,000	Naples, FL	$9,200,000
87	Friendship, ME	5,200,000	San Francisco Area, CA	$9,200,000
88	Upper Southeast (Other), AK	5,200,000	Apalachicola, FL	$9,100,000
89	Belford, NJ	4,900,000	Anchorage, AK	$9,100,000
90	Belhaven-Washington, NC	4,700,000	Neah Bay, WA	$8,900,000
91	Cameron, LA	4,400,000	Darien-Bellville, GA	$8,700,000
92	Yakutat, AK	4,400,000	Brookings, OR	$8,600,000
93	Spruce Head, ME	4,400,000	Blaine, WA	$8,500,000
94	Hampton Bay-Shinnicock, NY	4,099,999	Los Angeles, CA	$8,400,000
95	Ocean City, MD	4,099,999	Belhaven-Washington, NC	$8,300,000
96	Cape Canaveral, FL	4,000,000	Monterey, CA	$8,000,000
97	Oriental-Vandemere, NC	4,000,000	Morro Bay, CA	$7,800,000
98	Morro Bay, CA	3,600,000	Moss Landing, CA	$7,600,000
99	Panama City, FL	3,600,000	Newport, RI	$7,500,000
100	Bon Secour-Gulf Shores, AL	3,200,000	Cape Canaveral, FL	$7,400,000

Source: NOEP, 2015

Table A3: Commercial Fishery Landings, Narragansett Bay Watershed Ports 2006-2015 (in 2016 dollars)

Year	Weight (lbs.) (1000s)	Value ($1000s)
2006	56,300	$80,693
2007	46,300	$57,032
2008	44,300	$48,503
2009	47,500	$44,209
2010	43,100	$43,182
2011	67,400	$65,203
2012	69,400	$57,991
2013	203,100	$115,203
2014	85,000	$69,518
2015	70,600	$64,573

Source: NOEP, 2006-2015

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