# Assessment of Trawl-Induced Damage to American Lobster

**Report to the American Lobster Management Board**
**By the American Lobster Technical Committee**
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At the May 2012 Lobster Board meeting the TC was tasked with looking at the effects of bottom tending mobile gear on lobster in response to management actions that could lift a prohibition on this type of gear in Closed Area II on Georges Bank. Lobstermen that fish in this area have reported large congregations of ovigerous females within Closed Area II and they're concerned that opening it to mobile gear will have a negative impact on the local lobster population. The studies cited below document the effects that bottom tending mobile gear have on lobster in their respective areas. These results suggest that opening Closed Area II to these types of gear will result in additional incidental damage to lobster. It's important to note that studies cited below were done in areas where lobster are generally smaller than those found on Georges Bank (ASMFC 2009), and thus incidental damage could be quite different in this area due to gear selectivity and size of lobster. Additional surveys and studies are needed to more accurately assess the effects of mobile gear on lobster near Georges Bank.

When a surge in trawl effort directed toward lobster caused substantial conflicts between the bottom trawl and lobster trap fishery in Long Island Sound in the early 1980s, the Connecticut legislature commissioned the Department of Environmental Protection to examine the impacts of mobile trawl gear on lobster. Agency biologists compared direct and delayed mortality from trawl nets versus trap gear (Smith and Howell 1987). Biologists made monthly trips aboard commercial stern trawlers (n=63 trips, 12-26m vessel size, tow duration 1-3 hrs) and lobster trap vessels (n=12 trips, 12-14m vessel size) from July 1983-January 1985 to examine lobster catches for immediate damage and mortality, and collected animals for transport to laboratory open circulating seawater tanks for extended examination over 14 days. Similar observations were also recorded from cruises made by a research stern trawler (13m vessel size, tow duration 0.5-2 hrs).

Summary of Results

- Monthly incidence of major damage and immediate mortality varied seasonally from 0-14% in the trawl fishery (n=6,174 lobster) and 0-4% in the trap fishery (n=4,762 lobster). There was no difference in damage/mortality rate by vessel size.
- Delayed mortality occurred only in trawl-caught animals and almost exclusively in animals that sustained major damage (broken or crushed body or claws) or were newly molted (new-shell).
- Trawl-induced damage occurred at similar rates in cold-water versus warm-water intermolt periods (2% January-June versus 3% August-September)) and between cooling and warming postmolt periods (12% October-December versus 13% July).
- The above results suggest that damage due to trawling is more a function of shell condition than water temperature. The importance of shell condition points to the effects of compression in the trawl net on recently molted animals.
- Sub-legal size new-shell lobster incurred significantly greater damage rates than legal-size lobster caught by trawl. Hard-shell animals, and those captured in traps, showed no size differences in damage rate.

- Trawl-caught egg bearing females (n=909) incurred no greater damage/mortality rates than non-egg bearing females or males. Egg loss attributable to either harvest technique was not examined.

Two other studies also documented similar damage rates and an increase in damage immediately following molting periods with lower rates during intermolt periods. In Rhode Island waters, Ganz (1980) reported an overall 9% major damage rate estimated from biweekly experimental trawl tows (n=105 tows, tow duration 1 hr, 5228 lobster). However, injury rates increased to 16-21% during the molt in June-July and October-November while averaging 0-5% in all other months. Spurr (1978) also found trawl-induced injury to be greater in July than in September based on experimental tows taken in New Hampshire waters.

These damage rates must be expanded by the relevant bottom trawl fishing effort in order to assess the total effect of trawl gear on the affected population. For example, damage to 14% of lobster contacted by bottom trawls (as indicated by the Connecticut study) during the 3-6 month season when lobster are molting and most vulnerable would be of little consequence to the health of the population if trawl effort during the same time period is relatively low. Similarly, damage due to trawling may be minor relative to damage by lobster traps (4% during the period of greatest vulnerability) if effort in the lobster fishery is high. Other factors to consider include: The seasonal distribution of mobile gear fishing effort, trawl/dredge design, mortality of lobster contacted by mobile gear but not landed, and the size selectivity of bottom trawl gear. All of these factors would substantially change the total damage to lobster by these types of mobile gear.

The proposed regulation changes will also include lifting the prohibition on scallop dredges. Jamieson and Campbell (1980) looked at the impacts of scallop dredges on lobster in the Gulf of Saint Lawrence in areas with and without commercial scallop fishing. They found that 1.3% of lobster in the fished areas were either injured or retained and 11.7% of lobster in the non- fished areas were retained/injured by experimental scallop dredge. SCUBA divers followed behind the dredge and observed lobster in the drag path during and after the tow. Injured lobster were not found in the drag path though some were observed to retreat into burrows in front of a moving dredge and the damage/mortality associated with those animals is unknown.

The authors concluded that damage to American lobster in the research area was minimal from the observed drags of sea scallop dredge. They noted that seabed substrate was generally smooth and most lobster were able to avoid the gear. Though this study provides useful information, one needs to exert caution when trying to draw parallels between this study and interactions of scallop dredges and lobster on Georges Bank . The selectivity of the gear is very dependent on the physical terrain and speed of the tows. Additionally, the mean size of the lobster in this study was 72mm which is less than the $25^{th}$ percentile for the lobster population around Georges Bank (average 80-115mm, ASMFC 2009). Lobster size will affect damage rates as well as retention rates in the gear.

Applying the results of these studies to assess potential effects of opening a closed area of Georges Bank to bottom tending mobile gear would require 3-5 years of the following information:

- Monthly or seasonal proportion of newly-molted versus hard-shelled lobster for sub-legal and legal size classes from experimental trawls and lobster traps that capture all size classes and sexes present on Georges Bank
- Monthly or seasonal estimates of major damage rates (i.e. broken or crushed body or claws exclusive of culls and old damage) from commercial or experimental trawling and lobster traps on Georges Bank or the Gulf of Maine where shell development is comparable
- Data characterizing tow duration, net size, and deck handling practices for the proposed mobile gear fishery(s) for comparison to data describing fishing effort in the lobster trap fishery.
- Characterization of the amount of spatial overlap between the area exposed to bottom trawling and known lobster habitat.

**Literature Cited**

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