



Paul J. Diodati
Director

Commonwealth of Massachusetts

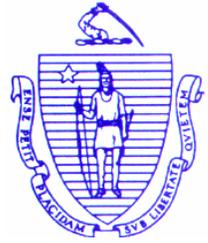
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February 4, 2009

To: Dan McKiernan, Deputy Director
From: Bob Glenn, Senior Marine Fisheries Biologist
Re: Analysis of Outer Cape Cod lobster sea-sampling data relative to the proposed changes to the maximum size and v-notch definition by NMFS.
Cc: Paul Diodati, Director

Dan,

Per your request, Tracy Pugh and I have completed the analysis on the impacts of the NMFS proposed rule changes to the maximum size and v-notch definition in the Outer Cape Cod Lobster Management Area (OCCLMA). For this analysis I included estimates of the percentage of the commercial catch weight that would be lost under the proposed changes to the v-notch definition and maximum size in OCCLMA. Attached please find a detailed description and the results of this analysis.

Regards,

Bob

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**An analysis on the potential impacts of a 1/8" v-notch definition and a maximum size on the Outer
Cape Cod lobster trap fishery**

Robert P Glenn and Tracy L. Pugh
Massachusetts Division of Marine Fisheries
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Executive Summary

To address the concerns of Outer Cape Cod Lobstermen, DMF enhanced its lobster trap sea sampling in 2008 to include trips from the more northern portion OCCLMA. Sampling coverage was doubled in 2008 to include the port of Provincetown. These data and previous year's data were analyzed to verify claims made by lobstermen in Outer Cape Cod about the economic impacts of the proposed federal rules to impose a first-ever maximum size and further restrict the possession of v-notch lobsters through the imposition of the 1/8" standard currently in place for LCMA's 2,3,4,5 and 6.

Based on the observed trips, the forecasted impacts of the imposition of the maximum size, 6 7/8" lowered to 6 3/4" by 2010, would be less 0.5 % of the total catch in pounds. Lobsters at this size are rarely encountered by DMF observers. No marketable (non-egg-bearing/non-v-notched) lobsters greater than either proposed maximum size were observed in 2008 in the 28 sea sampling trips.

The impacts of the change in v-notch possession standard are more challenging to estimate. This analysis reveals that the incidence of v-notched lobsters is two to three times higher in the catch of Provincetown lobstermen compared to those from ports of Nauset and Chatham. This elevation in v-notch rate is expected because Provincetown and its nearby fishing locations lie within federal Area 514, considered the Gulf of Maine stock and the dominant conservation measure in the Gulf of Maine inshore fishery (Area 1) is the mandatory v-notch rule requiring all commercial lobstermen to notch all egg-bearing females. These areas also include the Area 1/OCC "overlap zone" where Area 1 and OCC fishermen fish side-by-side. The dramatic difference in v-notch rate detected by location mandates caution when applying any OCC-wide estimates of losses.

A second challenge in this analysis concerns the precision of the v-notch measurement. DMF's observer protocols did not include measuring the depth of the notch. Consequently the analysis can only present a "worst case scenario" by analyzing the incidence of "old notches", those that show the remnant of the cut but have grown back to some degree. For this analysis all "old notches" were assumed to be deeper than 1/8" and therefore protected. The actual degree of protection and losses to industry would be less.

The analysis of 2005-2008 sea sampling in the southern portion of OCCLMA suggest the 1/8" v-notch measure would result in an additional 3-5% loss of landings. However, based on the single sea sampling season, 2008, Provincetown vessels could experience larger losses of roughly 10 %.

Introduction

On October 6th, 2008 the National Marine Fisheries Service (NMFS) published proposed rule changes affecting the retention of lobsters by vessels fishing – or authorized to fish - in the Outer Cape Cod Lobster Management Area (OCCLMA). Specifically, NMFS proposed to change rules governing v-notched female lobster possession and maximum sizes in this area to be consistent with rules in the offshore fishery - Area 3. The current 1/4" v-notch definition ("Standard V-shaped notch means a straight-sided triangular cut, with or without setal hairs, at least 1/4 inch (0.32 cm) in depth and tapering to a point") would be amended to a 1/8" v-notch definition (Standard V-shaped notch means a straight-sided triangular cut, with or without setal hairs, at least 1/8 inch (0.32 cm) in depth and tapering to a point."), and the maximum size would be established as 6 7/8" in 2009 and 6 3/4" in 2010.

To estimate the effects of these two rule changes we conducted an analysis of the MADMF commercial lobster trap sea sampling data from the Outer Cape Cod region using 2005 through 2008 data. Included in these analyses are estimates of the percentage of the catch in number and weight that would be lost as a result of the proposed rule changes.

Methods

Marine Fisheries instituted fishery- dependent at-sea trap sampling in 1981 as a long-term coastwide monitoring program to produce biological and catch per unit effort data on the American lobster resource. A sea sampling/survey design was chosen by which both catch per unit effort and biological data could be collected temporally and spatially with sufficient precision for stock assessments. The objective of the trap sampling program is to assess variations in population parameters due to environmental factors, fishing pressure, and regulatory changes. A total of two trips (1 trip out of the port of Chatham and 1 trip out of the port of Nauset) were conducted each month from May through November (14 trips per year) from 1981 to 2007 in the Outer Cape Cod (OCC) region.

At the urging of Provincetown lobstermen, MADMF enhanced its sampling of the OCC region in 2008 for the first time to include additional sampling from the port of Provincetown. The numbers of trips conducted per month by port within the OCC region from 2005 to 2008 are depicted in Table 1.

Sea-sampling consists of placing at-sea observers aboard vessels of volunteer commercial lobstermen during normal lobstering operations. Sampling trips are day trips, and the sampler records information for a minimum of 100 traps per day. The actual number of traps sampled per day typically ranges from 100 to 400, depending on the lobstering operation being observed. All data are transcribed onto log sheets and key-punched into a relational computer database. Prior to analysis of any raw data a standard auditing process is employed to ensure quality control.

Sea samplers record: catch in number of lobsters, number of trap hauls, set-over days, trap and bait type, carapace length (to the nearest mm), sex, shell hardness, cull status, presence of shell damage, external gross pathology, mortality, egg bearing status, and presence of v-notches for females. Trap locations were recorded using a hand-held GPS (Garmin eTrex). Depth at mean low water for each trap location was recorded from NOAA navigational charts as a coastwide standard to avoid variability from tidal fluctuations.

Samplers record v-notches in the tails of female lobsters using a standard protocol which classifies v-notches into three categories: sharp notch, old notch, and missing or mutilated flipper. A sharp notch is defined as a straight-sided V without setal hairs. An old notch is a notch on a lobster that has persisted through at least one molt. Old notches are typically irregularly shaped and may have setal hairs. A flipper that is mutilated in a way that could obscure a notch, or is missing, is considered to be notched.

Potential Impacts of 1/8" V-notch Definition

To assess the impact of the proposed change in v-notch definition, we calculated the amount of catch lost under the current 1/4" v-notch definition, the catch lost due to a 1/8" v-notch definition and the difference between the two using the sea sampling data. The difference in the catch lost between the 1/4" and 1/8" definitions represents the loss in catch that would be solely attributable to the proposed change in the v-notch definition.

Table 1. Number of sea-sampling trip made by port in the Outer Cape Cod region. 2005 - 2008

Port: Chatham				
	2005	2006	2007	2008
May	1	1	1	1
June	1	1	1	1
July	1	1	1	1
August	1	1	1	1
September	1	1	1	1
October	1	1	1	1
November	1	1	1	1
Port: Nauset				
	2005	2006	2007	2008
May	1	1	1	1
June	1	1	1	1
July	1	1	1	1
August	1	1	1	1
September	1	1	1	1
October	1	1	1	1
November	1	1	1	1
Port: Provincetown				
	2005	2006	2007	2008
May				1
June				2
July				2
August				2
September				2
October				5
November				
Totals	14	14	14	28

MADMF samplers did not measure v-notch depth, so it is not possible to exactly estimate the number of lobsters that would be protected under the 1/8" v-notch definition. To account for this we erred on the conservative side and counted female lobsters with ANY mark (new notch, old notch, or mutilated flipper) on the flipper as v-notched under the 1/8" definition. This effectively equated to applying a "zero-tolerance" v-notch definition in this analysis. As such, all estimates of catch lost to the 1/8" v-notch definition will represent the "worst" case. Actual losses due to 1/8" v-notch definition will be less.

The potential catch lost in number generated from sea sampling data was converted to weight using a standard length-weight relationship for OCC that is defined as;

$$\text{Weight} = 1.37 \text{ E}^{-03} * (\text{Carapace Length} ^{2.893})$$

This was done to account for the fact that v-notched lobsters vary in size but are typically mature and large, thus making the potential losses in weight much greater than the potential losses of catch in number of individuals.

For this analysis the weight of 1/4" v-notched lobsters was calculated by summing the total weight of non egg-bearing lobsters that were greater than or equal to 3 3/8" (86 mm) carapace length, and were coded as a "new notch", or a "mutilated flipper". These represent lobsters that would have been "marketable" if a v-notch complying with 1/4" definition was not present.

The weight of 1/8" v-notched lobsters was calculated by summing the total weight of non egg-bearing lobsters that were greater than or equal to 3 3/8" (86 mm) carapace length, and were coded as a "new notch", an "old notch", or a mutilated flipper. These represent lobsters that would have been "marketable" if a v-notch complying with the 1/8" v-notch definition was not present.

The percentage of the catch that is lost due to the 1/4" v-notch definition was calculated as follows;

$$\% \text{ 1/4" V-Notch} = \left(\frac{\text{Weight of 1/4" V-Notched Lobsters}}{\text{Weight of Marketable Lobsters}} \right) * 100$$

The percentage of the catch that would be lost due to the 1/8" v-notch definition was calculated as follows;

$$\% \text{ 1/8" V-Notch} = \left(\frac{\text{Weight of 1/8" V-Notched Lobsters}}{\text{Weight of Marketable Lobsters}} \right) * 100$$

Potential Impacts of a 6 ⁷/₈" and 6 ³/₄" Maximum Size

To assess potential impact of a 6 ⁷/₈" and 6 ³/₄" maximum size we calculated the percentage of the catch by weight and the projected revenue that would be lost under each of these measures. Similar to the analysis for v-notch definitions, the number of lobsters greater than 6 ⁷/₈" and 6 ³/₄" carapace length (respectively) were converted to a total weight of lobsters using the length-weight relationship presented above. The estimated percent of catch lost in weight was calculated by dividing the weight of the lobsters greater than the proposed maximum sizes by the total weight of the marketable catch.

Results

From 2005 to 2008 the projected losses due to the difference between the 1/4" and 1/8" v-notch definitions in Nauset and Chatham ranged from 3.8 % to 5.0 % in pounds (Table 2). In 2008 the projected losses due to the difference between the 1/4" and 1/8" v-notch definitions in Provincetown was 10.7 % in pounds (Table 3). The observation that the number of v-notched lobsters was substantially higher in the Provincetown area as compared to Nauset and Chatham was expected given Provincetown's close proximity to LMA 1. In LMA 1 fishermen are mandated to v-notching all egg-bearing lobsters. In fact 87 % of all the traps sampled out the port of Provincetown in 2008 occurred west of the 70° longitude line which separates NMFS statistical area 514 and 521, and also separates the Gulf of Maine and Georges Bank stock units (Figure 1 and Figure 2). Moreover some of the highest incidence of v-notched lobster was observed in the "overlap zone" around Provincetown where Area 1 lobstermen and OCCLMA lobstermen fish side-by-side. These data suggest that in 2008 the majority of the Provincetown fishery occurred within the Gulf of Maine stock unit.

Table 2. The percent of the observed catch in weight lost due to 1/4" (current) and 1/8" v-notches from Nauset/Chatham*.

Nauset and Chatham		Percent Reduced		
		1/4" Definition (status quo)	Estimated 1/8" Definition (proposed)	Difference (represents additional losses to current discards)
2005	<i>Pounds</i>	3.1	6.9	3.8
2006	<i>Pounds</i>	2.5	6.3	3.9
2007	<i>Pounds</i>	3.2	7.0	3.8
2008	<i>Pounds</i>	2.2	7.2	5.0

Table 3. The percent of the observed catch in weight lost due to 1/4" (current) and 1/8" v-notches from Provincetown*.

Provincetown		Percent Reduced		
		1/4" Definition (status quo)	Estimated 1/8" Definition (proposed)	Difference (represents additional losses to current discards)
2008	<i>Pounds</i>	4.2	14.9	10.7

*Note: 1/8" v-notch estimates represent an inflated value because DMF sea samplers only coded the depths as either straight-sided 1/4" or "old" if the notch had undergone a molt. All "old notches" are assumed to be deeper than 1/8". Actual impacts would be less if notch depths were measured.

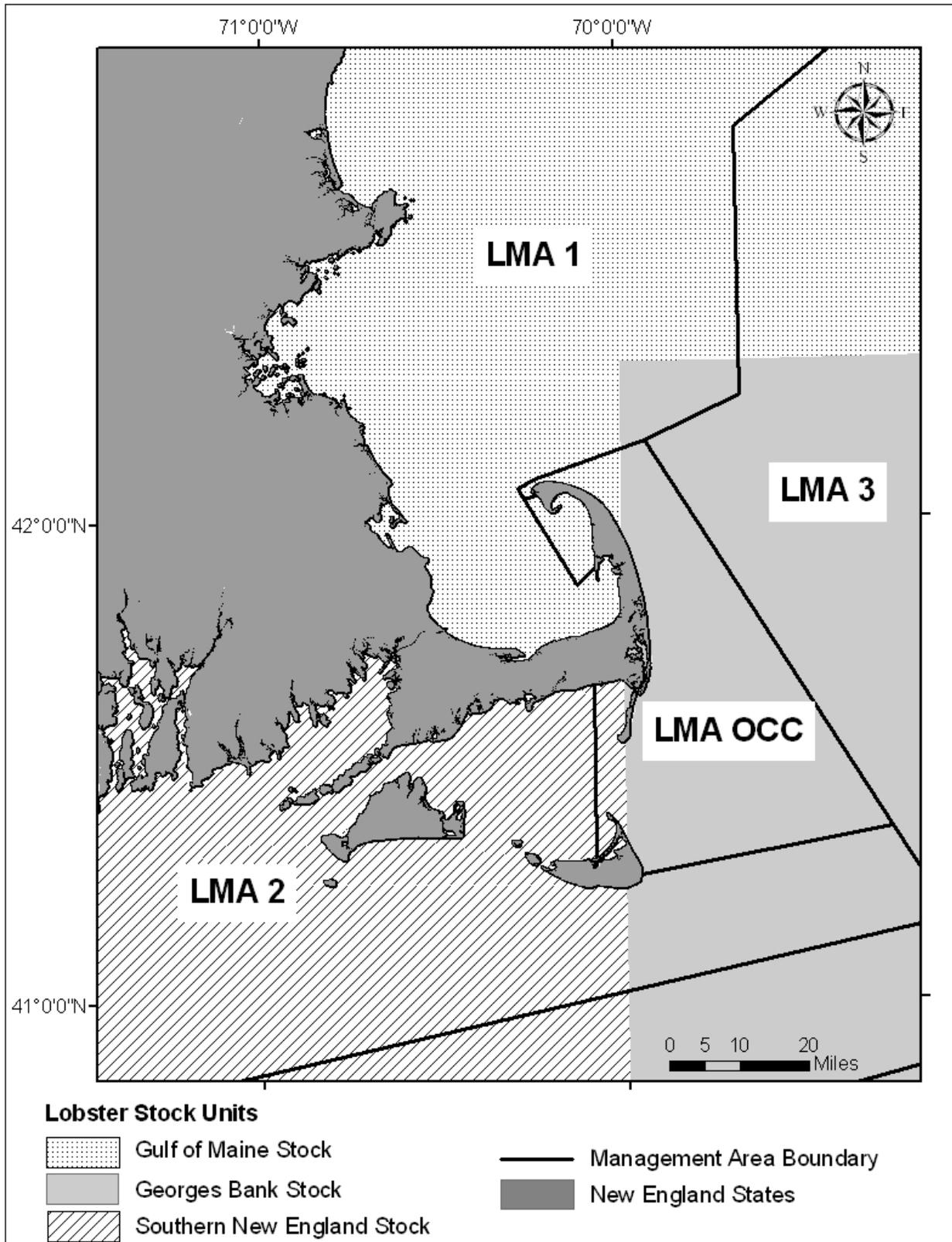


Figure 1. Map depicting the Massachusetts coast with boundaries for Lobster Management Areas 1, 2, 3, and OCC and boundaries for the Gulf of Maine, Georges Bank, and Southern New England lobster stocks.

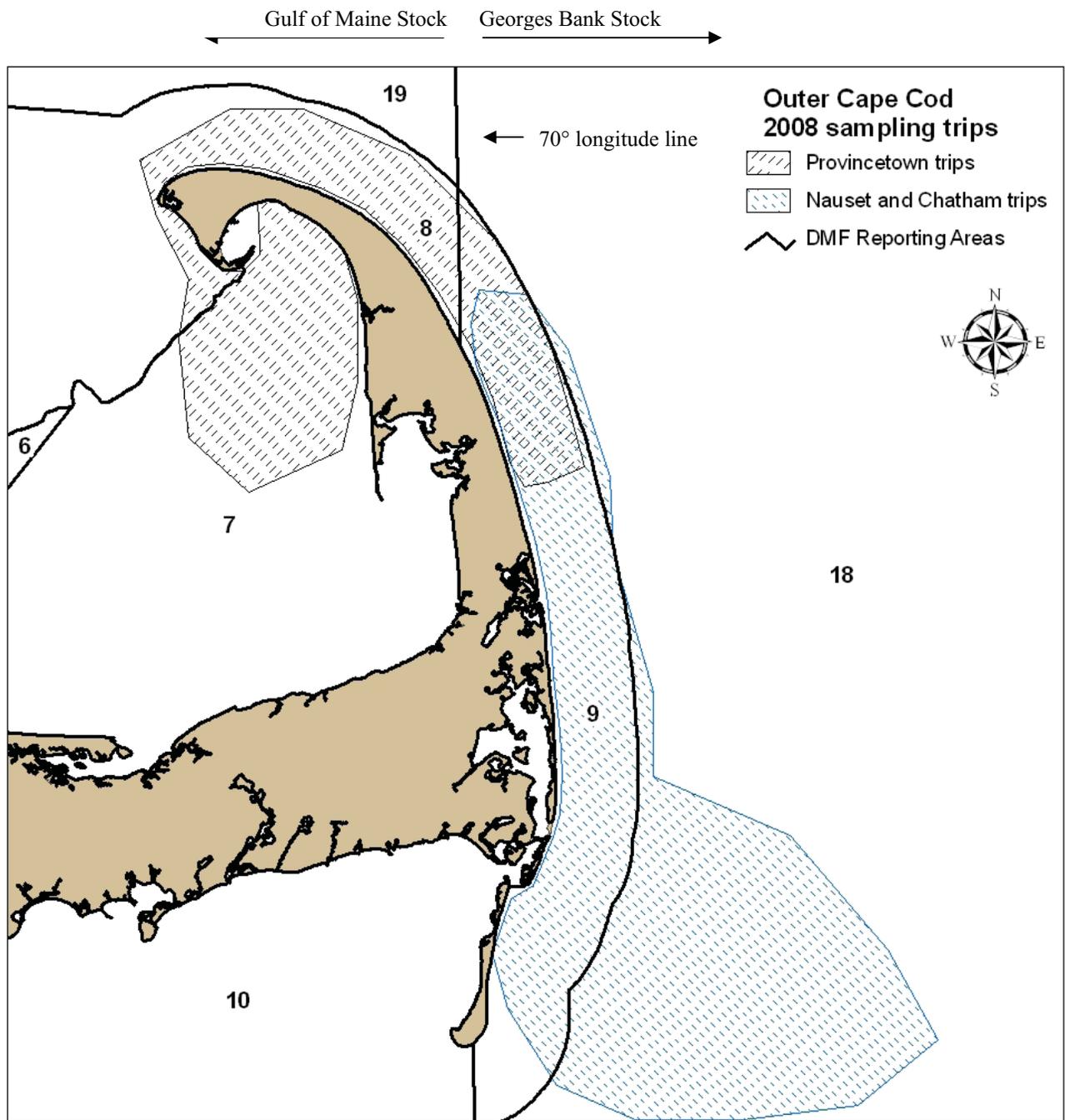


Figure 2. A map depicting the Outer Cape Cod region with MADMF lobster reporting areas and areas where sampling occurred (shade areas) out of the ports of Provincetown and Nauset/Chatham in 2008.

The potential total catch lost in weight as a result of the proposed maximum sizes by port is presented in Table 5. Very few marketable (non-egg-bearing, non-v-notched) lobsters' greater than either of the proposed maximum sizes were observed, as such the potential loss to the fishery due to either would be negligible. In fact, out of 85,695 lobsters sampled in the OCC region since 1981, only 6 (0.007 %) were greater than 6 ⁷/₈", and only 14 (0.02%) were greater than 6 ³/₄".

Table 5. The estimated percent lost of lobster catch in pounds from 6 ⁷/₈" and 6 ³/₄" maximum size in Nauset/Chatham (2005 – 2008) and Provincetown (2008).

Nauset and Chatham		Percent Reduced	
		6 7/8" (2009 rule)	6 3/4" (2010 rule)
2005	<i>Pounds</i>	0.0	0.0
2006	<i>Pounds</i>	0.2	0.4
2007	<i>Pounds</i>	0.0	0.0
2008	<i>Pounds</i>	0.0	0.0
Provincetown		Percent Reduced	
		6 7/8" (2009 rule)	6 3/4" (2010 rule)
2008	<i>Pounds</i>	0.0	0.0