

SOCIAL IMPACTS**CHAPTER 7**

As a complement to the economic analysis, the social impact assessment (SIA) examines the social and cultural consequences of the potential changes to the Atlantic Large Whale Take Reduction Plan (ALWTRP) that are under consideration. The discussion is organized as follows:

- Section 7.1 discusses the requirements to develop an SIA;
- Section 7.2 describes the general methodology used to assess the social impacts of the regulatory alternatives that NMFS is considering;
- Section 7.3 provides a detailed socioeconomic characterization of the communities that may be affected by modifications to the ALWTRP, and assesses the vulnerability of these communities to adverse impacts;
- Section 7.4 examines the potential socioeconomic impacts of Alternative 6 (Preferred), identifying the groups of vessels that may be most heavily affected under NMFS' preferred alternative;
- Section 7.5 identifies other potential impacts of the management measures under consideration, including adverse effects on fishermen's quality of life and the potential benefits of marine mammal protection for the general public;
- Section 7.6 provides a summary of the impacts identified, including a comparison of the social impacts of the alternatives NMFS is considering.

7.1 BACKGROUND

The National Environmental Policy Act (NEPA) is the primary legal authority necessitating development of an SIA for Federal management actions, including those of the ALWTRP under the authority of the Marine Mammal Protection Act (MMPA). According to Section 40 CFR 1508.14, "[if] economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all these effects on the human environment." In addition, Executive Order 12898 requires that Federal agencies achieve environmental justice by addressing "disproportionately high and adverse human health and environmental effects on minority and low income populations."

7.2 METHODOLOGY

National Oceanic and Atmospheric Administration (NOAA) guidance recommends that the SIA take the form of a social factor analysis organized around a matrix of indicators comparing each regulatory alternative (NOAA, 2007). The guidance suggests that the matrix consist of a set of indicators that address the following social factors:

- The size and demographic characteristics of the fishery-related work force residing in the area;
- The attitudes, beliefs, and values of fishermen, fishery-related workers, and other stakeholders;
- The social structure and organization of the affected community, including effects on the ability of jurisdictions to provide support and services to families and communities;
- Life-style, health, and safety impacts, as well as non-consumptive and recreational uses of marine resources; and
- Historical dependence on and participation in the fishery, as reflected in structural changes in fishing practices, income distribution, and rights.

The guidance further recommends that changes in the chosen social variables be considered relative to baseline conditions for these variables, allowing an assessment of the impact of the policy measure in question.

The approach undertaken here is consistent with this guidance. The analysis involves two basic elements:

- First, the analysis uses county-level socioeconomic data and fishery-dependent data to assess the vulnerability of communities (i.e., counties) to adverse social impacts stemming from promulgation of commercial fishing regulations under the ALWTRP. The analysis is primarily built on data from NMFS' Dealer, Processor, and Vessel Trip Report (VTR) databases, as well as demographic and socioeconomic data from the U.S. Census and the U.S. Department of Labor. Available studies of socioeconomic conditions in Atlantic coast ports provide additional information on community and cultural factors in affected regions.
- Second, based on the results of the economic impact assessment (see Chapter 6), the analysis characterizes the changes in fishing practices and fishing activity that may occur under Alternative 6 (Preferred). This includes a review of the estimated impact of the alternative on the annual operating costs and revenues of vessels in the affected fisheries, as well as consideration of the associated socioeconomic impacts, focusing on

potential changes in landings and employment in the harvest, dealer, and processing sectors.

To supplement this analysis, the SIA also qualitatively considers various other social impacts – both negative and positive – that may result from modification of the ALWTRP. In all cases, the analysis measures these impacts relative to Alternative 1, the no action alternative. Alternative 1 would make no change in current ALWTRP requirements, preserving the regulatory status quo. Thus, it would have no effect on prevailing socioeconomic conditions and no impact on the social factors described above.

7.3 CHARACTERIZATION OF COMMUNITY VULNERABILITY

7.3.1 Factors Affecting Vulnerability

When considering the effect of proposed regulations on fishing communities, one potential approach is to focus the analysis on individual ports or municipalities. Clearly, however, fishing communities can extend beyond the boundaries of a particular port or city. Fish can be landed in one town and processed in a neighboring town. Likewise, a fisherman can land catch in one town, live in a neighboring town, and register his vessel in yet another location. In recognition of these factors, this analysis focuses at the county level.¹ While a county's political boundaries do not limit the network of social interactions and economic resource flows described above, the use of counties as an analytic focus offers several advantages. First, the geographic range of the county is a useful spatial mid-point between individual towns/ports and large regions; this is especially important given that ALWTRP regulations apply to such an extensive geographic area (virtually the entire east coast of the U.S.). In addition, many of the data used to characterize communities (e.g., unemployment rate, population) are readily available at the county level.

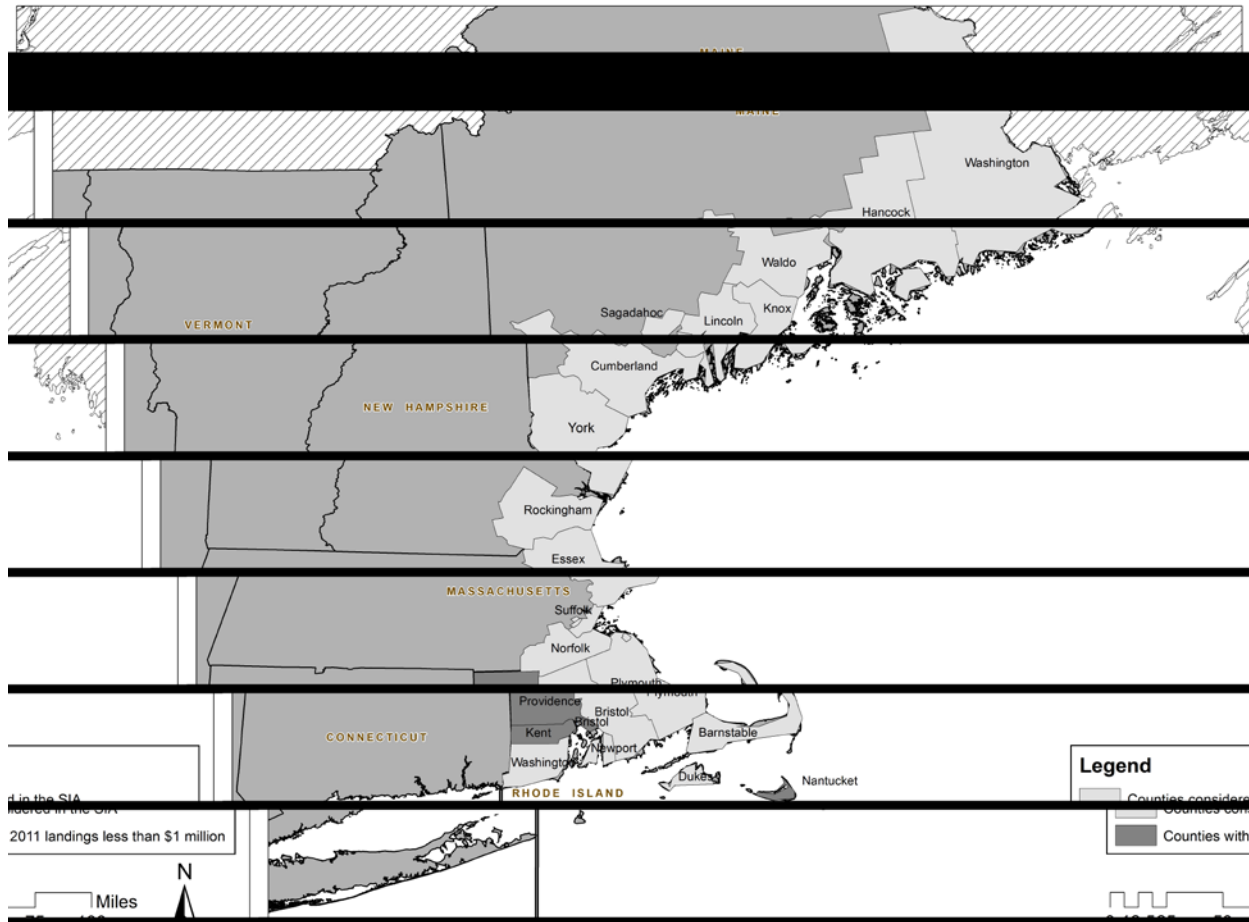
The analysis takes as its principal focus coastal counties in the Northeast that are likely to be substantively affected by the management measures under consideration. As Exhibit 7-1 indicates, this includes all coastal counties in Maine, New Hampshire, Massachusetts, and Rhode Island for which NMFS data show, in 2011, more than \$1 million in ex-vessel revenue attributable to landings made with gear regulated under the ALWTRP. The focus on the Northeast is consistent with the results of the economic analysis, which indicate that the cost of complying with new requirements is likely to be greatest for vessels fishing in Northeast waters. Trap/pot vessels operating out of ports in this region are most likely to be affected by the minimum trawl length and area closure requirements that NMFS is considering. In contrast, trap/pot vessels operating out of ports in the Mid-Atlantic region are less likely to fish in the waters subject to these requirements; although such vessels would be subject to new gear marking requirements under Alternatives 2 through 6 (Preferred), the cost of complying with these requirements is unlikely to spur changes (e.g., vessel retirement or significant reductions in income) that would have marked impacts on the social fabric of the fishing community. Likewise, the economic analysis in Chapter 6 suggests that gear restrictions proposed for Southeast trap/pot fisheries under Alternatives 2 through 6 (Preferred) are already, in many

¹ This discussion thus uses the terms “counties” and “communities” interchangeably.

areas, standard practice; hence, the social impacts attributable to these measures are likely to be minor.

Exhibit 7-1

COUNTIES CONSIDERED IN THE SOCIAL IMPACT ANALYSIS



In both fishing and non-fishing communities, the ability to adapt to change varies with social, political and economic considerations. The vulnerability of fishing communities, however, is influenced by additional factors, including the importance of familial relationships, the vulnerability of infrastructure, and the commitment to fishing as a culture and way of life (Clay and Olson 2008). From an analytic perspective, vulnerability includes the characteristics of “exposure, sensitivity, and capacity of response to change or perturbation” (Gallopín 2006, as cited in Colburn and Jepson 2012). Consistent with Gallopín’s definition, this SIA considers each county’s vulnerability to be a function of the extent to which its fishing industry is affected by the regulations (i.e., exposure), the significance of the fishing industry within the county (i.e., sensitivity), and baseline factors that may affect communities’ ability to absorb the economic costs imposed by the regulations (i.e., capacity to respond to change). The discussion that follows briefly describes the parameters used to evaluate each aspect of vulnerability. Appendix 7-A describes all of the parameters considered in the socioeconomic analysis, as well as the source of the data or methods upon which the analysis draws.

7.3.1.1 Exposure

The analysis first considers the extent to which the local fishing industry is exposed to ALWTRP regulations. Exposure is defined in two ways:

- **Value/proportion of harvest associated with affected gear** – The counties most likely to experience adverse social impacts are those in which gear regulated under the ALWTRP is an important source of commercial fishing revenue, either on an absolute or a relative basis.
- **Number of entities affected** – Similarly, the most vulnerable counties are likely to be those that are home to the greatest number of vessels that fish with gear regulated under the ALWTRP.

7.3.1.2 Sensitivity

Those communities that are more heavily dependent (both economically and socially) on the fishing industry are more likely to experience adverse social impacts due to fishing regulations. This analysis relies upon a measure of fishing dependence designed to take additional factors into account. This measure, the Occupational Alternative Ratio Summary (OARS), emphasizes the importance of fishing as an occupation to participants in the labor force as a whole, and the dependence of the local economy on the fishing industry. In general, a higher score indicates a greater dependence on fishing as an occupation, and a lower likelihood that displaced fishermen can easily enter into alternate occupations.²

7.3.1.3 Capacity to Respond to Change

A number of economic and demographic factors will influence a community's ability to absorb economic stress, tempering or exacerbating vulnerability to social impacts stemming from ALWTRP regulations:

- **Unemployment Rate, Poverty Rate, Median Income** – Fundamental economic indicators such as the unemployment rate, poverty rate, and median income can indicate the local economy's resilience to regulatory impacts. Communities that are already economically depressed may find it more difficult to absorb the economic effects of regulatory changes and may be subject to greater social impacts.

² Measures of fishing dependence and gentrification (see below) are based on Hall-Arber et al. (2001). At the time the analysis was developed, these data represented the most recent published attempt to address these issues systematically, allowing for a direct comparison between counties. Colburn and Jepsen (2012) have developed additional indices allowing for evaluation of fishing dependence and gentrification; however, they have yet to be broadly applied. For a qualitative discussion of these issues, see the Community Profiles for Northeast U.S. Marine Fisheries developed by the NMFS Northeast Fisheries Science Center (2010). These profiles are available online at: <http://www.nefsc.noaa.gov/read/socialsci/communityProfiles.html>.

- **Gentrification** – Gentrification can be a key source of coastal community vulnerability (Jacob et al. 2010 and Clay and Olson 2008, as cited in Colburn and Jepson 2012). According to Hall-Arber et al. (2001), as former working waterfronts succumb to the pressures of gentrification, community character and culture are lost, diversity diminishes, and the fishing community is less able to adapt to changes in the environment. Additional fishing regulations can make it even more difficult for individuals to maintain a “fishing way of life.” Communities already experiencing gentrification will likely be more susceptible to social impacts as ALWTRP regulations are implemented. Hall-Arber et al. (2001) integrate various measures of gentrification into a score that can be used to characterize community vulnerability.

7.3.2 Assessment of Community Vulnerability

Exhibits 7-2 through 7-4 present socioeconomic data for each county identified as potentially vulnerable to social impacts due to ALWTRP regulations. By evaluating the vulnerability indicators described above, the analysis characterizes the extent to which the counties are susceptible to regulatory-driven social impacts.

Counties in mid-coast and Downeast Maine, where the lobster fishery is the major driver of the commercial fishing economy, tend to be the most vulnerable to adverse social impacts from ALWTRP regulations. Hundreds of lobster vessels are based in these counties, and their landings are extensive (see Exhibit 7-3). Hancock and Knox counties report the greatest value of landings with ALWTRP gear (\$108.7 million and \$94.6 million, respectively), as well as the greatest number of vessels fishing with such gear (approximately 949 and 953, respectively). The exposure of these counties to adverse impacts is heightened by the fact that landings made with ALWTRP gear account for a high percentage (91 percent in both cases) of overall ex-vessel revenues. Washington County (ME) is also highly exposed, with potentially affected landings of \$51.8 million. Each of these counties is highly dependent on fishing, as measured by Hall-Arber et al.’s OARS score. Moreover, the high poverty and unemployment rates in these counties suggest that they have limited capacity to absorb additional economic stress. As a result, they are particularly vulnerable to the impacts of ALWTRP regulations.

More than 50 percent of ex-vessel revenue in Maine’s other coastal counties is attributable to landings made with ALWTRP gear. In some instances, however, such as Waldo County, the overall value of these landings is relatively low. In others, such as Lincoln, Sagadahoc, Cumberland, and York, the value of potentially affected landings is substantial, but the economy as a whole is more diversified. As a result, these counties are somewhat less sensitive to adverse impacts that may stem from changes in ALWTRP regulations. The same is true of New Hampshire’s Rockingham County. There, 85 percent of ex-vessel revenue is derived from landings made with ALWTRP gear, which suggests that the county’s harvesting sector is highly exposed. The sensitivity of the county’s economy as a whole, however, is tempered by its low fishing dependence score. In addition, Rockingham County’s unemployment rate is the lowest reported among the counties analyzed; this suggests that its

economy has a relatively strong capacity to respond to change and that the region is less vulnerable to adverse impacts than areas where the unemployment rate is higher.

In Massachusetts and Rhode Island, the situation is more varied. In general, the value of landings made with ALWTRP gear in the counties of these states is lower than that reported for counties in Maine and New Hampshire, both on an absolute and a relative basis. In addition, the economies of coastal counties in Massachusetts and Rhode Island tend to be more diversified and less dependent on the commercial fishing sector. Nonetheless, ALWTRP gear accounts for ex-vessel revenues of more than \$15 million per year in Essex (MA), Barnstable (MA), and Bristol (MA) counties, suggesting that exposure to adverse impacts in these counties may be substantial. Dependence on commercial fishing is considered medium in Essex and Bristol counties but is rated high in Barnstable County. With an unemployment rate that exceeds 10 percent, Barnstable County may be particularly vulnerable to adverse impacts stemming from the introduction of new ALWTRP regulations.

Businesses that deal in or process fish or shellfish landed by fisheries subject to the ALWTRP are scattered throughout the Northeast region (see Exhibit 7-4). To the extent that changes in ALWTRP regulations reduce overall harvest, these businesses may be affected. A reduced flow of product to dealers and processors could result in layoffs of employees and, in extreme cases, closure of some businesses altogether. As discussed below, however, the analysis suggests that the regulations under consideration would be unlikely to have a major impact on landings. Thus, any impact on the dealer or processing sectors in the region is likely to be minimal.

7.3.3 Caveats

The evaluation of at-risk communities focuses on areas where the absolute impact of potential regulations is likely to be the greatest. While impacts elsewhere may be smaller on an absolute basis, they could be substantial in relative terms; the importance of such impacts to the affected communities should not be overlooked.

Exhibit 7-2

SOCIOECONOMIC PROFILE OF SUBSTANTIALLY AFFECTED COUNTIES – DEMOGRAPHIC PARAMETERS

County	State	Key Ports	Population (2010)	Median Household Income 2007-2011	Persons below Poverty Level 2007-2011	Un-employment Rate (10/2011 - 11/2012)	Fishing Dependency	Gentrification Level	Infrastructure
Washington	ME	Beals Island/Jonesport, Cutler, Eastport, Lubec	32,856	\$35,272	20.4%	9.0%	High	Low	Medium-Low
Hancock	ME	Stonington/Deer Isle, Bucksport	54,418	\$47,421	12.4%	6.4%	High	Low	Medium-Low
Waldo	ME	Belfast, Searsport, Northport	38,786	\$41,728	14.5%	7.1%	High	Medium-Low	Low
Knox	ME	Rockland, Vinalhaven, Port Clyde	39,736	\$46,845	11.4%	5.8%	High	High-Low	Medium
Lincoln	ME	South Bristol, Boothbay Harbor	34,457	\$48,862	9.8%	5.9%	Medium	NA	NA
Sagadahoc	ME	Georgetown, Phippsburg	35,293	\$56,865	9.4%	5.9%	Medium	NA	NA
Cumberland	ME	Portland, Harpswell	281,674	\$57,267	10.7%	5.5%	Medium	High	High
York	ME	Kennebunkport/Cape Porpoise, York	197,131	\$56,552	8.7%	6.1%	Medium	High-Medium	Medium-Low
Rockingham	NH	Hampton/Seabrook, Portsmouth, Isle of Shoals	1,316,470	\$64,664	8.0%	5.4%	Low	High	High
Essex	MA	Gloucester, Rockport, Marblehead	743,159	\$65,785	10.6%	8.0%	Medium	Medium	High
Suffolk	MA	Boston Harbor	722,023	\$51,638	20.8%	6.9%	Low	Low	Low
Norfolk	MA	Cohasset	670,850	\$83,733	6.3%	5.9%	NA	NA	NA
Plymouth	MA	Plymouth, Scituate, Hingham	494,919	\$74,698	7.2%	8.2%	Low	High-Medium	Low
Barnstable	MA	Sandwich, Hyannis, Chatham, Provincetown, Woods Hole	215,888	\$60,525	8.4%	10.6%	High	Medium-Low	High-Medium-Low
Dukes	MA	Vineyard Haven	16,535	\$69,760	10.2%	5.8%	High	High	Medium
Bristol	MA	New Bedford, Fairhaven, Westport	548,285	\$55,813	11.3%	10.7%	Medium	High	High
Newport	RI	Jamestown, Newport, Tiverton, Sakonnet Point	82,888	\$69,369	7.7%	12.7%	Medium	High-Low	Medium-Low
Washington	RI	Point Judith/Galilee	126,979	\$72,163	7.5%	10.8%	Medium	High	High

Exhibit 7-3

SOCIOECONOMIC PROFILE OF SUBSTANTIALLY AFFECTED COUNTIES – HARVEST PARAMETERS

County	State	Top Species Landed by Value	ALWTRP Harvest Value (\$)	ALWTRP Harvest Value as % of Total Harvest Value	Estimated Number of Vessels Fishing with ALWTRP Gear	Total Estimated Employment on ALWTRP Vessels	
						Lower Bound	Upper Bound
Washington	ME	Lobster, softshell clam, sea scallop	\$51,831,000	77%	663	898	1,561
Hancock	ME	Lobster, American eel, softshell clam	\$108,674,000	91%	949	1,216	2,165
Waldo	ME	Lobster, American eel, sea scallop	\$1,457,000	80%	47	55	102
Knox	ME	Lobster, softshell clam, Atlantic herring	\$94,643,000	91%	953	1,164	2,118
Lincoln	ME	Lobster, oysters, softshell clam	\$21,072,000	72%	351	469	820
Sagadahoc	ME	Lobster, worms, quahog	\$6,193,000	56%	110	135	245
Cumberland	ME	Lobster, pollock, cod	\$45,160,000	69%	555	737	1,297
York	ME	Lobster, bluefin tuna, cod	\$12,251,000	85%	199	300	502
Rockingham	NH	Lobster, cod, pollock	\$20,407,000	85%	235	347	577
Essex	MA	Lobster, cod, pollock	\$23,299,000	32%	467	671	1,184
Suffolk	MA	Cod, lobster, pollock	\$2,334,000	13%	107	185	300
Norfolk	MA	Lobster, softshell clam, bluefin tuna	\$1,602,000	90%	49	63	112
Plymouth	MA	Lobster, oysters, cod	\$9,426,000	58%	270	358	643
Barnstable	MA	Lobster, sea scallops, bluefin tuna	\$18,486,000	34%	211	304	537
Dukes	MA	Oysters, lobster, channeled whelk	\$2,932,000	67%	59	82	142
Bristol	MA	Sea scallop, cod, lobster	\$15,246,000	4%	102	160	271
Newport	RI	Lobster, sea scallop, monkfish	\$8,684,000	61%	165	233	426
Washington	RI	Loligo squid, lobster, illex squid	\$7,760,000	15%	182	271	472

Exhibit 7-4

SOCIOECONOMIC PROFILE OF SUBSTANTIALLY AFFECTED COUNTIES – DEALER AND PROCESSOR PARAMETERS

County	State	Number of Dealers Handling ALWTRP Species	Dealers Handling ALWTRP Species as % of All Dealers	Estimated Employment at Dealers Handling ALWTRP Species	Number of Facilities Processing ALWTRP Species	Facilities Processing ALWTRP Species as % of All Processors	Estimated Employment at Facilities Processing ALWTRP Species	Value of ALWTRP Species Processed	Value of ALWTRP Species as % of All Species Processed
Washington	ME	28	72%	106	1	100%	21	\$653,000	25%
Hancock	ME	34	62%	206	2	50%	47	\$1,451,000	39%
Waldo	ME	3	75%	63	1	100%	97	\$794,000	4%
Knox	ME	40	53%	154	1	50%	4	\$20,000	0%
Lincoln	ME	21	75%	100	3	75%	58	\$431,000	51%
Sagadahoc	ME	4	44%	15	1	100%	1	\$26,000	98%
Cumberland	ME	37	40%	490	8	100%	244	\$37,656,000	87%
York	ME	19	63%	168	2	100%	36	\$2,098,000	85%
Rockingham	NH	18	47%	195	2	100%	201	\$16,839,000	18%
Essex	MA	40	47%	386	9	64%	800	\$80,697,000	43%
Suffolk	MA	10	45%	115	14	82%	701	\$63,713,000	44%
Norfolk	MA	5	63%	30	0	NA	0	NA	NA
Plymouth	MA	32	64%	315	0	NA	0	NA	NA
Barnstable	MA	36	55%	238	4	100%	71	\$1,455,000	68%
Dukes	MA	9	56%	NA	0	NA	0	NA	NA
Bristol	MA	33	28%	690	9	82%	508	\$47,730,000	18%
Newport	RI	22	59%	124	0	NA	0	NA	NA
Washington	RI	25	40%	124	4	80%	93	\$2,420,000	13%

7.4 SOCIOECONOMIC IMPACTS OF ALTERNATIVES

The preceding discussion identified and characterized communities most vulnerable to potential changes in ALWTRP regulations. The discussion that follows looks more closely at specific segments of the harvest sector and potential impacts on vessel operators. The discussion focuses on whether the costs of regulatory compliance will cause changes in fishing effort (e.g., vessel retirement) and landings that may lead to broader socioeconomic effects, such as impacts to the dealer and processing sectors or changes in regional employment.

7.4.1 Comparison of Vessel Compliance Costs to Ex-Vessel Revenues

To examine the potential for socioeconomic impacts due to new ALWTRP requirements, the analysis considers the economic burden placed on different groups of vessels, as identified in Chapter 6. Comparing estimates of average vessel compliance costs to estimates of the revenues typically earned by vessels in the affected sectors helps to indicate the extent to which the regulations will impose a hardship on vessel operators.

7.4.1.1 Vessel Distribution by Geographic Area

The comparison of average compliance costs to vessel revenues draws on the model vessels employed in the economic impact analysis. Cost burdens for lobster vessels are characterized for 32 unique fishing areas; burdens for OTP vessels are characterized for five areas. Gillnet vessels face relatively minor costs associated with gear marking requirements, which are unlikely to affect fishing decisions. Thus, they are not included in the cost burden analysis.

7.4.1.2 Number of Affected Vessels

The purpose of the SIA is, in part, to identify groups of vessels that may face disproportionately high compliance costs. For this reason, the analysis focuses only on OTP vessels that are active in areas that would be subject to minimum trawl-length standards; i.e., it excludes vessels that fish solely in state waters that would be exempt from these requirements. The estimates of affected vessels and of economic burden that are presented below are consistent with this focus; for state waters, they pertain only to areas that would be subject to minimum trawl-length requirements.

7.4.1.3 Vessel Revenue

The analysis compares estimates of average annual compliance costs for each group of model vessels in a particular fishery and location (e.g., lobster vessels fishing in the non-exempt state waters of Maine Zone D) to a corresponding estimate of average annual revenue for the vessels in this area. Gross revenue for each vessel group is estimated as a function of average annual catch per trap, the average number of traps fished over the course of a year, and average annual ex-vessel prices.

For the lobster fishery, the analysis develops annual catch per trap estimates based on a variety of data sources (see Chapter 6, Exhibit 6-4). The Vertical Line Model provides an estimate of the average number of traps fished by each model vessel. The resulting estimate of annual catch (pounds per year) is converted to an annual revenue figure using area-specific ex-vessel price data (see Exhibit 6-4).

The analysis uses a similar methodology to calculate annual gross revenue for the model vessels that represent the OTP fishery:

- **Massachusetts OTP Vessels** – The OTP fisheries in Massachusetts are relatively small, and catch data for many species and areas are confidential. Therefore, the analysis employs a weighted average catch per trap figure derived from available data on the catch of three key species (conch, scup, and black sea bass), as reflected in Massachusetts DMF Catch Report data (2011). This process yields a single catch per trap figure for the model vessel representing each geographic area. The same weighting scheme is then used to derive a single price per pound figure for each area. This information, combined with an estimate from the Vertical Line Model of the average number of traps fished by OTP vessels in each area, provides an estimate of annual revenue per vessel.
- **Other Northeast OTP Vessels** – Information on catch per trap is not available for OTP vessels in other Northeast waters. For these areas, the analysis estimates average annual revenue per vessel based on VTR and Dealer data.

7.4.1.4 Vessel Compliance Costs

The economic analysis (see Chapter 6) provides estimates of incremental compliance costs for each model vessel and regulatory alternative. Compliance costs include the cost of new gear required to comply with the rule's minimum trawl length regulations (e.g., additional groundline), labor costs associated with reconfiguring gear, and associated catch impacts. For vessels affected by seasonal closures, upper bound costs reflect the impact of suspending fishing during the closure period. In the lower bound, the estimate of costs reflects a mix of revenue losses for vessels that are assumed to be unable to relocate and relocation costs (e.g., fuel, time, and potential catch impacts) for vessels that seek out alternative fishing grounds. All costs are expressed on an annualized basis.

7.4.1.5 Comparison of Costs and Revenues

To identify potentially hard-hit sectors of the commercial fishing industry, the analysis compares estimates of average vessel compliance costs to estimates of average gross revenue per vessel. Exhibits 7-5 through 7-7 present the results. There is no clearly-defined threshold at which annualized costs represent a large enough percent of annual revenues that a vessel

operator would cease fishing or would otherwise suffer social and economic hardship. For purposes of analysis, however, the exhibits highlight two impact categories:

- **Heavily-Affected Vessels** – Segments of a fishery for which the estimated upper bound compliance costs exceed 15 percent of annual revenues.
- **At-Risk Vessels** – Segments of a fishery for which estimated compliance costs range between 5 and 15 percent of annual revenues.

These categories are consistent with those employed in previous analyses of the impacts of new ALWTRP regulations.³

The results presented below focus on the impacts of Alternative 6 (Preferred); a summary of the impacts of the other alternatives can be found at the end of the chapter. Because vessels that would not be affected by the seasonal closure of Massachusetts Restricted Area #2 under Alternative 6 (Preferred) are likely to face a substantially lower cost burden than those affected by the closure, the discussion separately describes the estimated impact of these provisions.

Impacts of Gear Configuration and Gear Marking Requirements

Under Alternative 6 (Preferred), the cost of meeting new gear configuration and gear marking requirements is estimated to be less than 15 percent of gross revenues for all vessels (see Exhibits 7-5 and 7-6). As a result, the impact of these provisions alone would not lead any group of vessels to be designated as heavily affected, either in the low or high cost scenarios. Several groups, however, are identified as at-risk. Under the lower bound scenario, the at-risk category includes OTP vessels fishing in the state waters of Rhode Island or northern Massachusetts (SRAs 1-9). Under the upper bound scenario, the analysis identifies 10 additional groups of vessels as at-risk:

- OTP vessels fishing in Massachusetts SRAs 10 through 13 or SRA 14, as well as OTP vessels fishing in Federal waters of the Northeast region;
- Massachusetts lobster vessels fishing in SRAs 7, 9, and 14;

³ See National Marine Fisheries Service, *Final Environmental Impact Statement for Amending the Atlantic Large Whale Take Reduction Plan: Broad-Based Gear Modifications*, August 2007.

Exhibit 7-5

**COMPARISON OF VESSEL COMPLIANCE COSTS TO GROSS REVENUES UNDER ALTERNATIVE 6 (PREFERRED):
GEAR MARKING AND RECONFIGURATION – LOBSTER VESSELS**

Waters	State	Zone/Area	Number of Vessels Affected¹	Lower Bound Annualized Compliance Costs²	Upper Bound Annualized Compliance Costs²	Average Annual Gross Revenue	Lower Bound Cost as a Percent of Revenue	Upper Bound Cost as a Percent of Revenue
At-Risk Vessels								
Federal	ME	E	98	\$807	\$1,885	\$23,713	3.4%	8.0%
State	MA	14	27	\$449	\$883	\$14,144	3.2%	6.2%
State	MA	9	42	\$1,569	\$3,122	\$50,386	3.1%	6.2%
State	MA	7	67	\$1,242	\$2,467	\$40,106	3.1%	6.2%
Federal	ME	D	147	\$516	\$2,300	\$39,030	1.3%	5.9%
Federal	ME	F	143	\$448	\$1,350	\$23,373	1.9%	5.8%
State	ME	E	51	\$838	\$1,553	\$28,000	3.0%	5.5%
Other Vessels								
Federal	ME	B	103	\$390	\$1,544	\$31,250	1.2%	4.9%
Federal	ME	C	105	\$425	\$2,141	\$44,102	1.0%	4.9%
Federal	ME	G	155	\$95	\$1,494	\$41,500	0.2%	3.6%
State	ME	D	165	\$747	\$1,276	\$42,584	1.8%	3.0%
State	MA	S. Cape (10-13)	37	\$214	\$383	\$13,410	1.6%	2.9%
State	ME	B	59	\$281	\$467	\$22,489	1.3%	2.1%
Federal	ME	A	184	\$(330)	\$783	\$43,017	-0.8% ³	1.8%
Federal	Other	LMA OC Other	15	\$403	\$2,114	\$122,471	0.3%	1.7%
State	ME	F	29	\$472	\$771	\$47,202	1.0%	1.6%
State	ME	G	48	\$314	\$510	\$33,086	1.0%	1.5%
State	ME	C	175	\$531	\$793	\$53,513	1.0%	1.5%
Federal	Other	LMA 2 Other	113	\$190	\$924	\$64,740	0.3%	1.4%
State	MA	8	30	\$310	\$570	\$46,542	0.7%	1.2%
State	MA	6	70	\$256	\$444	\$38,588	0.7%	1.2%
Federal	Other	LMA 1 Other	267	\$85	\$498	\$45,131	0.2%	1.1%
State	ME	A	132	\$75	\$223	\$30,100	0.2%	0.7%
State	MA	3	119	\$146	\$230	\$35,128	0.4%	0.7%
State	RI	All	74	\$122	\$184	\$28,477	0.4%	0.6%
State	MA	5	78	\$139	\$216	\$34,008	0.4%	0.6%
State	MA	1	29	\$114	\$170	\$29,193	0.4%	0.6%
State	MA	2	158	\$129	\$189	\$38,622	0.3%	0.5%

Exhibit 7-5

**COMPARISON OF VESSEL COMPLIANCE COSTS TO GROSS REVENUES UNDER ALTERNATIVE 6 (PREFERRED):
GEAR MARKING AND RECONFIGURATION – LOBSTER VESSELS**

Waters	State	Zone/Area	Number of Vessels Affected¹	Lower Bound Annualized Compliance Costs²	Upper Bound Annualized Compliance Costs²	Average Annual Gross Revenue	Lower Bound Cost as a Percent of Revenue	Upper Bound Cost as a Percent of Revenue
State	MA	4	141	\$124	\$190	\$52,792	0.2%	0.4%
State	NH	All	134	\$81	\$81	\$32,589	0.2%	0.2%
Federal	Other	LMA 3	66	\$79	\$80	\$381,295	0.0%	0.0%

Notes:

1. Number of affected vessels based on methods discussed in economic impact analysis.
2. This exhibit considers only the costs of compliance attributable to gear marking and reconfiguration requirements. All impacts are measured relative to Alternative 1, the no action alternative.
3. As noted in Chapter 6, the analysis of gear conversion costs results in net cost savings for some groups of vessels. The negative value reported here reflects such savings, which are primarily attributable to a reduction in the number of buoy systems required when trawls are employed. While this is an anomalous result – the introduction of a regulatory mandate is unlikely to lead to a reduction in costs – the value is reported for the sake of both analytic consistency and transparency.
4. Affected groups are listed in descending order, based on costs as a percent of gross revenue in the upper bound scenario.
5. No groups are identified as “heavily affected.”

Exhibit 7-6

**COMPARISON OF VESSEL COMPLIANCE COSTS TO GROSS REVENUES UNDER ALTERNATIVE 6 (PREFERRED):
GEAR MARKING AND RECONFIGURATION – OTP VESSELS**

Waters	State	Zone/Area	Number of Vessels Affected¹	Lower Bound Annualized Compliance Costs²	Upper Bound Annualized Compliance Costs²	Average Annual Gross Revenue	Lower Bound Cost as a Percent of Gross Revenue	Upper Bound Cost as a Percent of Gross Revenue
At-Risk Vessels								
State	RI	All	57	\$286	\$491	\$4,086	7.0%	12.0%
State	MA	Northern (1-9)	7	\$9,995	\$19,950	\$199,103	5.0%	10.0%
State	MA	S. Cape (10-13)	52	\$4,555	\$9,075	\$121,067	3.8%	7.5%
Federal	Northeast		8	\$5,898	\$14,704	\$199,103	3.0%	7.4%
State	MA	14	38	\$1,042	\$2,049	\$36,197	2.9%	5.7%

Notes:

1. Number of affected vessels based on methods discussed in economic impact analysis.
2. This exhibit considers only the costs of compliance attributable to gear marking and reconfiguration requirements. All impacts are measured relative to Alternative 1, the no action alternative.
3. Affected groups are listed in descending order, based on costs as a percent of gross revenue in the upper bound scenario.
4. No groups are identified as “heavily affected.”

- Lobster vessels fishing in the non-exempt state waters of Maine Zone E; and
- Lobster vessels fishing in the Federal waters of Maine Zones D, E, and F.⁴

The estimate of impacts for these vessels ranges no higher than seven percent of gross revenues in the lower bound scenario and no higher than 12 percent in the upper bound scenario. This impact is substantial; however, the economic burden associated with gear marking and gear reconfiguration provisions alone is not sufficient to place these vessels in the heavily affected category, or to suggest that the impact of complying with these provisions would have a severe impact on socioeconomic conditions in coastal communities.

Vessels Affected by Closures

In comparison to Alternative 1, the no action alternative, the analysis estimates that under Alternative 6 (Preferred), 109 lobster vessels would be required to suspend operations or relocate their effort to comply with the seasonal closure of Massachusetts Restricted Area #2. The costs these vessels would incur to comply with the closure would be in addition to the costs attributable to other requirements. The analysis indicates that, in aggregate, these measures would have a substantial impact on the affected vessels (see Exhibit 7-7).

- As a lower bound, the analysis assumes that the vessels affected by the closure would be able to relocate their gear and continue to operate in other areas while the closure remains in effect. Under this scenario, the annual cost of compliance is estimated to range from 4.8 to 12.4 percent of the affected vessels' average annual gross revenue. The results suggest that most of those affected would face a cost burden that would place them in the at-risk category (i.e., annualized compliance costs ranging from 5 to 15 percent of annual revenues).
- As an upper bound, the analysis assumes that the affected vessels would suspend operations and forgo the revenue (net of operating cost savings) on the catch they otherwise would have landed. In this case, the annual cost of compliance is estimated to range from 8.8 to 20.4 percent of the affected vessels' average annual gross revenue. The impact on most of those that would be displaced is estimated at greater than 15 percent – above the threshold specified for “heavily affected” vessels – suggesting the potential for some vessels to cease fishing entirely.

⁴ It is important to recognize that the estimate of impacts presented for each group of vessels is limited to the costs and revenues associated with gear being fished in a specific location. In practice, vessels may fish in multiple locations. Thus, the estimated cost of compliance as a percentage of revenue does not necessarily represent the overall burden on a particular vessel; instead, it represents the impact on that vessel for the portion of its effort based in a given area. Similarly, the estimate of revenues employed in the analysis does not necessarily represent a vessel's total revenues; it simply represents the revenues derived from effort in a particular area.

Exhibit 7-7

**COMPARISON OF VESSEL COMPLIANCE COSTS TO GROSS REVENUES UNDER ALTERNATIVE 6 (PREFERRED):
GEAR MARKING, RECONFIGURATION, AND CLOSURES – LOBSTER VESSELS**

Waters	State	Zone/Area	Closure	Number of Vessels Affected ¹	Annualized Gear Reconfiguration and Marking Costs		Annualized Closure Costs		Average Annual Gross Revenue	Lower Bound Total Cost as a Percent of Gross Revenue ²	Upper Bound Total Cost as a Percent of Gross Revenue ²
					Lower Bound	Upper Bound	Lower Bound	Upper Bound			
Heavily Affected Vessels											
Federal	MA	LMA 1 Other	MA Restricted Area #2	71	\$85	\$498	\$5,513	\$8,695	\$45,131	12.4%	20.4%
State	MA	7	MA Restricted Area #2	3	\$1,242	\$2,467	\$3,361	\$5,036	\$40,106	11.5%	18.7%
State	MA	9	MA Restricted Area #2	1	\$1,569	\$3,122	\$3,361	\$5,036	\$50,386	9.8%	16.2%
State	MA	5	MA Restricted Area #2	15	\$139	\$216	\$3,361	\$5,036	\$34,008	10.3%	15.4%
At-Risk Vessels											
State	MA	6	MA Restricted Area #2	14	\$256	\$444	\$3,361	\$5,036	\$38,588	9.4%	14.2%
State	MA	8	MA Restricted Area #2	5	\$310	\$570	\$3,361	\$5,036	\$46,542	7.9%	12.0%
Federal	MA	LMA OC Other	MA Restricted Area #2	1	\$403	\$2,114	\$5,513	\$8,695	\$122,471	4.8%	8.8%
Notes:											
1. Number of affected vessels based on the average number of full-time equivalent vessels active in the zone/area over the months of the closure, as estimated by the Vertical Line Model.											
2. This exhibit considers the total costs of compliance for vessels affected by area closures; i.e., costs attributable to closures as well as those associated with gear marking and gear reconfiguration. All impacts are measured relative to Alternative 1, the no action alternative.											

7.4.2 Landings and Employment Impacts

The regulatory alternatives under consideration may have implications for landings and employment in the harvest, dealer, and processing sectors. Building on the cost/revenue comparison presented above, this section discusses the potential landings reduction and employment impacts associated with Alternative 6 (Preferred). Because the analysis indicates that lobster vessels will experience the greatest cost burden, the discussion is limited to potential changes in lobster landings and associated employment impacts. All impacts are measured relative to Alternative 1, the no action alternative.

7.4.2.1 Landings Impacts

As Chapter 6 discusses in detail, the economic impact analysis assumes that implementation of Alternative 6 (Preferred) would result in an overall reduction in lobster landings. This effect is due to two factors:

- A reduction in catch per trap resulting from the use of longer trawls; and
- Reduced effort or relocation to less productive grounds during the seasonal closure of Massachusetts Restricted Area #2.

In the lower cost scenario, the analysis projects a reduction in lobster landings of approximately 474,000 pounds per year; in the higher cost scenario, the projected reduction in landings is approximately 1,231,000 pounds per year (see Appendix 7-B). In 2011, commercial landings of lobster totaled 126,460,000 pounds. Thus, the projected impact of Alternative 6 (Preferred) on the lobster catch is a 0.4 to 1.0 percent reduction in annual landings compared to Alternative 1, the no action alternative.

Even if the impacts projected under Alternative 6 (Preferred) for the higher cost scenario are realized, a notable effect on the lobster market is unlikely, particularly in the long run. In the near term, a 1.0 percent reduction in lobster landings would be expected to push prices up, which would have an adverse impact on consumers; the impact on prices would likely be greatest from January through April, when closure of Massachusetts Restricted Area #2 would be in effect.⁵ On a year-to-year basis, however, lobster landings are likely to fluctuate by considerably more than 1.0 percent; thus, the potential impact of new ALWTRP regulations would be unlikely to lead to a substantial change in overall market conditions.⁶ Moreover, the impact of gear reconfiguration requirements on catch would likely diminish over time; following an initial adjustment and learning period, fishermen may ultimately achieve catch rates similar to those they achieve with their current configuration of gear.

⁵ It is important to note that any increase in prices would, at least in theory, help to offset the costs that fishermen would incur in complying with new regulations. Whether this would in fact be the case depends on the extent to which an increase in prices at the retail level would translate to an increase in ex-vessel prices, or would instead be reflected in higher profits elsewhere in the supply chain.

⁶ For data on annual lobster landings, see Chapter 4, Exhibit 4-3.

7.4.2.2 Employment Impacts

As discussed above, the economic analysis estimates that the impact of Alternative 6 (Preferred) on lobster landings is likely to be relatively modest and well within the range of annual variation the fishery has recently experienced. Thus, the analysis does not anticipate that implementation of the alternative would lead lobster dealers or processors to cease operation or significantly reduce their workforces. Impacts on employment, if any, are likely to be concentrated in the harvest sector.

The potential for adverse impacts on employment in the harvest sector is subject to considerable uncertainty. It is difficult to estimate the point at which the cost of regulation would be so great that vessels would cease operating in the fishery. Clearly, however, the greater the burden the regulations would impose, the greater the likelihood that such impacts would occur. Thus, the analysis focuses on employment on vessels previously identified as heavily affected (i.e., those groups for which the upper bound estimate of annualized compliance costs exceeds 15 percent of annual revenues). As Exhibit 7-8 indicates, this includes the following groups:

- Massachusetts lobster vessels fishing in SRAs 5, 7, or 9 that would be displaced as a result of the closure of Massachusetts Restricted Area #2; and
- Lobster vessels fishing in Federal waters of LMA 1 that would be displaced by the closure of Massachusetts Restricted Area #2.

Assuming, on average, that each vessel in these groups carries a captain and a sternman, total employment on heavily affected vessels is estimated at approximately 179. These individuals face the greatest risk of unemployment as a result of the management measures that would be implemented under Alternative 6 (Preferred).

The nature and duration of any employment effects that would result from implementation of new management measures under the ALWTRP is closely tied to the state of the economy where the affected parties reside. In communities where the fishing industry is experiencing economic hardship, it will be difficult for displaced fishermen to find employment on other vessels. Similarly, in communities where unemployment is high, displaced fishermen may find opportunities to work in alternate occupations to be extremely limited. The available data preclude identification of the home ports of all heavily affected vessels. It is reasonable to assume, however, that many of these vessels are based in ports bordering Massachusetts Restricted Area #2; i.e., ports on Cape Cod or in Plymouth County (MA). Economic conditions in these communities vary. In general, however, the fishing industry in these areas faces numerous economic challenges, and the job market as a whole reflects elevated unemployment rates nationwide; thus, it is unlikely that fishermen displaced by the introduction of new ALWTRP regulations would readily find alternate employment.

Exhibit 7-8							
ESTIMATED EMPLOYMENT ON HEAVILY AFFECTED VESSELS: ALTERNATIVE 6 (PREFERRED), UPPER BOUND SCENARIO							
Fishery	Waters	State	Zone/Area	Closure	Affected Vessels¹	Average Crew Size²	Total Employment³
Lobster	Federal	MA	LMA1 - Other	MA Restricted Area #2	71	2	143
Lobster	State	MA	5	MA Restricted Area #2	15	2	29
Lobster	State	MA	7	MA Restricted Area #2	3	2	6
Lobster	State	MA	9	MA Restricted Area #2	1	2	2
Notes:							
1. Number of affected vessels based on methods discussed in economic impact analysis.							
2. Estimates of average crew size are derived from 2011 Catch Report data provided by Massachusetts DMR and from the GOMRI (2006) survey.							
3. Total employment figures may not equal the product of the affected vessels and crew size figures shown due to rounding.							

7.4.3 Impacts on Unique Subgroups

The analysis presented above considers the potential effect of new ALWTRP requirements at a very broad scale. This approach may mask social impacts on some unique subgroups. The Massachusetts seasonal or “student” lobster fishery constitutes one such group.⁷ While the number of student license holders, vessels, and landings does not constitute a substantial portion of the Massachusetts lobster fishery, the fishery is socially and culturally important in that it helps young people learn a trade and provides a source of experienced labor for the commercial lobster fishery.

Seasonal license holders must be full-time students. They are limited to 25 traps and are licensed to take and sell lobsters to a licensed dealer from June 15 through September 15. The number of seasonal permits issued varies from year to year and has declined from 60 in 2009 to 37 in 2011. On average, seasonal license holders individually land about 250 pounds of lobster per year. Total annual landings in 2011 were just under 10,000 pounds, less than one-tenth of one percent of all Massachusetts landings.

Seasonal fishermen generally fish from small boats; in some cases, the fishermen haul by hand rather than with a hauler/winch. In 2011, the median vessel size in the seasonal fleet was 20 feet. In 2009, all but eight of the 60 vessels in the seasonal fleet were less than 22 feet in length; the smallest was 12 feet and largest was 36 feet. The seasonal vessels overwhelmingly fish single traps. In 2009, 93 percent of all active vessels fished singles. Of the 47 vessels reporting crew information in 2009, 27 (57 percent) fished with just the operator on board (i.e.,

⁷ The discussion of the student lobster fishery is based upon information provided by the Massachusetts Division of Marine Fisheries: personal communication, November 7, 2012.

without additional crew). Most of the remaining vessels (13) fished with a single sternman. All seasonal vessels fish inshore waters; they are dispersed widely across the Massachusetts coast.

The minimum trawl-length requirements that NMFS is considering would apply to all commercial trap/pot vessels operating in Massachusetts waters that are subject to the requirements of the ALWTRP, including seasonal vessels. Given the size and configuration of these vessels, the limited experience of the operators and their tendency to fish alone, seasonal license holders may find it difficult to comply with the minimum trawl-length requirements, and participation in the seasonal fishery may diminish. If student fishermen are forced to seek summer employment in other industries, the effects of a diminished apprentice pool could negatively affect the Massachusetts lobster fishery.

7.4.4 Caveats

The cost and revenue comparison presented above is subject to a variety of uncertainties that should be considered when interpreting the results, all of which are detailed in Chapter 6. Briefly, these uncertainties include:

- The cost of gear reconfiguration, which is based upon available data and assumptions concerning the baseline configurations used in each area, the cost and useful life of specific gear elements, and the amount and value of the time required to implement the necessary conversions;
- Whether reconfiguration will result in a need for additional crew or vessel modification;
- The likely response (e.g., suspension or relocation) of fishermen faced with seasonal closure of their usual grounds, and the impact of those responses;
- The number of traps fished by a given vessel;
- The average catch per trap; and
- Catch impacts associated with gear conversion and area closures.

The assumptions made in defining heavily affected vessels and affected fishermen's likely response to ALWTRP requirements are also subject to significant uncertainty. Key caveats include the following:

- The analysis of impacts is based on annualized compliance cost estimates. Depending upon the timing of key regulatory requirements and other factors, the actual stream of annual costs that fishermen may face will vary; i.e., costs may be low in some years and high in others. To the extent that it is difficult to borrow money to finance purchases in high-cost years, larger numbers of vessel operators may be at risk of ceasing operation than the analysis suggests.

- The analysis is based upon estimates of the average compliance costs faced by all vessels within a vessel group. These estimates likely understate the costs to some vessels and overstate the costs to others.
- The analysis identifies vessels incurring costs greater than 15 percent of gross revenue as heavily affected, and focuses on these vessels as the most likely to exit the fishery. It is difficult to estimate the point at which the cost of regulation would be so great that vessels would retire. Further, this decision will be made on a vessel-by-vessel basis, and may include factors other than those considered in this analysis. To the extent that the threshold of adverse social effects for an individual vessel is lower or higher than is assumed in this analysis, social impacts may be over- or underestimated.
- The upper bound assumption that *all* vessels affected by a closure will suspend fishing for the duration of the closure is extremely conservative. Fishermen may have a number of strategies for remaining active during a closure (e.g., relocation). However, fishermen's ability to pursue these strategies may be constrained by regulations that limit access to alternative fishing grounds; practical considerations (e.g., distance, lack of familiarity with new fishing grounds); and tacit territorial agreements among members of the fishing fleet.
- Similarly, assumptions regarding reduced landings as a result of gear reconfiguration are highly conservative. There is no conclusive evidence that gear modifications required under the ALWTRP will result in catch impacts.

7.5 OTHER POTENTIAL SOCIAL IMPACTS

The discussion above focuses primarily upon socioeconomic impacts on the commercial fishing industry. The changes to the ALWTRP that NMFS is considering may have other social impacts, influencing the quality of life enjoyed by fishermen, their families, and other groups.

7.5.1 Potential Negative Social Impacts

For fishermen and their families, the following social impacts may be associated with modifications to ALWTRP requirements:

- Competition for fishing grounds may increase if changes to the ALWTRP include the seasonal closure of certain fishing grounds. Most notably, fishermen who would otherwise fish in the closed area may relocate their effort to new grounds, increasing competition in those areas. Competition for fishing grounds may also increase to the extent that fishermen relocate from their traditional fishing grounds to exempted waters or waters that

are otherwise subject to more moderate regulation. Tension, resentment, and conflict may result from attempts made by outsiders to exploit areas where they have not historically participated. Fishermen who are ultimately excluded from alternate grounds, and subsequently must sit out the season, may experience stress and anxiety associated with inactivity and lost income.

- Increased congestion in certain areas may also increase the incidence of gear conflicts. As noted above, individuals whose usual grounds are closed seasonally may relocate to nearby open areas. Similarly, some may move inshore to areas where minimum trawling requirements are less stringent or may move to exempted waters to avoid these requirements entirely. To the extent that effort becomes concentrated in these areas, gear conflicts are likely to become more frequent. The stress associated with such conflicts may erode relationships among fishermen and exacerbate tensions over fixed resources.
- Gear conflicts may also arise because of ALWTRP regulations that require fishermen in certain locations to use trawls with a single endline. When a trawl has two or more endlines, competing fishermen can use the location of the endline buoys to infer the position of the trawl on the ocean floor. The use of one buoy line may increase gear conflicts and gear loss, since it prevents other fishermen from visually determining the direction in which a trawl or string is set. The fishing community has generally proven adept at developing standard practices to avoid such conflicts, but their ability to adhere to such practices can be hampered by external variables such as weather.
- Minimum trawl length requirements implemented under the ALWTRP may pose safety issues for fishermen. Some industry representatives have suggested that hauling or setting trawls from a small vessel can be dangerous due to the increased quantity of groundline lying on and deploying from a crowded deck, increasing the risk of a crew member becoming entangled and possibly pulled overboard. Furthermore, sources suggest that hauling gear with sinking groundline may pose a danger when fishermen attempt to free fouled line from a snag on bottom structure – an occurrence that could become more common with the introduction of minimum trawl length requirements. Fishermen who ordinarily fish singles and are unfamiliar with the use of trawls may be particularly at risk.
- In addition to imposing time and cost burdens on some fishermen, the ALWTRP's requirements may increase psychological stress on the regulated community. The rule obligates affected fishermen – some of whom have been fishing for decades – to adjust to new fishing techniques. Established fishermen might experience feelings of anger, anxiety, or frustration as they learn the new techniques that the ALWTRP prescribes.

While these feelings would be difficult or impossible to quantify, they nevertheless represent a negative impact for fishermen and their families.

- As previously discussed, the management measures under consideration may have an adverse impact on fishermen's catch. Apart from direct effects on revenue, catch impacts could lead to negative social impacts. For instance, fishermen may spend additional time fishing to make up for the loss in productivity. To the extent that hours at sea increase, this could reduce the quality of life that fishermen and their families enjoy.
- Anecdotal evidence suggests that space limitations may make it infeasible for some small vessels to comply with minimum trawl-length requirements. The burden placed on small vessels could have important implications for the structure and character of fishing communities, particularly if it leads the operators of these vessels to exit the industry. This may leave the commercial fishing fleet smaller and more vulnerable to competition from corporate interests operating larger vessels. Fishermen who value the independence of their profession and the freedom to operate a small business may be harmed by these trends.

While such impacts are possible, it is difficult to predict their extent or determine the degree to which the regulatory alternatives differ with respect to the potential for such effects.

7.5.2 Potential Positive Social Impacts

It is possible that in some cases, the management measures under consideration would have a beneficial effect on fishermen. The potential for such impacts was noted in a 2012 report on a collaborative pilot project conducted by the Maine Department of Marine Resources, the Gulf of Maine Lobster Foundation, and the lobster industry (Maine DMR, 2012). This project sought to determine the impact of fishing longer trawls in areas in which lobstermen traditionally have fished singles or pairs. The fishermen participating in this effort noted several potential benefits of switching to trawls. In particular:

- Several fishermen noted they were able to haul traps configured in trawls more quickly than the same number of traps configured as singles, potentially resulting in decreased time spent at sea;
- Several individuals noted that their success in grappling for lost gear was greater with trawls than with singles. Thus, those who switch from singles to trawls may spend less time in their efforts to recover lost gear.⁸

⁸ These time savings may be offset by an increased incidence of hang downs with longer trawls; however, the anecdotal evidence suggests that trawls did not hang-down with any greater frequency than the usual single/double trap configured gear.

To the extent that the ALWTRP successfully protects and helps restore whale populations, those who view and photograph whales from private recreational vessels or from commercial whale watch vessels may also benefit. A number of studies have noted that enjoyment of the whale watching experience is positively correlated with the number of whales sighted. For instance, a study at the Stellwagen Bank National Marine Sanctuary asked respondents to cite the most attractive features of a whale watch; the top responses included the number of whales seen as well as the number of species seen (Day, 1985 as cited in Ramage, 1990). Hoagland and Meeks (2000) found that in seven of eight ports of entry to Stellwagen Bank, respondents to a survey ranked the number of whales seen as an attractive feature of a whale watch more often than any other feature. Likewise, Loomis and Larson (1994) determined that whale watch riders viewing gray whales were willing to pay more for the experience when populations were increased. Similarly, Shapiro (2006) found that the number of whales seen on a whale watch was positively and significantly correlated with the likelihood that the participant would recommend the tour to a friend (used as a measure of passenger satisfaction).

Whale watching is one of the most important recreational industries in New England. Hoagland and Meeks (2000) estimated the net economic “use” value of whale watching on Stellwagen Bank to be on the order of \$440 million.⁹ While it is not feasible to quantify the increase in whale sightings or the associated economic welfare benefits associated with the ALWTRP, it is possible to characterize the overall size and popularity of commercial whale watching operations on the east coast.¹⁰ While complete data on the industry are lacking, a study by Hoyt (2001) attempted to compile data for operations worldwide. Roughly half of all commercial whale watching worldwide occurs in the U.S., and much of this activity is centered in New England.¹¹ As shown in Exhibit 7-9, the Hoyt study identified 36 whale watching businesses in New England, with most operating multiple vessels. Hoyt estimated that over one million individuals take whale watching tours in the region each year, yielding over \$30 million in annual revenue. Because these figures only apply to permitted and registered operations, the full scale and economic impact of whale watching activity is likely greater. Overall, given the level of activity in the industry, the economic welfare benefits associated with enhanced whale watching could be substantial.

⁹ Present value, based on a five percent annual discount rate.

¹⁰ The Regulatory Impact Review included in this EIS provides a more detailed discussion of economic welfare concepts.

¹¹ Although whale watching operations exist in the Mid- and South Atlantic states, the degree of activity is smaller and cannot be reliably distinguished from tours to view other species, such as dolphins.

Exhibit 7-9				
NEW ENGLAND WHALE WATCHING INDUSTRY				
State	Number of Operations	Number of Vessels	Annual Ridership	Annual Revenue (millions \$)
Massachusetts	17	30-35	1,000,000	\$24.0
New Hampshire	4	6-10	80,000	\$1.9
Maine	14	18-24	137,500	\$4.4
Rhode Island	1	1	12,500	\$0.3
TOTAL	36	55-70	1,230,000	\$30.6
Source: Hoyt, 2001.				

Finally, it is noteworthy that increased whale populations may benefit the operators of whale watch vessels. Larger whale populations may increase demand for whale watch services, increasing patronage and/or the price that customers are willing to pay. In either case, whale watch operations may become more profitable.

The protection and restoration of populations of endangered whales may also generate non-use benefits.¹² Economic research has demonstrated that society places economic value on (relatively) unique environmental assets, whether or not those assets are ever directly exploited. For example, society places real (and potentially measurable) economic value on simply knowing that large whale populations are flourishing in their natural environment (often referred to as “existence value”) and will be preserved for the enjoyment of future generations.¹³ Using survey research methods, economists have developed several studies of non-use values associated with protection of whales or other marine mammals. Exhibit 7-10 summarizes these studies. In each, researchers surveyed individuals on their willingness to pay (WTP) for programs that would maintain or increase marine mammal populations.

¹² Portions of this discussion of non-use benefits are based on NMFS, *Steller Sea Lion Protection Measures, Final Supplemental Environmental Impact Statement*, November 2001.

¹³ Non-use values such as those measured in these studies are closely related to “spiritual” or “ethical” values emphasized by some whale conservation advocates. These observers argue that whales deserve protection from human interference and that such protection provides an intellectual or spiritual benefit to mankind.

Exhibit 7-10		
STUDIES OF NON-USE VALUE ASSOCIATED WITH MARINE MAMMALS		
Author	Title	Findings
Giraud et al. (2002)	Economic Benefit of the Protection of the Steller Sea Lion	Estimated willingness to pay (WTP) for an expanded Steller sea lion protection program. The average WTP for the entire nation amounted to about \$61 per person.
Hageman (1985)	Valuing Marine Mammal Populations: Benefit Valuations in a Multi-Species Ecosystem	Per-household WTP for gray and blue whales, bottlenose dolphins, California sea otters, and Northern elephant seals estimated to be \$23.95, \$17.73, \$20.75, and \$18.29 per year, respectively (1984 dollars).
Loomis and Larson (1994)	Total Economic Values of Increasing Gray Whale Populations: Results From a Contingent Valuation Survey of Visitors and Households	Mean WTP of U.S. households for an increase in gray whale populations estimated to be \$16.18 for a 50 percent increase and \$18.14 for a 100 percent increase.
Day (1985), cited in Rumage (1990)	The Economic Value of Whalewatching at Stellwagen Bank. The Resources and Uses of Stellwagen Bank	Non-use value of the presence of whales in the Massachusetts Bays system estimated to be \$24 million.
Samples et al. (1986)	Information Disclosure and Endangered Species Valuation	Estimated individual WTP for protection of humpback whales to be \$39.62 per year.
Samples and Hoyler (1989)	Contingent Valuation of Wildlife Resources in the Presence of Substitutes and Complements	Respondents' average WTP (lump sum payment) to protect humpback whales in Hawaii ranged from \$125 to \$142 (1986 dollars).
Wallmo and Lew (2012)	Public Willingness to Pay for Recovering and Downlisting Threatened and Endangered Marine Species	Per-household mean WTP annually over 10 years for increase in North Atlantic right whale populations estimated to be \$71.62 for recovery and \$38.79 for down-listing to threatened status (2010 dollars).

A 2012 study by Wallmo and Lew employed a stated preference method to estimate the value of recovering or down-listing eight ESA-listed marine species, including the North Atlantic right whale. Through a survey of 8,476 households, the authors estimated an average WTP value (per household per year, for a 10-year period) of \$71.62 for full recovery of the species and \$38.79 for recovery sufficient to down-list the species from “endangered” to “threatened.” While the other studies noted do not focus specifically on the North Atlantic populations of right, humpback, fin, or minke whales, they do demonstrate that individuals derive economic value from the protection of marine mammals.

7.6 SUMMARY AND COMPARISON OF ALTERNATIVES

An analysis of the socioeconomic characteristics of the potentially affected communities indicates that communities in mid-coast and Downeast Maine may be particularly vulnerable to adverse social impacts as a result of changes to the ALWTRP. Washington, Hancock, and Knox counties in particular are highly exposed to the effects of regulation due to the importance of the lobster fishery to these communities. The value of ALWTRP-affected landings in these communities is substantial, and is the greatest of all affected communities. Additionally, the total number of affected vessels in these three counties is higher than in any other county in the affected region. These communities are also highly sensitive to the proposed regulations, as evidenced by their significant social, cultural, and economic dependence upon fishing. The rural nature of the economy in these counties, coupled with high unemployment and poverty rates,

suggest that they may have a relatively low capacity to adapt to economic impacts induced by new ALWTRP regulations.

The economies of other coastal counties in Maine, as well as the economies of coastal counties in New Hampshire, Massachusetts, and Rhode Island, tend to be more diversified and less dependent on the commercial fishing sector. As a result, they are somewhat less sensitive to adverse impacts that may stem from changes in ALWTRP regulations. Nonetheless, the unemployment rate in some areas, such as Cape Cod (Barnstable County), is quite high. Thus, these areas are also potentially vulnerable to adverse impacts stemming from the introduction of new ALWTRP regulations.

Exhibit 7-11 summarizes the socioeconomic implications of the regulatory alternatives that NMFS is considering. As previously noted, the analysis measures these impacts relative to Alternative 1, the no action alternative. With respect to the action alternatives, the following findings are noteworthy:

- The cost of complying with the gear marking and gear reconfiguration requirements specified under Alternatives 2 through 6 (Preferred) is unlikely, in and of itself, to be substantial enough to force vessel operators out of business or to have a severe impact on socioeconomic conditions in coastal communities. The most significant effect of these requirements is likely to be their impact on small vessels. The size and configuration of these vessels may make it difficult for their operators to comply with minimum trawl-length requirements. The impact of the requirements on small vessels could have important implications for the structure and character of fishing communities, particularly if it leads the operators of these vessels to exit the industry.
- Vessels affected by seasonal closure requirements would, in some cases, face economic impacts that would be difficult to absorb. Based on the ratio of compliance costs to gross revenue, the number of vessels identified as heavily affected ranges from zero under Alternatives 2 and 3 to 163 under Alternatives 4 and 5. For the latter two alternatives, the vessels in the heavily affected category are lobster vessels that would be displaced by the closure of Jeffreys Ledge, the closure of Jordan Basin, or the closure of Massachusetts Restricted Area #1. In contrast, under Alternative 6 (Preferred), the analysis identifies 90 vessels as heavily affected; this group consists of lobster vessels that would be displaced by the closure of Massachusetts Restricted Area #2.
- The available data preclude identification of the home ports of all vessels that would be displaced by the closure of Jeffreys Ledge, Jordan Basin, Massachusetts Restricted Area #1, or Massachusetts Restricted Area #2. It is reasonable to assume, however, that many of these vessels are based in nearby ports; i.e., ports in southern Maine, New Hampshire, or on Cape Ann in the case of Jeffreys Ledge; ports in mid-coast Maine in the case of Jordan Basin; and ports on Cape Cod or elsewhere in Massachusetts in the

case of Massachusetts Restricted Area #1 or Massachusetts Restricted Area #2. The fishing industry in these areas faces numerous challenges, while the job market as a whole reflects the heightened unemployment rates that have persisted nationwide for several years. In light of these conditions, fishermen displaced by the introduction of new ALWTRP regulations would likely find it difficult to secure employment on other vessels and could be faced with a lengthy period of unemployment while they seek work in other occupations – or, potentially, in other regions.

- The estimated reduction in landings of lobster is greatest under Alternative 4 (2.1 million pounds per year) and smallest under Alternative 3 (997,000 pounds per year). However, landings reductions under all alternatives represent less than two percent of 2011 total landings. Because the reduction is substantially less than the annual fluctuation in total landings in recent years, adverse impacts on the dealer and processing sectors under any of the alternatives are unlikely.
- The other adverse social implications of Alternatives 2 through 6 (Preferred) are similar in nature. They include a potential increase in the competition for territory in areas that remain open to fishing; additional potential for gear conflicts in these areas; heightened safety risks associated with fishing longer trawls; and a potential reduction in the size of the commercial fishing fleet. Because the alternatives all affect roughly the same number of vessels, the expected magnitude of such impacts is likely in most cases to be similar. The potential for increased crowding, competition and gear conflicts, however, is lowest under Alternative 2, and is lower under Alternatives 3, 6 (Draft), and 6 (Preferred) than under Alternatives 4 and 5, which include the most extensive seasonal area closures.
- The public welfare benefits associated with increased whale protection are likely to be similar across all alternatives. The analysis measures the change in whale protection offered by a given alternative as a change in the co-occurrence of whales and vertical lines. By this measure Alternative 5 offers the greatest protection to whales, with a reduction in co-occurrence (upper bound scenario) of 42 percent. Alternative 2 offers the least additional protection, with a decrease in co-occurrence (upper bound scenario) of 36 percent.

It is important to consider the socioeconomic burden of the ALWTRP in the context of the larger set of regulations faced by ALWTRP fisheries and the fishing industry as a whole. To the extent that certain communities and groups of vessels have been adversely affected by existing regulations, changes to the ALWTRP may add to their burden and have a substantial impact. The cumulative effects analysis presented later in this EIS considers these issues.

Exhibit 7-11

SUMMARY OF SOCIOECONOMIC IMPACTS BY ALTERNATIVE

Parameter	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Draft)	Alternative 6 (Preferred)
Number of Heavily Affected Vessels (Upper Bound Scenario)	0	0	0	163	163	90	90
Total Employment on Heavily Affected Vessels (Upper Bound Scenario)	NA	NA	NA	330	330	179	179
Anticipated Reduction in Lobster Landings (Upper Bound Scenario)	0	1,283,000 lbs.	997,000 lbs.	2,112,000 lbs.	1,807,000 lbs.	1,235,000 lbs.	1,231,000 lbs.
Impacts on Dealers	No change	Minor short-term supply disruptions possible	Minor short-term and seasonal supply disruptions possible	Minor short-term and seasonal supply disruptions possible	Minor short-term and seasonal supply disruptions possible	Minor short-term and seasonal supply disruptions possible	Minor short-term and seasonal supply disruptions possible
Impacts on Processors	No change	Minor short-term supply disruptions possible	Minor short-term and seasonal supply disruptions possible	Minor short-term and seasonal supply disruptions possible	Minor short-term and seasonal supply disruptions possible	Minor short-term and seasonal supply disruptions possible	Minor short-term and seasonal supply disruptions possible
Other Potential Negative Social Impacts	No change	Minor	Some potential for increased congestion and gear conflict	Greater potential for increased congestion and gear conflict	Greater potential for increased congestion and gear conflict	Moderate potential for increased congestion and gear conflict	Moderate potential for increased congestion and gear conflict
Positive Social Impacts (Reduction in Baseline Co-occurrence Score, Upper Bound Scenario)	No change (0.0 percent change in baseline co-occurrence score)	Public welfare benefits of increased whale protection (36.1 percent reduction in baseline co-occurrence score)	Public welfare benefits of increased whale protection (37.7 percent reduction in baseline co-occurrence score)	Public welfare benefits of increased whale protection (40.8 percent reduction in baseline co-occurrence score)	Public welfare benefits of increased whale protection (42.0 percent reduction in baseline co-occurrence score)	Public welfare benefits of increased whale protection (38.2 percent reduction in baseline co-occurrence score)	Public welfare benefits of increased whale protection (38.2 percent reduction in baseline co-occurrence score)

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Appendix 7-A

**DESCRIPTION OF COUNTY
SOCIOECONOMIC CHARACTERIZATION DATABASE**

Exhibit 7A-1

DATABASE FOR COUNTY SOCIOECONOMIC CHARACTERIZATION

Data Category	Database Parameter	Description/Source
Demographic	Key ports	Hall-Arber et al. (2001) and NMFS (2010).
	Population (2010)	U.S. Census Bureau, State and County QuickFacts, 2010, obtained from http://quickfacts.census.gov/qfd/states/25000.html .
	Median household income (2007-2011)	
	Persons below poverty level (2007-2011)	
	Unemployment rate	U.S. Bureau of Labor Statistics Local Area Unemployment Statistics.
	Fishing dependency	Rating of alternative occupation potential as estimated in Table 2 of Hall-Arber et al., 2001.
	Gentrification level	Rating of the degree of gentrification for key ports, as estimated in Table 8 of Hall-Arber et al., 2001.
	Infrastructure	Rating of infrastructure differentiation, as estimated in Table 5 of Hall-Arber et al., 2001. Infrastructure: The type and extent of fishing-related infrastructure in a community can provide a measure of the community's dependence on the fishing industry. In interpreting this parameter, however, it is important to take the scale of fishing activity and size of the community into account. As such, it does not provide a simple and direct measure by which to compare one community's fishing dependence to that of another. This information is provided solely for context; it is not employed in the analysis.
Harvest Sector	Key species landed	Based on ex-vessel value of commercial species landed by county. Derived from 2011 NMFS Dealer data.
	Value of total harvest (\$)	Total ex-vessel value of commercial species landed in the county. Derived from 2011 NMFS Dealer data.
	Value of ALWTRP harvest (\$)	Ex-vessel value of commercial species landed in the county by vessels fishing with gear subject to ALWTRP regulations. Derived from 2011 NMFS Dealer data.
	ALWTRP harvest value as percent of total harvest value	Ex-vessel value of landings harvested with ALWTRP-regulated gear as a percent of the value of all landings in the county.

Exhibit 7A-1

DATABASE FOR COUNTY SOCIOECONOMIC CHARACTERIZATION

Data Category	Database Parameter	Description/Source
	Estimated number of vessels fishing with ALWTRP gear	Estimated number of active vessels fishing with ALWTRP-regulated gear; derived from sources used in the Vertical Line Model. In Federal waters, the analysis employs 2011 NMFS Northeast Vessel Trip Report (VTR) and 2011 NMFS Northeast Permit data indicating homeport. In Maine state waters, the analysis uses ME DMR's 2010 Annual Log Survey dataset to develop distributions of homeports associated with vessels fishing in the ME Lobster Zones. In New Hampshire, the analysis assumes all vessels port in Rockingham County. In Massachusetts, the analysis uses MA DMF permit and 2009 Catch Report data, which identify vessel homeport. In RI, the analysis distributes vessels to counties based on reported harvest values in the 2011 NMFS Dealer data. These estimates include vessels fishing in waters currently exempt from the ALWTRP.
	Estimated total employment on ALWTRP vessels	Number of individuals working on ALWTRP vessels is based on a low and high bound estimate of the average crew for representative vessels by fishery and location. Average crew size is derived from crew sizes identified in Federal VTR and Permit databases, 2011 Massachusetts Catch Report Data, and the GMRI (2006) survey. Average crew sizes (low/high) are as follows: State waters lobster vessels (1/2); Federal waters lobster vessels (2/3); State waters gillnet vessels (2/4); Federal waters gillnet vessels (3/5); State waters OTP vessels (1/2); and Federal waters OTP vessels (2/3).
Dealer Sector	Overall number of dealers	Number of seafood dealers purchasing catch landed in the county. Derived from 2011 NMFS dealer data.
	Number of dealers handling ALWTRP species	Number of seafood dealers purchasing catch landed with ALWTRP-regulated gear. Derived from 2011 NMFS dealer data.
	Dealers handling ALWTRP species as a percent of all dealers	Number of seafood dealers purchasing catch landed with ALWTRP-regulated gear as a percent of the total number of seafood dealers in the county.
	Estimated employment at dealers handling ALWTRP species	Employment at dealers handling ALWTRP catch, based on the average number of employees per dealer establishment and the number of dealers in the county. The average employment figure is derived from data in the Census Bureau's County Business Patterns database (based on data for the "fish and seafood wholesale" industry). Inconsistencies between the number of dealers reported in the U.S. Census Data and those reported in NMFS Dealer database indicate that the definition and nature of businesses identified as "dealers" may differ between the two sources. Thus, the total employment values presented should be considered rough estimates; they may over- or underestimate actual employment at these establishments.
Processing Sector	Total number of processing facilities	Number of seafood processing facilities in the county, derived from 2011 NMFS Survey of Fishery Products data.
	Number of facilities processing ALWTRP species	Number of seafood processing facilities that handled species affected by ALWTRP requirements, derived from 2011 NMFS Survey of Fishery Products data.

Exhibit 7A-1

DATABASE FOR COUNTY SOCIOECONOMIC CHARACTERIZATION

Data Category	Database Parameter	Description/Source
	Facilities processing ALWTRP species as a percent of all processing facilities	Number of seafood processing facilities that handled species affected by ALWTRP requirements, as a percent of the total number of seafood processing facilities in the county.
	Estimated employment at facilities processing ALWTRP species	Total number of individuals employed at processing facilities handling ALWTRP species. These figures reflect the average number of individuals employed at processors during the year, based on monthly employment data reported to the 2011 NMFS Survey of Fishery Products.
	Total value of seafood processed	Total estimated value of fish processed at facilities in the county, derived from the 2011 NMFS Survey of fishery products.
	Value of ALWTRP species processed	Total estimated value of ALWTRP species processed at facilities in the county, derived from the 2011 NMFS Survey of Fishery Products.
	Value of ALWTRP species processed as a percent of value of all species processed	Total estimated value of ALWTRP-related fish processed, as a percent of total value of fish processed in the county.
Note: All data 2011, unless otherwise indicated.		

Appendix 7-B

**ESTIMATED IMPACT OF ALTERNATIVES
ON ANNUAL LOBSTER LANDINGS**

Exhibit 7B-1				
ESTIMATED REDUCTION IN ANNUAL LOBSTER LANDINGS BY ALTERNATIVE				
Alternative	Lower Bound Impact (lb./year)	Upper Bound Impact (lb./year)	Lower Bound Impact as Percent of 2011 Landings	Upper Bound Impact as Percent of 2011 Landings
1	0	0	0.0%	0.0%
2	458,000	1,283,000	0.4%	1.0%
3	409,000	997,000	0.3%	0.8%
4	632,000	2,112,000	0.5%	1.7%
5	583,000	1,807,000	0.5%	1.4%
6 (Draft)	474,000	1,235,000	0.4%	1.0%
6 (Preferred)	474,000	1,231,000	0.4%	1.0%