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MSC Assessment Report for

Maine Lobster Trap Fishery

Client: The Fund for the Advancement of Sustainable Maine Lobster

Version 3: Public Comment Draft Report

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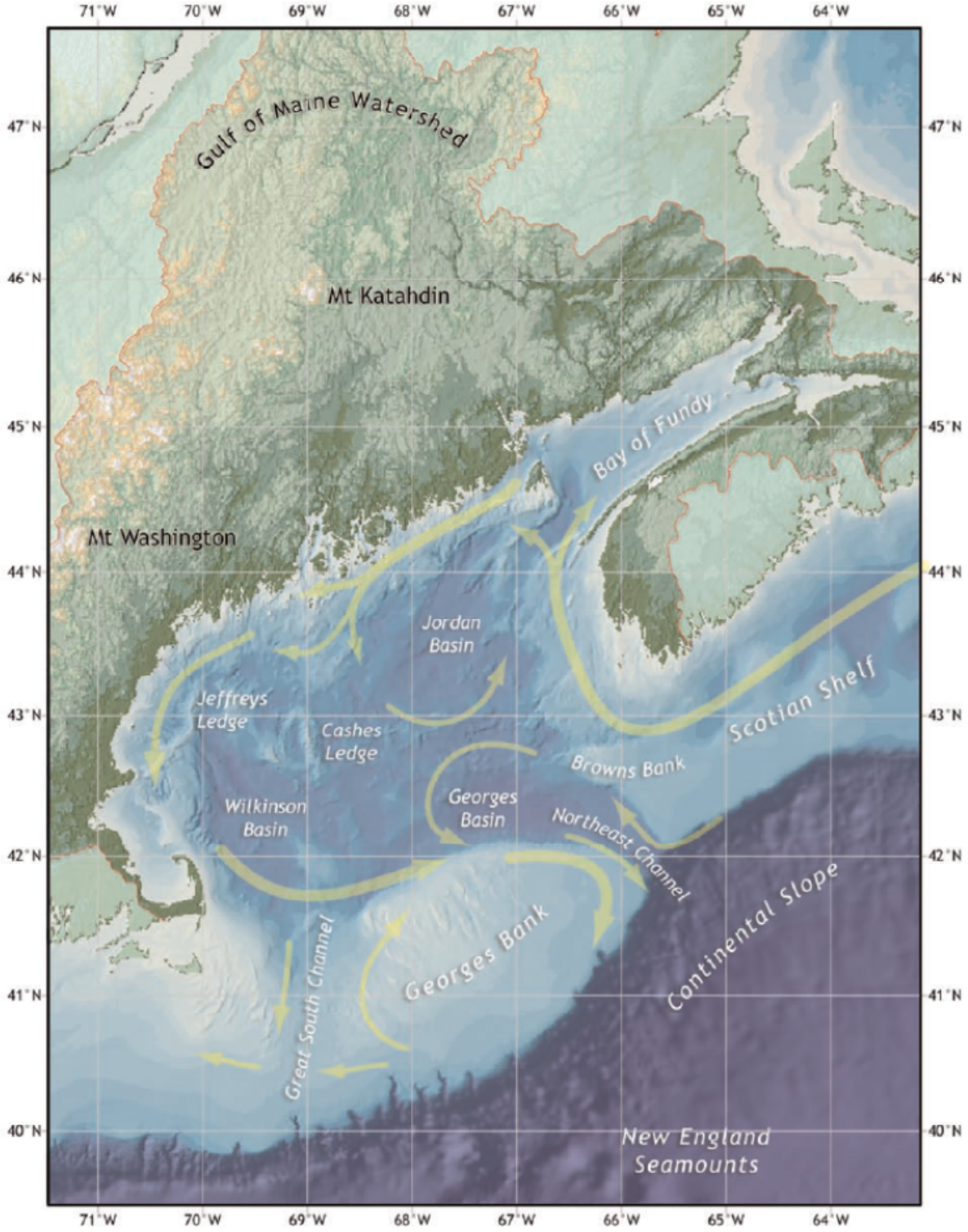

Source: Richert and Incze 2003 Prototype Biophysical Maps of the Gulf of Maine

The Gulf of Maine

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SUMMARY

This Public Comment Draft Report sets out the results of the assessment of the Maine Lobster Trap Fishery against the Marine Stewardship Council (MSC) Principles and Criteria for sustainable fishing.

The assessment commenced in December 2008 using the MSC Fisheries Assessment Methodology (FAM) (v1). The MSC introduced their MSC Certification Requirements (CR) and MSC Guidance to the Certification Requirements (GCR) in November 2011 (and have further updated both since then). Recognising that fishery assessments using FAM v1 assessment trees were underway, the MSC confirmed that, until November 2012, it would accept variation requests from Conformity Assessment Bodies (CABs) for any fishery having started an assessment process and wishing to continue using the FAM v1 assessment tree until the time of their reassessment. A variation was submitted in accordance with this derogation by Intertek Moody Marine (IMM) on 15th November 2011 and it was accepted (see: http://www.msc.org/track-a-fishery/in-assessment/north-west-atlantic/Maine_lobster_trap_fishery/assessment-downloads). This assessment has therefore been undertaken in accordance with the FAM v1 assessment tree and associated guidance and conforms to the requirements of the CR and GCR.

To date, the following required steps have been undertaken in the MSC assessment of the fishery:

- Announcement of the assessment
- Appointment of a specialist assessment team
- Notification of the use of the MSC "default assessment tree"
- Notification and undertaking of a site visit to the fishery
- Production of a report that describes the background to the fishery, the fishery management operation and the evaluation procedure and results
- The nomination and stakeholder consultation of peer reviewers
- Peer review of the report
- Production of a Public Comment Draft Report

The assessment was carried out by a team of three experts: Dr. Colin Bannister - former Head of the Shellfish Resource Group at the Centre of Environment, Fisheries and Aquaculture Science (Cefas) in the United Kingdom (UK); Dr. Howard Powles – former Director of Fisheries Science and of Biodiversity Science for the Canadian Department of Fisheries and Oceans (DFO); and, Prof. Bonnie McCay of Rutgers University, New Jersey, where she is a professor in the Department of Human Ecology.

The assessment team undertook a site visit to Maine and included meetings with Federal and State fishery scientists and managers, academics and researchers, individual fishermen and representatives from fishermen's organisations; representatives from environmental/conservation organisations; and individuals and representatives from the lobster trading, marketing, processing and restaurant industries. Following the information gathering phase the assessment team undertook a rigorous review and scoring of the fishery against the MSC Criteria and Principles for Sustainable Fishing.

The fishery scored above the minimum requirement for all of the Performance Indictors resulting in the fishery achieving an overall average score of above 80 for all three MSC Principles. Therefore it was concluded that the Maine Lobster Trap Fishery could be recommended for certification.

There was a delay in securing a peer reviewer with a particular qualification/experience in cetacean and fishing gear interactions. Once this was resolved reviews were undertaken. Following the reviews some scores relating to Principle 2 Performance Indicators were reduced. None of the scores dropped below the minimum requirement but, the overall Principle 2 average score dropped below 80. The client was subsequently able to collate and provide further information which enabled the assessment team to revise the report and re-score some Performance Indicators. This resulted in the overall Principle 2 score achieving >80.

The extended time in appointing peer reviewers; taking account of the reviewer's comments; the assembling of additional information; the review of this information; the revision of the report; and, the development and agreement of the draft client action plan, resulted in a considerable delay in the original timeline for the assessment. Stakeholders were informed of the changes in timeline and the reasons for the delay.

Scores of the Principles

This assessment has resulted in the following recommended scores against the three MSC Principles:

Principle 1: 90.6
Principle 2: 83.0
Principle 3: 86.6

The main strengths of the fishery

- The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing.
- There is an adequate assessment of the stock status incorporating limit and target reference points.
- The fishery does not pose a risk of serious or irreversible harm to retained species.
- The fishery meets national and international requirements for protection of ETP species and has in place precautionary management strategies designed to ensure the fishery does not pose a risk of serious or irreversible harm to ETP species and minimises mortality of ETP species.
- The management system exists within an appropriate and effective legal and/or customary framework capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2;
- The management system has effective consultation processes that are open to interested and affected parties.
- Monitoring, control and surveillance mechanisms ensure the fishery management measures are enforced and complied with.
- There is effective and timely review of the fishery-specific management system

The main weakness of the fishery

- The potential impact of the fishery on habitat has not been explicitly considered within the management of the fishery.
- There are limited long-term objectives that are consistent with MSC Principle 2 and that incorporate the precautionary approach.
- Specific management objectives designed to achieve the outcomes expressed by MSC's Principles 2.

Conditions

The assessment team identified conditions that will enable the fishery to score at least 80 against all Performance Indicators. These conditions are summarised below:

Condition 1	The client is required to present evidence by the fourth annual audit that shows : • There is a partial strategy in place that is expected to at least achieve the SG 80 level of performance for PI 2.4.1, i.e. "*The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm*". • There is some objective basis for confidence that the partial strategy will work,

	based on some information directly about the fishery and/or habitats involved. • There is some evidence that the partial strategy is being implemented successfully.

Condition 2	The client is required to show by the third annual audit that clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within management policy.

Condition 3	The client is required to show by the fourth annual audit that short and long term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system

1 INTRODUCTION

This report sets out the results of the assessment of the Maine Lobster Trap Fishery against the Marine Stewardship Council (MSC) Principles and Criteria for Sustainable Fishing.

1.1 The fishery proposed for certification

The MSC Guidelines to Certification Bodies specify that the Unit of Certification (UoC) is, "The fishery or fish stock (=biologically distinct unit) combined with the fishing method/gear and practice (=vessel(s) pursuing the fish of that stock)." The fishery proposed for certification is therefore defined as:

Species:	American Lobster (*Homarus americanus*)
Geographical Area:	Atlantic States Marine Fisheries Commission (ASMFC) Lobster Conservation Management Area (LCMA) 1
Method of Capture:	Trap
Management System:	Maine Department of Marine Resources (DMR) Atlantic States Marine Fisheries Commission (ASMFC) National Marine Fisheries Service (NMFS)
Client:	The Fund for the Advancement of Sustainable Maine Lobster

If the fishery was to achieve MSC certification the scope of the certificate will include only commercial vessels licensed by the State of Maine that fish within the ASMFC Lobster Conservation Management Area (LCMA) 1. The client has confirmed its willingness to establish a certificate sharing mechanism upon successful certification of the fishery.

It should be noted that the Maine lobster fishery is predominantly focused in Maine's 3 mile territorial waters in LCMA1. 20% of the of Maine licensed vessels have a federal permit endorsement to fish beyond Maine's 3 mile territorial waters in LCMA 1 and less than 10 have qualified and elected to fish in LCMA 3 (defined by the 25600 Loran line running approximately parallel to Maine's shoreline, ~40 nautical miles from shore) (Wilson 2007). In 2011, only 2 Maine licensed vessels elected to fish in LCMA 3 (Tarr, 2011). Maine licensed vessels are not permitted to fish in state waters of New Hampshire or Massachusetts or in Canadian waters. In order that this MSC assessment and potential future certification cover as many of the Maine licensed vessels as possible the geographic extent of the UoC has been chosen to match the most appropriate administrative boundary, i.e. that specified by Maine licensed vessels that possess a federal licence: LCMA 1.

1.2 Report structure and assessment process

The aims of the assessment are to determine the degree of compliance of the fishery with the MSC Principles and Criteria for Sustainable Fishing, as set out in Section 8 of this report.

This report sets out:

- the background to the fishery under assessment and the context within which it operates in relation to the other areas where the target species is fished
- the qualifications and experience of the team undertaking the assessment
- the standard used (MSC Principles and Criteria)
- stakeholder consultation carried out. Stakeholders include all those parties with an interest in the management of the fishery and include fishers, management bodies, scientists and environmental Non-Governmental Organisations (ENGO's)
- the methodology used to assess ('score') the fishery against the MSC Standard.

- a scoring table with the Performance Indicators adopted by the assessment team and Scoring Guideposts which aid the assessment team in allocating scores to the fishery. The commentary in this table then sets out the position of the fishery in relation to these Scoring Guideposts.

The intention of the earlier sections of the report is to provide the reader with background information to interpret the scoring commentary in context.

Finally, as a result of the scoring, the Certification Recommendation of the assessment team is presented, together with any conditions attached to certification.

In draft form, this report is subject to critical review by appropriate, independent, scientists ('peer review'). The comments of these scientists are appended to this report. Responses are given in the peer review texts and, where amendments are made to the report on the basis of peer review comments; these are also noted in the peer review text. Following peer review, the report is then released for public scrutiny on the MSC website.

The report, containing the recommendation of the assessment team, any further stakeholder comments and the peer review comments is then considered by the Intertek Moody Marine Governing Board (a body independent of the assessment team). The Governing Board then make the final certification determination on behalf of Intertek Moody Marine Ltd.

It should be noted that, in response to comments by peer reviewers, stakeholders and the Intertek Moody Marine Governing Board, some points of clarification may be added to the final report.

Finally, the complete report, containing the Intertek Moody Marine Ltd Determination and all amendments, are released for further stakeholder scrutiny.

1.3 Stakeholder meetings attended

Information used in this assessment has been obtained from interviews and correspondence with stakeholders in this fishery and supplementary information provided by the client. Meetings and conference calls were held with representatives from the harvesting, processing and marketing sectors, academic institutes, state and federal management organisations and environmental non-governmental organisations (NGOs) between 20th and 24th April 2009 in Portland, Rockland, Ellsworth, and Hallowell.

The assessment team would like to express their sincere gratitude to Jessica Joyce for providing invaluable organisational and administrative support prior to and during the site visit.

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Published information and unpublished reports used during the assessment are listed below:

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2 GLOSSARY OF ACRONYMS AND ABBREVIATIONS USED IN THE REPORT

ALWTRP	Atlantic Large Whale Take Reduction Plan
ALWTRT	Atlantic Large Whale Take Reduction Team
ASMFC	Atlantic States Marine Fisheries Commission
CL	Carapace Length
CPUE	Catch Per Unit Effort
CSM	Collie-Sissenwine Model
DFO	Department of Fisheries and Oceans or Fisheries and Oceans Canada
DIFW	(Maine) Department of Inland Fisheries and Wildlife
DMR	Maine Department of Marine Resources
DNC	Dominion Nuclear Connecticut
EEZ	Exclusive Economic Zone
EIS	Environmental Impact Statement
ENGO	Environmental Non-Government Organization
ESA	Endangered Species Act
ETP	Endangered, Threatened, Protected
FMP	Fisheries Management Plan
FRCC	Fisheries Resource Conservation Council
GBK	Georges Bank
GMRI	Gulf of Maine Research Institute
GOM	Gulf of Maine
GOMA	Gulf of Maine Area
IFMP	Interstate Fisheries Management Plan
ISFMP	Interstate Fisheries Management Program
JEA	Joint Enforcement Agreement
LCMA	Lobster Conservation Management Area
LCMT	Lobster Conservation Management Team
MLA	Maine Lobstermen's Association
MMPA	Marine Mammal Protection (Act)
MSA	Magnuson Stevens Act
MSC	Marine Stewardship Council
Mt	Metric tons
NEFSC	New England Fisheries Science Center (NMFS/NOAA)
NESFC	North Eastern Sea Fisheries Committee
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PBR	Potential Biological Removal
PRT	Plan Review Team (ASMFC)
SNE	Southern New England
TRP	Take Reduction Plan
UMLBM	University of Maine Length-Based Model
USWFS	United States Fish and Wildlife Services

3 BACKGROUND TO THE FISHERY

3.1 Introduction to the American lobster

The American clawed lobster (*Homarus americanus*, L) is a slow-growing, long-lived, shelter-seeking benthic crustacean that is distributed extensively across the continental shelf from the Straits of Belle Isle, Newfoundland, and southern Labrador in the north, to Cape Hatteras, North Carolina in the south. Regionally, lobster abundance is highest in the coastal waters of the Gulf of Maine and the Canadian Maritimes.

Although most abundant in shallow coastal waters between four and fifty meters in depth, particularly in areas and embayments with cobble/boulder substrates, the lobster also occurs out to depths of 700m, where it inhabits canyons and undulations in sandy mud bottoms along the edge of the continental shelf from Sable Island to New Jersey and North Carolina. The biology of the American lobster was first described in detail by Herrick (1911), and a long and detailed history of subsequent investigations into many aspects of lobster biology, life history and population dynamics throughout North America is summarised in Cobb & Phillips (1980) and Factor (1995).

3.2 Lobster biology

Lobsters are shelter-seeking animals, living on the sea floor in a range of habitats, usually employing rocks, crevices, and burrows for cover when these are available, or undulations and gullies in the seabed when they are not. Shelter provides protection from predators at critical life history events such as moulting, reproduction, and egg-extrusion, and is therefore particularly important for newly settled post-larvae, growing juveniles, and mating and egg-carrying females. In rocky terrain juvenile lobsters tend to stay within the confines of their shelters up to about 25-35 mm CL (3 to 4 years) after which they begin to forage more widely and adopt adolescent and eventually adult behaviour patterns. After emergence, lobsters exhibit strong olfactory behaviour that leads them to enter baited traps, especially at night.

The life history of a cohort begins with copulation in the summer or early fall, usually when the female is soft-shelled after the moult that follows the release of a previous egg batch, although insemination may not occur every year, and can also take place in the hard shelled state (Aiken and Waddy, 1980). After mating, eggs are extruded by the female and attached externally to the pleopods, to be carried under the abdomen for a 9 to 12 month incubation period, during which some loss of eggs can occur. In the following year, eggs hatch from the late spring to early fall, depending on the rate of maturation, and on regional variations in temperature. Once released into the water column, the larvae remain planktonic in the neuston layer for four life-stages before settling to the seabed. Food availability and temperature affect the rates of development and survival, and oceanographic conditions strongly influence the dispersal of larvae. The duration of the pelagic phase varies with ocean temperature, ranging from approximately 10 days at 23°C to nearly two months at 10°C, which affects both feeding and predation. Pelagic larvae can be retained by local gyres, or dispersed large distances. Lobsters are generally most abundant, and support the most productive fisheries, in coastal waters, embayments and basins that receive a regular supply of settling pelagic larvae (Wahle et al 2004, Incze et al 2006). Settlement is facilitated by geotactic, phototactic and thigmotactic behaviours that enable stage IV post larva to search for, select and take shelter in the preferred cobble/boulder substrates that are particularly prevalent along the coast of the Gulf of Maine (Wahle & Steneck, 1991 & 1992, Wahle & Incze, 1997).

Lobsters feed on a range of animals including crabs, molluscs, polychaete worms, and sea urchins, as well as fish, algae and other lobsters. In addition to being important predators, young American lobsters are also preyed upon by a variety of species, including fish (e.g., cod, sculpin, cunner, tautog, black and striped sea bass, etc.), sharks, rays, crabs and larger lobsters (Factor, 1995).
During their first year, lobsters are relatively stationary, typically remaining within an area of a few

square meters of their primary shelter, but as they grow their potential range increases, in some areas to a few miles only, and in other areas to much larger distances from tens to a hundred or more miles. In warmer waters, including some parts of the Gulf of Maine, some lobsters may stay in the same geographical locality for most of their life, where they may show a variety of local movements on the order of a few miles, whether to and fro along the coast, or from shallow to slightly deeper water and back. Others make more substantial inshore–offshore movements, leaving the coast to overwinter in deeper water and returning inshore in spring when the coastal waters warm up. Such a migration pattern is associated particularly with inshore lobsters that move seaward to such offshore banks as Grand Manan, or Browns Banks, or offshore lobsters that overwinter in canyons and then migrate shoreward in spring to such banks as Georges Bank (Factor, 1995).

3.3 Moulting, growth and size distribution

Lobster life history is dominated by the presence of the hard exoskeleton, which provides important protection from predators, and is cast periodically in order to facilitate growth. Lobsters need the protection of shelter at the moult, when they cease to move and feed. Since insemination usually occurs when females are in soft-shelled condition after a moult, the timing of the moult and reproductive cycles is linked.

Because hard parts of the body are lost at the moult, lobsters are not aged routinely (but see Section 4.6 below) and are instead assessed using size-based methods (see Section 5) that calculate mortality rates by transforming the rate of change of numbers with size into a rate of change over time. This requires either growth equations or transition matrices that are derived from data on moult increment and moult probability. The former can be measured using data from tagging experiments, which show that moulting lobsters generally increase in size by about 15% in length and 50% in weight (Fogarty, 1995). Moult frequency, which is difficult to measure precisely, varies with life history stage and size (Factor, 1995): there are probably 20-30 moults from first stage larva to minimum legal size (81mm CL in the Gulf of Maine), after which moult frequency declines to 7-10 times in the first year (to reach a length of just 1-1.5 inches) to 3-4 times a year as juveniles, and to once a year or less in adulthood. Growth is believed to slow down after the onset of sexual maturity (Cadrin, 1995).

Growth rate varies regionally and with depth, due to differences in temperature, food availability, and activity. In warmer waters it is most likely to be slower, because although moult frequency may be higher at higher temperatures (Aiken, 1977), and therefore tends to be higher in warmer coastal waters than in cooler offshore waters (Aiken, 1980, Aiken & Waddy, 1986), this can be compensated by a smaller moult increment. The latter was shown by comparing moult increments between lobsters in warm waters inshore and cool waters offshore (Fogarty and Idoine, 1988), and by observations indicating an inverse relationship between temperature and moult increment in Long Island Sound from 1979 to 2007 (DNC, 2008). On the other hand, lobsters may reach sexual maturity earlier in warmer waters (Templeman, 1936, Estrella and McKiernan 1989).

The size distribution observed in a lobster fishery results from the interaction between demography (growth rate and natural mortality), fishing mortality, lobster behaviour at the trap, and trap selectivity. In the Gulf of Maine, 99% of the size distribution in the commercial catch ranges from the minimum legal size of 81 mm CL up to just over 110 mm CL. The median length is about 90 mm in males, and slightly smaller in females, and the 25 to 75 percentiles range from about 85 to 95 mm in females, and 85mm to just over 90 mm in males (Figures 5.1.1.4.1 and 2 in ASMFC 2009a). The strong left skew in this size distribution is strongly influenced by the relatively high exploitation rate. This is well shown by the size distributions obtained from surveys carried out using ventless traps, which show a rapid increase in the relative abundance of lobsters from 35 mm CL up to the minimum legal size of 82 mm CL, followed by a dramatic decrease in the catch proportion from 82 to 100 mm CL in the fished part of the size range (ASMFC 2009a, Figure 5.2.2.2.1).

3.4 Reproduction

The ogive describing the relationship between size and the proportion of female lobsters that is mature varies considerably from one part of North America to another, For example, in the Gulf of St Lawrence the ogive covers the range 50-90 mm CL, with a mean size of 50% maturity at about 70 mm CL (Comeau & Savoie, 2002), whereas in the Gulf of Maine the ogive extends from 65-120 mm CL, with a 50% point at about 90 mm CL (ASMFC 2009a Figure 7.2.1.10). Lobsters in this size range are believed to be at least 4 to 8 years of age at this point in their life.

Using data from Herrick (1896), Estrella and Cadrin (1995) showed that egg production is relatively low, increasing exponentially from approximately 17,000 at 100 mm CL to 220,700 at 200 mm CL.

Mating in the American lobster is polygynous (Cobb, 1995). It appears that females mate with the dominant male of their choice, and this male is capable of attracting and inseminating multiple females. Experimental observations suggest that males facilitate mating by occupying and defending shelters that are used by females whilst their shells harden after moulting and insemination (Karnofsky et al 1989). The Stock Assessment Report points out that in a polygynous system of this kind, which is common in decapods, it has hitherto been assumed that the supply of sperm is plentiful, and that the limiting resource is female egg production (p14, ASMFC, 2009a), hence the decision to protect female spawners in many crustacean fisheries. In recent years, however, the sex ratio of lobsters in the Gulf of Maine has become highly skewed towards females, possibly due to the protection of eggers and v-notched females. This raises concerns about the possibility of sperm limitation, although there are potentially alleviating mechanisms, such as intermoult insemination (Waddy & Aiken, 1990), the ability to fertilise multiple clutches due to sperm storage by the female (Waddy & Aiken, 1986), and the evidence from genetics that a female can mate with more than one male (Gosselin et al, 2005).

3.5 Natural mortality

The perception is that because lobsters have a long life span and a low reproductive rate they are k-selected, leading to the assumption that after the dispersal and settlement of larvae, natural mortality is on average low. New age data, cited below, identify the presence of very old lobsters in the upper parts of the size distribution, confirming that this perception is reasonable. A value of M=0.15 was assumed for recruit and legal size lobsters in earlier assessments (Fogarty and Idoine, 1988, NEFSC 1993, 1996). The decline of key predators such as cod over the past 30 years is likely to have reduced natural mortality of lobsters over the same time period. In Southern New England, however, large mortalities have occurred periodically since the 1990s, and at one sampling location the prevalence of shell disease due to bacterial infestation has increased from zero prior to 1999 up to 15-20% since 2001. These incidents have prompted the current stock assessment to make additional model runs with higher values of M.

3.6 Age in lobsters

Important studies have recently been undertaken in Europe and North America to age lobsters by measuring the concentration of the pigment lipofuscin in neural tissue, where it accumulates over time. This method has been applied to wild caught *H. gammarus* off the east coast of England (Sheehy et al 1999, Sheehy & Bannister, 2002) and to *H. americanus* in Long Island Sound (Giannini, 2007). In both studies a lipofuscin-age key was obtained by first measuring lipofuscin in lobsters of known age (hatchery reared juveniles released into the sea and recaptured in the commercial fishery up to 12 years later, in England, and lobsters reared and held in aquaria for up to five years, in the USA). The relationship between lipofuscin and predicted age in the 48 wild-caught lobsters from Long Island Sound is shown in Figure 2.1.1, ASMFC 2009a.

Both studies confirm that lobster longevity is high (up to 70+ years of age at the top end of the wide size distribution sampled in England, and up to 22 years in the more restricted distribution sampled in

Long Island Sound). The range of age at size was wide, and overlapped considerably between size groups, so that size alone gives a very poor prediction of age (Figure 2.1.2, ASMFC 2009a). In the English commercial size distribution the recruit size class contained 5 to 8 cohorts, indicating that there is a protracted recruitment process that must buffer the size distribution from year-class variation. This could in turn introduce error into the estimation of mortality when stocks are assessed by length-based models (Sheehy & Bannister, 2002), but as the technology required to measure lipofuscin is such that large samples of lobsters cannot yet be aged routinely, growth data based on conventional measures of moult increment and probability continue to be used in assessments.

3.7 Trapping studies

A significant problem in lobster assessment and management is to understand the relationship between fishing effort (trap numbers and trap density) and fishing mortality on a stock, in order to determine whether trap limits are an effective management tool. From 2004-07 experimental trap fishing and lobster tagging was initiated in the Monhegan Island Lobster Conservation Area in order to investigate the impact of the cumulative removal of legal sized lobsters over time, and the impact on catches of different trap densities and soak time. This work is preliminary, and has not yet been fully reported or peer reviewed, but preliminary results (Carl Wilson, pers comm.) are of considerable interest:

a) tag-recapture results produced a low recapture rate, suggesting that there was a high turnover of lobsters in the experimental area. Catch rate declined and soak time increased over a fishing season, possibly due to local depletion, emigration, or seasonally declining water temperature.
b) comparisons between cumulative effort and catch in areas with medium and high trap density suggest that despite a three-fold difference in trap density, the difference in catch was only 15%. There was evidence that at medium and high densities, reduced catch rates could be compensated by increasing the frequency of hauling. In the low trap density area, catch per trap was highest, but not enough to compensate for the reduction in total catch due to lower trap numbers.
c) when the experimental fishers were allowed to vary their soak time from one to eight days there was no clear relationship between legal-sized catch and soak time.

3.8 Recruitment

Over the last three decades there has been a significant tranche of research into various aspects of the lobster recruitment process in eastern US and Canada, especially in the Gulf of Maine, including the following:

a) studies on the production and distribution of lobster larvae in the Gulf of St Lawrence (Hudon, 1987), the offshore banks of the Gulf of Maine (Harding and Trites, 1988) and Nova Scotia (Harding et al 1987)
b) laboratory and field studies on the behaviour of post-larvae, their habitat selection, and predator avoidance (e.g. Cobb et al 1989a, 1989b, Wahle and Steneck, 1992, Katz et al 1994, Lawton and Lavalli, 1995)
c) collection of standardised quantitative estimates of young-of-year settlement at a string of coastal sites in the Gulf of Maine using diver-based suction sampling and, more recently passive collectors, in order to produce a time series of coastal settlement indices (e.g. Wahle and Incze, 1997, Steneck and Wilson, 2001). In recent years sites have also been established in Nova Scotia, the Gulf of St Lawrence, and Newfoundland (time-limited).
d) field and modelling studies of growing complexity into how the predominantly anti-clockwise circulation in the Gulf of Maine, and its seasonal and inter-annual variations, affect the dispersal, advection and settlement of post larvae year-on-year. (Harding et al 2005, Incze et al 2006, and Xue et al 2006, all of which contain a comprehensive list of citations).

The aim is to describe the process of recruitment from the pelagic phase through benthic settlement and on to the fishable stock, (Wahle, 1993; Fogarty, 1998, Palma et al 1999, Wahle 2003, Incze et al

2003). It is hoped to clarify the relationships between various inshore and offshore lobster stock components, and to understand more clearly the relative importance of density-independent (larval supply) and density-dependent (settlement and benthic ecology) processes, with potentially important implications for lobster management (Ennis, 1995, Steneck and Acheson, 1997. Ultimately the work may also inform questions about the cause of the large increase in recruitment that has dominated the Gulf of Maine stock and fishery since the late 1980s (Incze et al, 2006).

3.9 Genetics and stock structure

Stock structure has recently been described by a new study of lobster genetics along the coast of North America, which analysed DNA from 2,500 lobsters, mainly egg bearing females, from 34 sites across the geographic range and from coastal and deep waters (Kenchington et al 2009). Northern samples around the Gulf of St Lawrence showed significantly lower genetic differentiation than southern samples taken from Fundy to Cape Cod, and when the data were screened to identify areas of low gene flow between neighbouring samples, only a single barrier was found in the northern area, but, somewhat unexpectedly, seven areas of reduced gene flow were found in the southern area (Grand Manan, Lobster Bay (New Brunswisk), Boothbay (Maine) plus Crowell Basin, Buzzards Bay (Massachusettes), Long Island Sound, Cape Cod to Georges Bank, Georges Basin, and south of Browns Bank). It is postulated that during the last ice age lobsters were forced onto the southern continental slopes by low temperature and falling water level, but then, as the ice retreated, they re-colonised northwards along the slope and into newly available embayments, thus creating patterns of genetic difference that are being maintained by contemporary patterns of bathymetry, temperature, and circulation. The significance of the gene flow barriers for stock management has not yet been worked out.

3.10 History of the Gulf of Maine fishery

Lobsters were among the many coastal species harvested by Native American Indians, and European colonists and settlers found them a dependable source of bait, food, and fertilizer. Early fisheries were conducted in shallow waters along the shoreline by hand, dip and hoop net, and gaffs (Nicosia and Lavalli 1999). In the 19th century lobster fishing in the Gulf of Maine also became a commercial activity and wooden lath traps became the dominant gear (Rathbun 1884). The fishery expanded outward from waters around Boston and New York as local stocks declined; the commercial fishery reached New Hampshire and Maine in the 1840s, coinciding with the development of a market for canned as well as fresh lobsters. Wooden lath traps became the dominant gear by 1840, fished singly or in short strings or trawls. (Most lobstermen now use wire traps that are worked singly, or in strings of varying length, depending on location, depth, and bottom type.). The use of gasoline powered engines started around 1904.

The history of American lobster in the U.S. after 1840 was one of declining catches and average sizes of lobsters, and with periods of crisis, adjustments in fishing effort, and state and interstate attempts to come up with appropriate regulations (ASMFC 2009a; Acheson 2003). The first of these periods was in the 1870s, when declining lobster landings led states up and down the coast to implement minimum sizes and closed seasons; the state of Maine also instituted protection of berried female lobsters. Decline in landings, average sizes, and catch per trap, as well as struggles between and among dealers and harvesters led to a Convention in 1903 of representatives of all lobster fishing states plus Canada (Collins, 1904). This Convention was able to enact protections of berried females and prohibition of landing shelled lobster meat but little else, because of concerns about differing local conditions, enforcement issues, inadequacies of landing statistics, and so forth. Individual states responded then and in following years in the early 20th century with increases in size limits and other measures, and Maine instituted a maximum carapace length. V-notching of the tails came about as voluntary measures in Maine and Massachusetts, supported eventually by laws prohibiting the landing of V-notched lobsters.

Overall landings remained low from the 1920s through the 1940s, around 5,000 t, and increased

slowly to the late 1970s, averaging nearly 14,000 t. Since then, landings have doubled to nearly 37,000 t in recent years, with increases in effort in inshore (0-3 nm) and nearshore (3-12 nm) areas and the development and intensification of an offshore fishery (12-200 nm), particularly after the mid-1960s with the development of a deepwater trap fishery in offshore canyons. Expansion of these fisheries coincided with decline in many other fisheries in the region. Landings doubled for reasons not yet fully explained (ASMFC, 2000; Drinkwater et al., 1996). In the meantime, as discussed below, lobster management came under the federal fisheries management system that came into effect in 1977, claiming for the nation a 200-mile exclusive economic zone (EEZ) and adding a layer of fisheries management for federal waters to a system that had been - and continues to be - dominated by states.

As a result, the American lobster now supports one of the most valuable commercial fisheries in the north-eastern US, with annual revenue in excess of $370 million in 2007 (cited in ASMFC, 2009a). This revenue is derived from lobsters in three stock units defined on the basis of regional differences in life history parameters, viz., the Gulf of Maine and Southern New England stocks, which are primarily inshore, and the Georges Bank stock offshore (see Figure 1).

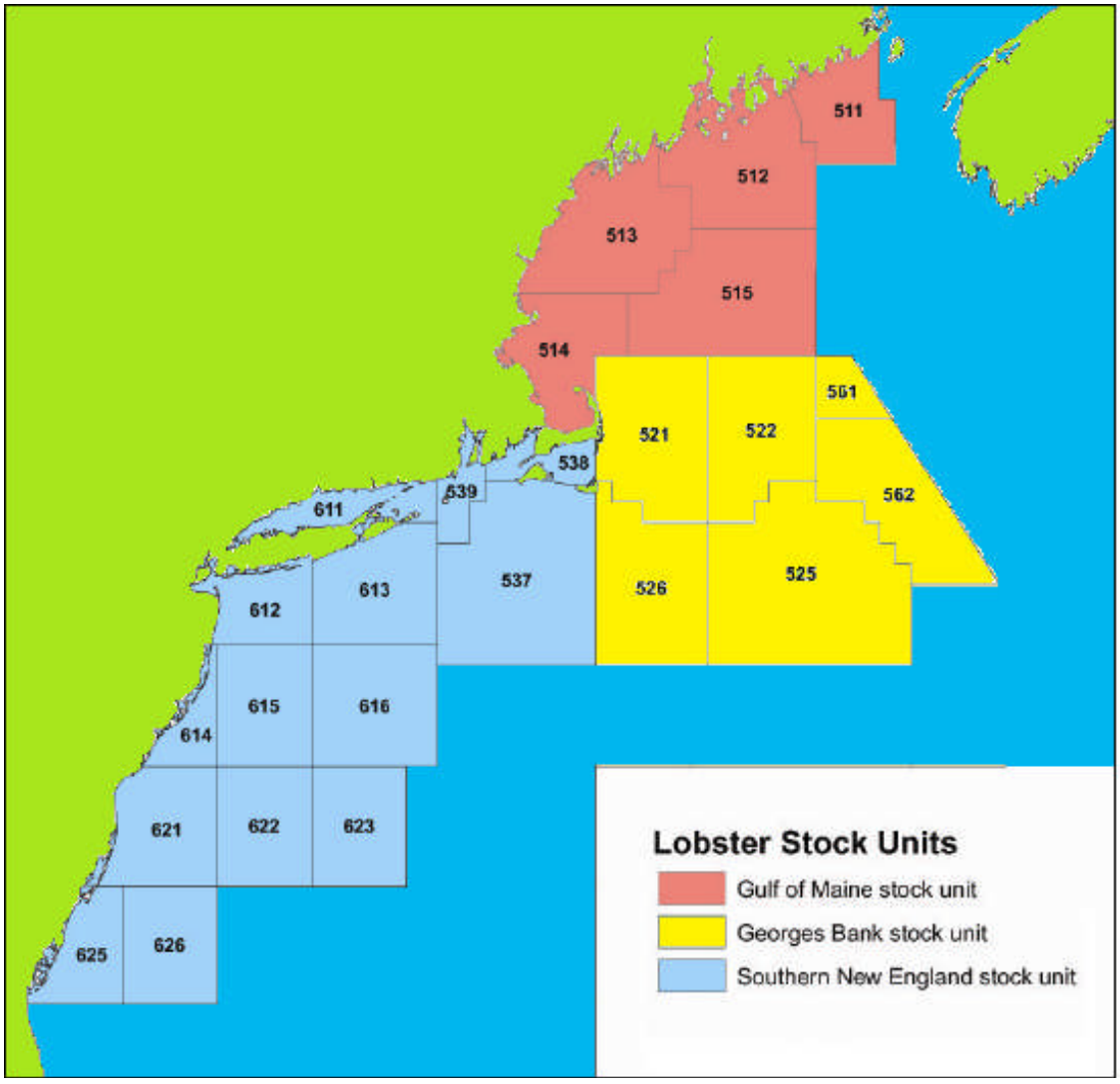


Figure 1. The American lobster stock units: Gulf of Maine; Georges Bank; and Southern New England and National Marine Fisheries Service (NMFS) statistical reporting areas (adapted from ASMFC 2009)

The fishery being considered under this assessment is that portion of the Gulf of Maine stock fished by commercial vessels licensed by the State of Maine in the area designated as Lobster Conservation Management Area 1 (LCMA 1) by the Atlantic States Marine Fisheries Commission (ASMFC) (see Figure 2). This comprises parts of the National Marine Fisheries Service (NMFS) statistical reporting areas 511, 512, 513, 514 and 515, and the northwestern corner 467 (Cobscook Bay). While comprehensive data for all reporting areas are available only through 2007, more recent data for the area under assessment are available through the state of Maine's annual landings program. Maine state landings have risen from 64 million pounds worth an estimated $281 million (2007) to 96 million pounds worth an estimated $318 million (2010).

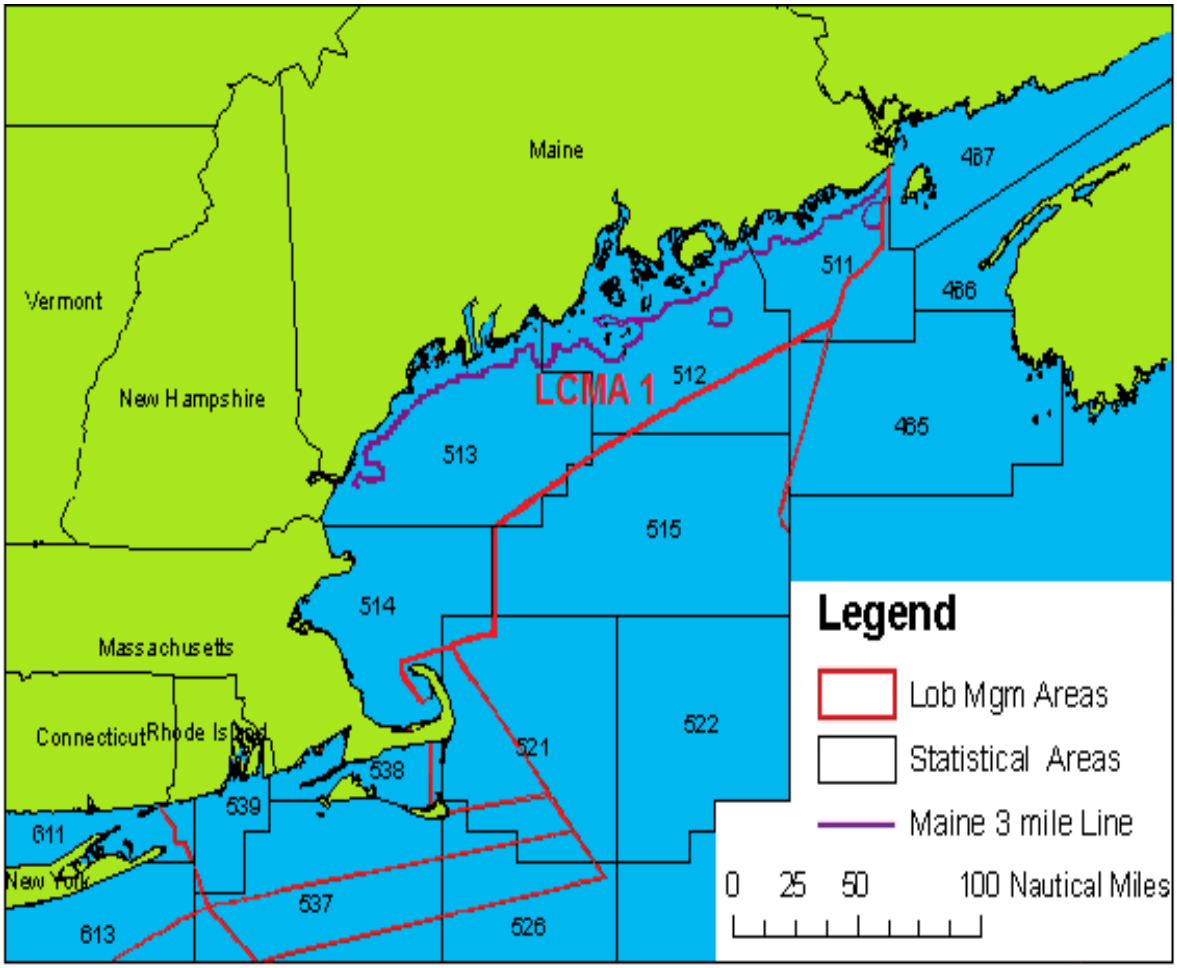


Figure 2. Lobster Conservation Management Area 1 (LCMA 1) (adapted from Wilson 2007)

The Gulf of Maine supports the largest US fishery, constituting 76% of US lobster landings between 1981 and 2007, compared to 19% from Southern New England and 5% from George's Bank. From 1981 to 1989 Gulf of Maine landings were stable and averaged 14,600 t, but then increased dramatically from 19,200 t in 1990 to 37,300 t in 2006. The average was 33,000 t from 2000-2007, with a time series high of 37,297 t in 2006. The increase in landings in the Gulf of Maine was dominated by catches from the state of Maine, particularly from the mid-coast portion of the state. In Maine landings tripled between 1981 and 2003 and have remained high since this time. The period from 2004 to 2007 accounted for the three highest landings values in the time series (ASMFC 2009a: 23) (see Figure 3). As shown in Figure 3, Maine landings have increased each year since then.

In recent years a large percentage of Maine lobster has gone to canneries, which have largely relocated to Atlantic Canada. This is predominantly new-shell lobster that cannot withstand long distance shipping to Maine's hard-shell customers. The majority of Maine's hard-shell lobsters are shipped live to the Europe, Florida, the West Coast of the U.S., and to major retail and restaurant chains such as Wal-Mart, Kroger's, and Red Lobster. Many are shipped to wholesalers in Boston and New York City.

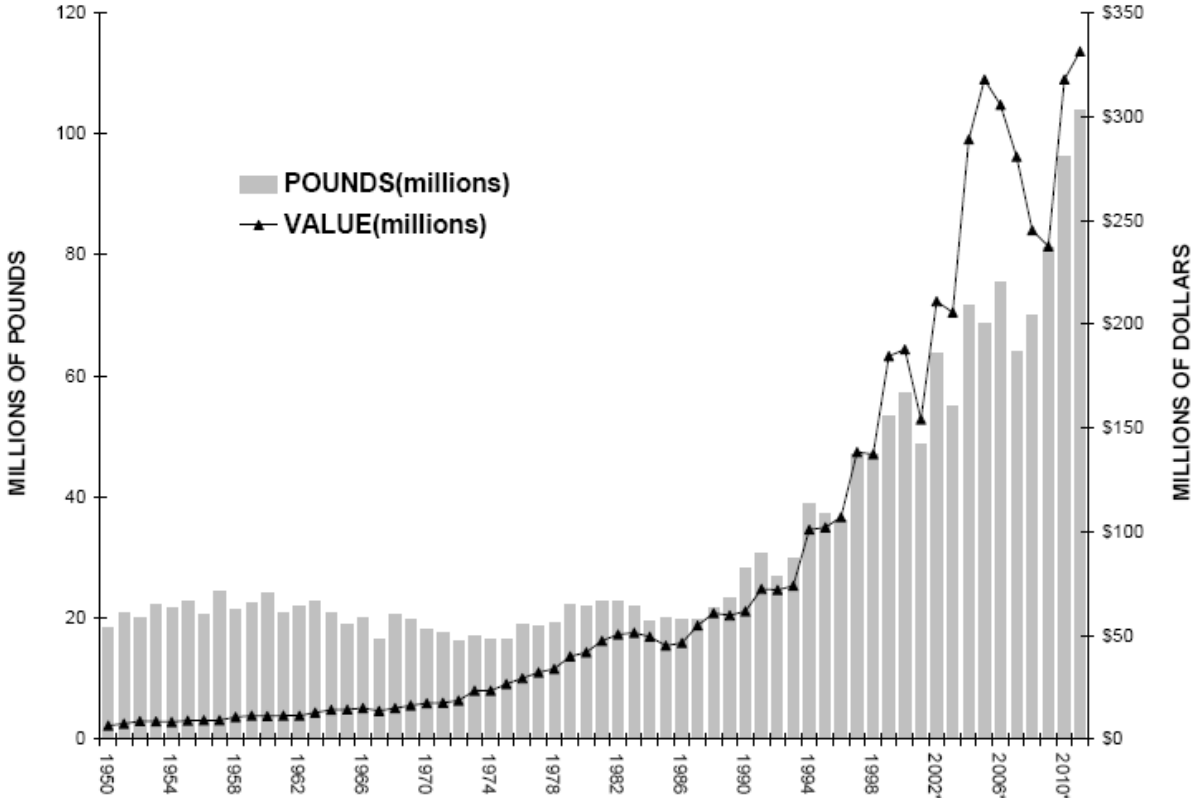


Figure 3. The quantity and value of American Lobster landed to the State of Maine
Source: http://www.maine.gov/dmr/commercialfishing/historicaldata.htm

3.11 The Maine lobster fleet and gear description

This Maine lobster fleet is comprised mainly of small vessels (22-42 feet) operated by one or two people that make day trips in state waters (i.e. ≤ 3 miles from baselines), near shore waters (>3 miles and < 12 miles) and offshore waters (> 12 miles) from numerous small ports that are scattered along the coastline and islands of Maine. Historically lobster fishing has been a seasonal activity, combined with other fisheries, and although lobster fishers have become more specialized, lobstering retains a strong seasonal pattern, with more activity in the 3rd and 4th quarters of the year (Gulf of Maine Research Institute 2008), although there is considerable variation. Within Maine, those in the "downeast" region have more seasonality than those in the southern part of the state. The landings pattern closely follows seasonal increases in temperature leading to the summer molt. The fishery capitalizes on the summer inshore molt and pursues these lobsters further offshore in the fall and winter. The winter fishery is limited by falling water temperatures, inclement weather and the remaining availability of lobsters (Wilson 2007). Because of the seasonal nature of the fishery, the relatively small vessel size and permit endorsement, the distance the fleet operates from their home port means the Maine fishery does not extend to the full southerly extent of LCMA 1.

In 2010, the State of Maine issued 6,150 commercial lobster licenses. Approximately 20% (1,235) of

these licence holders have a Federal permit endorsement to fish beyond Maine's 3 mile limit in LCMA 1. Of the federal permitted vessels less than 10 have qualified and elected to fish in Area 3 (defined by the 25600 Loran line running approximately parallel to Maine's shoreline, ~40 nautical miles from shore) (Wilson 2007). In 2010, only two Maine fishermen elected to fish in Area 3 (personal communication with Ann Tarr, DMR licensing manager, 2011).

The number of licensed lobstermen in the State of Maine has not increased, even since the 1950s (Acheson 2003: 16) and the present number of licenses is actually lower than the average of 6,721 of the period 1950-2000 (Acheson 2003: 16). In contrast, the fishing effort employed by the Gulf of Maine inshore/nearshore lobster fleet has grown significantly, as has dependence on the lobster resource, as other fisheries have declined and access to them has become tightly controlled (Gulf of Maine Research Institute, 2008). "It is believed that many fishermen who previously targeted lobsters only part-time, or not at all are now exclusively dependent on the lobster resource" (Gulf of Maine Research Institute, 2008, pg 8). It is widely agreed that the increase in landings over the last two decades was fuelled by a major increase in effort. According to the ASMFC (2009a), the number of traps fished in the Gulf of Maine was fairly stable between 1982 and 1993, averaging approximately 2.3 million traps. However, from 1993 to 2002 the number of traps fished in the Gulf of Maine increased substantially, and in 2007 the state issued approximately 3.18 million trap tags. In 2010, this number had fallen to 2.95 million trap tags. The reduction is the result of a limited entry program that allows one new entrant, capable of fishing a maximum of 800 traps, for every 2400 to 4000 tags (number varies by zone) not renewed in the previous year.

Today most lobster traps - also known locally as "pots" - used in Maine's fishery are constructed of plastic coated wire. They usually have two funnelled openings called "heads", through which lobsters enter the first compartment commonly called the "kitchen" to feed on the bait – usually herring. After feeding, lobsters may venture through the inner funnel or parlour head into the compartment called the "parlour". The traps are required to have unobstructed vents or gaps in the parlour section to allow undersize lobsters to escape. These may be rectangular or circular. The trap must also be equipped with a biodegradable panel – or "ghost panel"- which is designed to release lobsters from traps which are lost while fishing. Often times, the ghost panel and escape vent are combined into one unit by using ferrous metal rings to hold the plastic escape vent in place. The design of the trap is specified in regulation (5.4.2.2.).

Traps account for more than 98% of the lobster fishery. Lobsters are also taken as a bycatch with otter trawls and gillnets but may not be landed in Maine. Recreational fishing occurs, especially in coastal waters, but only limited estimates of the catch are available. In 2010, a landings program sampling 10% of all Maine lobster license holders identified 37,016 pounds of lobster being landed for "personal use" (numbers are actual, not expanded). In Maine a maximum of 5 traps is permitted for recreational fishing. In New Hampshire and Massachusetts the limit is 10.

Trap limits are in place within the fishery with a maximum of 800 traps being applied.

There is considerable latent effort in the region's lobster fisheries, as measured by license holders who landed less than 1,000 pounds in 2005 (Gulf of Maine Research Institute, 2008). Latent effort is far less in Maine than in other areas. Data for Maine are reported by state zones A-G (see section 5.3.3.2), which ranged from 11 to 20% of latent effort in 2005; in contrast, the New Hampshire component of LCMA 1 was 70% and the Massachusetts component was 61% (Gulf of Maine Research Institute, 2008, pg 21). In 2010, there were 5,977 commercial licenses issued, of which 4,276 were active and 1,701 were inactive. These individuals were allocated 3.01 million trap tags, of which 2,553,600 were fished (Jensen et al, 2011, citing Wilson's analysis of 2010 dealer reporting data).

Photo 1. Typical Maine lobster fishing vessels (Source: Suellen Hathaway)

Photo 2. A regulation lobster trap, with the funnelled opening on the left hand side of the trap, in the middle can be seen the funnel that leads to the parlour. An orange plastic rectangular escape vent can also be seen on the bottom right side of the trap.

4 STOCK ASSESSMENT

4.1 Stocks assessment units and documentation

The Gulf of Maine American lobster stock is one of three identified stocks off the northeast coast of the United States, the others being Southern New England and Georges Bank, as described on p16 of ASMFC 2009a and shown in Figure 5 below. The Gulf of Maine and Southern New England stocks are primarily inshore, and the Georges Bank stock is offshore. The demarcation of these stocks was changed in 2006 (ASMFC, 2006) following a review of distribution and life history characteristics and this change has been maintained in the 2009 assessment (ASMFC 2009a).

The ASMFC undertakes the stock assessment through the American Lobster Stock Assessment Sub-Committee. To facilitate their work the Intertek Moody Marine Assessment team had access to the 2009 Draft American Lobster Assessment for Peer Review (ASMFC 2009a), the 2009 Advisory Report to the Peer Review (ASMFC 2009b), and the 2006 American Lobster Stock Assessment Report for Peer Review (ASMFC 2006a). To underpin the text in the scoring tables for Principle 1, this section summarises key features of lobster data collection and monitoring, biological information, assessment of stock status, and management advice from the 2009 assessment, for the Gulf of Maine stock.

4.2 Data collection and monitoring

The lobster fishery is monitored and the stock assessed using a combination of fishery dependent and fishery independent data collected by the states of Maine, New Hampshire and Massachusetts, and by the National Marine Fisheries Service (NMFS), as described in Section 5 of ASMFC 2009a, and summarised below.

4.2.1 Fishery dependent data

- **Landings and effort**
  - Maine - NMFS compiles reports of landings by federally permitted dealer. At the State level, dealer reports were voluntary up to 2004, when monthly landing and transaction data became mandatory. In 2008 100% dealer reporting became mandatory, and a minimum of 10% of harvesters must report catch and effort in logbooks.
  - New Hampshire - NMFS compiles mandatory reports of data from federally licensed vessels. The State instituted mandatory reporting of annual landings from all harvesters from 1969-85. From 1986-2005 trip level landings and effort were collected from a random selection of harvesters and all new entrants. From 2006 all harvesters must report monthly trip level data if they land > 1000lb of lobster. Harvesters can participate voluntarily in electronic harvest reporting.
  - Massachusetts - The State requires annual returns of monthly catch and effort for reporting areas consistent with NMFS reporting areas.
  - Recreational catch is collected by Maine, New Hampshire and Massachusetts, but is small.

- **Discards/by catch**
  Limited information is collected on regulatory and market driven discards based on sea sampling and targeted studies.).

- **Biological sampling**
  The following port and sea-based programmes contribute to the assessment of catch per unit effort (CPUE) and the estimation of catch at length by sex and maturity stage:
  - NMFS, through the New England Fisheries Science Center (NEFSC) Observer

programme, since 1991. Relational database of catch, effort, and a full array of biological data by location/depth strata on a trip basis, mainly summer.

- NEFSC Port sampling, since 1983. Targets 50 trips distributed across Gulf of Maine, Georges Bank, and Southern New England, mainly in summer.
- Atlantic Offshore Lobsterman's Association, since 2001. Voluntary sampling at sea on 20 vessels. Biological data by location/depth strata for standard trawls of 40 traps, once a week, 10-11 months a year.
- Maine Department of Marine Resources (DMR) programme. Since 1967, port samplers select at random 10 days per month April to December to survey dealers who buy from => 5 fishers. Catch, effort, and 10 lobsters are measured from each boat. Since 1985, observers sample at sea on lobster boats from May-November, and undertake a limited programme in winter. The programme collects biological data, plus disease data since 2003.
- New Hampshire. Since 1991, observers sample at sea from May to November for catch, effort and biological data. Since 2005 port sampling has collected CPUE, and biological data for 100 lobsters, for six samples a month from May to November 4 from state and 2 from federal waters.
- Massachusetts. Since 1981, at sea sampling collects CPUE, & biological data from 600 lobsters per trip, at least once a month from May to November for six areas covering Gulf of Maine, Georges Bank, Southern New England. There is also a newly instituted port sampling program that collects information from 600 lobsters per trip.

4.2.2 Fishery independent data

- **Trawl surveys**
  - NMFS (NEFSC). Spring and fall surveys are carried out by standard vessel and trawl with liner using a randomised depth-stratified design with variances. The number of hauls is proportional to stratum area (1x30-minute tow per 260 nm^2). Lobster data from the fall survey have been used since 1982.
  - Maine / New Hampshire. Since 2000 there has been a joint Maine New Hampshire Fall inshore depth stratified standardised bottom trawl survey out to 12 miles, modelled on NEFSC pattern. 1x 20- minute standard tow per 40 nm.
  - Massachusetts. Since 1978 there have been spring and fall randomised depth stratified standardised bottom trawl surveys in territorial waters. 1x 20-minute tow per 19 nm^2.

  Abundance indices are calculated as: standard delta mean catch per tow at length by sex for Gulf of Maine for NEFSC, Massachusetts surveys, and the geometric mean catch per tow by sex for Maine / New Hampshire.

- **Ventless trap survey (2006 - 2011)**
  ASMFC has funded a time-limited study that is randomised and stratified by depth and statistical area. Commercial fishers are contracted to fish with a 6-pot trawl or 2 trawls of 3 pots, with alternate vents or no vents. These were worked at fixed stations twice per month with 3-day soak between hauls, from June to August to cover the moulting period. Stations were selected at random per area at the start of the year. At-sea samplers recorded catch, effort, and biological data.

- **Settlement indices**
  To produce long-term trends (Palma et al 1999, for Maine), stage IV lobsters are sampled in the plankton by neuston nets, and in standardised quadrats on cobble substrate by divers using suction samplers. The quadrants produce a standard settlement index (Wahle and Incze 1997) for the mid-coast of Maine and other areas along the US coast (See Section 3.8 and Section 4.3.5 in this Report)

4.3 Biological information for stock assessment.

A large literature provides a comprehensive overview of all aspects of the general biology, life history and demography of the lobster, as briefly outlined in Section 3. The lobster is notable for substantial spatial heterogeneity in biology and dynamics, caused by regional differences in temperature and light regimes that influence the timing and duration of local production and life history events, and by regional oceanographic and habitat patterns that affect distribution, settlement and survival. Local habitat also crucially affects the behaviour of individual lobsters, their accessibility to fishermen, and their catchability by traps, thus affecting biological sampling results (Geraldi et al 2009). Consequently local data are important for stock assessments, and the Gulf of Maine is well served in this respect (ASMFC, 2009a).

4.3.1 Growth

To facilitate size-based assessments, growth parameters convert numbers at length into numbers over time, in order to calculate mortality rates. Regional estimates of moult increment and moult probability for Gulf of Maine, Southern New England and Georges Bank are based on the literature and local field data using traditional data and methods (p 6-9 ASMFC 2009a). The assessment uses moult probability functions first used in the 2000 assessment (ASMFC, 2000), and moult increment functions revised in the 2005 assessment (ASMFC 2006a).

The results of new research on lobster aging in Europe and the US (p6 in ASMFC 2009a) were summarised in Section 3.6 of this Report. They show that lobster longevity is extreme (e.g. 70+ years in large lobsters in eastern England), that length is a very poor predictor of age, and that the recruit size class must contain several cohorts. Age slicing of length based models could therefore produce biased results, but since lipofuscin aging is not yet routine the present assessments must continue to use length based models run with conventional growth parameters.

4.3.2 Maturity

This is modelled as a logistic fit to field data on the proportion mature at size, although for female lobsters these data may be biased by the regulations protecting eggers and v-notched females. Maturity staging is based on ovarian dissection and cement gland staging. In Gulf of Maine, data were combined from three sub-areas by weighting them using the 1984-1994 landings for each area. The mean size of first maturity in Gulf of Maine is about 90mm CL (p 10-12, and Figure 7.2.1.10 in ASMFC 2009a)

4.3.3 Fecundity

There is an extensive literature on fecundity for numerous lobster areas, including that by Estrella and Cadrin (1995), who summarised data from Canada and from their own collections in coastal Massachusetts. The most extensive data on fecundity were originally collected by Herrick (1896), whose results were almost identical to those collected by Estrella and Cadrin (op cit). The 2009 assessment therefore used the Estrella analysis of Herrick's data. Fecundity increases exponentially from approximately 17,000 at 100 mm CL to 220,700 at 200 mm CL. (p12 ASMFC 2009a)

4.3.4 Natural mortality

Based on the background outlined in Section 3.5 of this Report, base-case runs of the assessment models have assumed that M= 0.15 for all recruit and legal sized lobster (Fogarty and Idoine, 1988, ASMFC 2006a), but runs have also been made with higher M values to explore the effect of taking into account periodic mortality incidents observed in recent decades, and the growing prevalence of shell disease in the more crowded inshore fishing areas (p16-17 ASMFC 2009a).

4.3.5 Predicting recruitment

As noted in Section 3.8 of this Report, long-term studies of newly settled lobster life history stages in the Gulf of Maine aim in the long term to predict recruitment to the trap fishery (Wahle, Incze & Fogarty, 2004, Incze et al, 2006). For current assessments, the key feature of this work is the collection of standardised quantitative estimates of young-of-year settlement at a string of coastal sites in the Gulf of Maine using diver-based suction sampling and passive collectors, in order to produce a time series of coastal settlement indices (e.g. (Wahle & Steneck, 1992, Wahle and Incze, 1997; Wahle and Wilson, 2001). This time series will hopefully provide an early warning of any reversal in the current regime of high recruitment. Supporting information on the catch per effort of sub-legal lobsters has been collected by the ventless trap surveys noted under Section 4.2.2.

4.4 Assessment models

As described in Section 6 of ASMFC 2009a, length based models have been used to assess the American lobster stock at regular intervals (1996, 2000, 2006, 2009), and these assessments have all been peer reviewed. The model used has changed over time from the traditional length cohort analysis model with yield per recruit and egg per recruit outputs used in 1996 and 2000, to the Collie-Sissenwine Model ('CSM') used in 2006 and 2009, and the University of Maine developed length-based model ('UMLBM') used in 2009 as the basis for the current advice to managers. The overlap in CSM model usage between 2006 and 2009 provides some continuity of interpretation.

The CSM model assesses the fishery using the change in abundance between two size classes (new recruits and post-recruits) and the conduct of the model is described in Section 6.1 of ASMFC 2009a. It provides estimates of recruitment, total abundance (recruits plus post-recruits), and fishing mortality F. The CSM model was fit to landings and fall survey data.

The UMLBM is a catch at length projection model whose use is described in Section 6.2 of ASMFC 2009a. It uses size-transition matrices to represent growth. As configured in 2009 it provides estimates of recruitment, a 'reference abundance' (the number of lobsters of 78+ mm CL on 1 January, plus the recruits that enter the 78 mm length group during the year), spawning biomass, and the 'effective exploitation' E (=catch number /reference abundance). Instantaneous fishing mortality F is potentially available from the model but has been replaced in the stock assessment report by E as being notionally more understandable by fishers. The UMLBM model assumes that there is a single well-mixed stock but it incorporates heterogeneity among surveys by generating a size-based selectivity for the different survey areas. The model is similar to that used for lobsters in New Zealand (Breen et al 2000) and for sea scallops off the north-eastern US (NESFC 2007). A preliminary version of the model (Chen et al 2005a) was presented and reviewed in the 2006 assessment (ASMFC 2006a). The configuration of the model is described in detail in Section 6.3 of ASMFC 2009a.

The models are run using size distributions raised to total Gulf of Maine landings derived from the monitoring and biological sampling data, and are tuned using survey data sets, weighted in the case of the UMLBM by landings from the surveyed sub-areas. Model outputs were tested for uncertainty in the parameters by using alternative runs and assumptions to compare against the base case. Results were also subjected to a 7-year retrospective analysis, which shows that the models tend to overestimate F and underestimate abundance in the most recent year. This is common to many assessments elsewhere, and is a bias that is, in effect, precautionary.

The CSM and UMLBM models simulate the dynamics of the whole lobster stock (i.e. not just one cohort) over time, and therefore provide information about variation and uncertainty, in comparison with the traditional length cohort yield per recruit and egg per recruit model ('life history model') which simulates the dynamics of a single cohort under nominal equilibrium conditions (constant recruitment and mortality) that are unlikely to be met in practice, and which does not permit the calculation of variances.

The trends in key outputs from the base case runs of the CSM and UMLBM are shown in, respectively, Figures 7.1.1.1 and 7.2.1.12 of ASMFC 2009a.

4.5 Evaluating stock status using stock indicators and reference points

A new stock determination criterion was introduced in 2010, i.e. post site visit. A description of the changes leading up to these from 2006 through 2009 has been included below in order to show that the reference point system is reviewed regularly and changed in line with the findings of the review.

4.5.1 Previous US lobster reference points

Prior to 2006, the status of US lobster stocks was defined by comparing egg-per-recruit at the current harvest rate (fishing mortality) to an overfishing criterion defined as 10% of the egg production from an unfished population (F10), as specified in Amendment 3 to the American Lobster Fishery Management Plan (ALFMP) (ASMFC 1997). F10 is one of a suite of traditional 'life history' reference points that also include F_{max} and $F_{0.1}$ (Fogarty and Gendron, 2004), and it was also used previously in Canada (FRCC 1995). It has since fallen out of favour because of the lack of a clear biological meaning for stakeholders, the difficulty of estimating the effect of uncertainty, and the likely violation of the equilibrium assumption inherent in the underlying cohort analysis model (FRCC 2007, and ASMFC 2009a).

Since 2006 a trend-based approach has been adopted, using stock indicators and reference point values derived from the time series of outputs from assessment models. Stock indicator values averaged across recent years are compared to threshold (limit) and target reference values derived from the time series of stock indicator values for a historical reference period. The evolution of this approach over time is as follows:

- 2006.
  Addendum VIII of Amendment 3 to the American Lobster Fishery Management Plan (ASMFC 2006c) described the weaknesses of the F10 approach and specified that stock status should be determined using the mean abundance and mean fishing mortality (F) for sexes combined for the most recent three years, and comparing these to new threshold (limit) and target reference values. The proposed thresholds were the median abundance and median F for the reference period 1982-2003 (Gulf of Maine and Georges Bank) or 1984-2003 (Southern New England). The proposed target reference values were a minimum of one estimated standard error from the median, to allow for measurement error in estimating the recent abundance and F. The stock would be 'overfished' if current mean F exceeded the threshold, and 'depleted' if current mean abundance was below the threshold. This approach was recommended by the 2006 American Lobster stock assessment (ASMFC, 2006), which used outputs from the CSM. Because of concern that the reference period comprised a relatively limited and recent trend, the stock assessment also examined trends in a comprehensive suite of indicators for the same period, comprising empirical measures of mortality, abundance and fishery performance (See Section 4.5.3).

- 2009
  The 2009 American Lobster stock assessment adopted the newly developed UMLBM and its outputs for reference abundance and exploitation rate, E. It proposed comparing the 2005-2007 mean abundance and mean E to new threshold reference values calculated as the median reference abundance and median E for 1982-2003. The principle is the same as that proposed in 2006, but the data were the UMLBM outputs, although for comparison the 2009 stock assessment report also contained updated CSM outputs, plus the suite of empirical indicators (see Section 4.5.3).

  Although this approach was recommended by the Technical Committee, the 2009 Peer Review Panel considered that a median threshold abundance was inappropriate because by

definition 50% of the values will fall below the threshold even in a well-managed fishery. The Panel accepted trend-based reference points as an interim measure until appropriate biologically-based reference points can be developed, but proposed that the median values should become targets, and that the threshold reference points should be, respectively, half the median abundance, and the 90th quartile of the 1982-2003 values of E (ASMFC 2009b).

- 2010
  Lobster reference points were discussed further with stakeholders at a Gulf of Maine Lobster Foundation lobster summit in January 2010, leading to proposals for a 'stop-light-approach' based on percentiles of the statistical distribution of reference abundance and E estimated for the historic reference period. The American Lobster Board requested the Technical Committee to review these proposals, leading to formal proposals described in Technical Committee Memorandum 10-034 of April 2010 (ASMFC 2010a), and adopted as the current proposed reference point framework in Section 4 of Addendum XVI to Amendment 3 of the ALMFP (ASMFC 2010b). Both documents describe the previous history in their preambles.

4.5.2 The current reference point framework

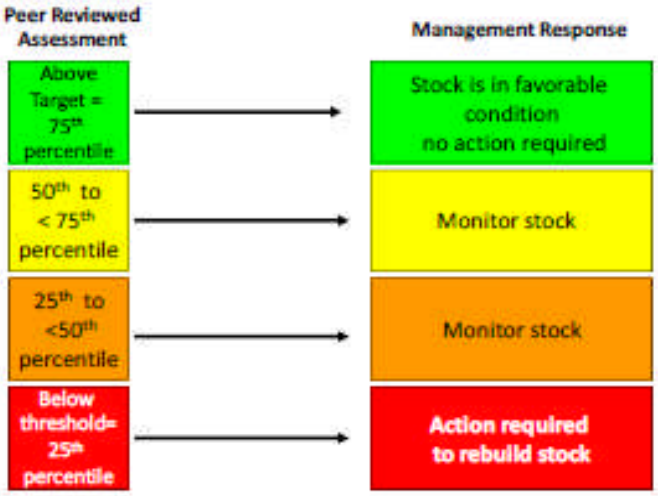
Based on the previous paragraph, Addendum XVI means that the time series of outputs from an assessment model will be used in conjunction with the 'stop-light-approach', as outlined below, and illustrated by tables copied over from Addendum XVI (ASMFC 2010b)

a) Reference abundance and exploitation rate E for the three most recent years will be averaged and compared to percentiles in the statistical distribution of these indicators for the historical reference period 1982-2003.

b) If model *abundance* is less than the threshold 25th percentile of the distribution, the stock will be regarded as depleted, and in the red zone that requires immediate management action.

   If model abundance is at or above the target 75th percentile, the stock will be regarded as being in a favourable position in a green zone where no action is required.

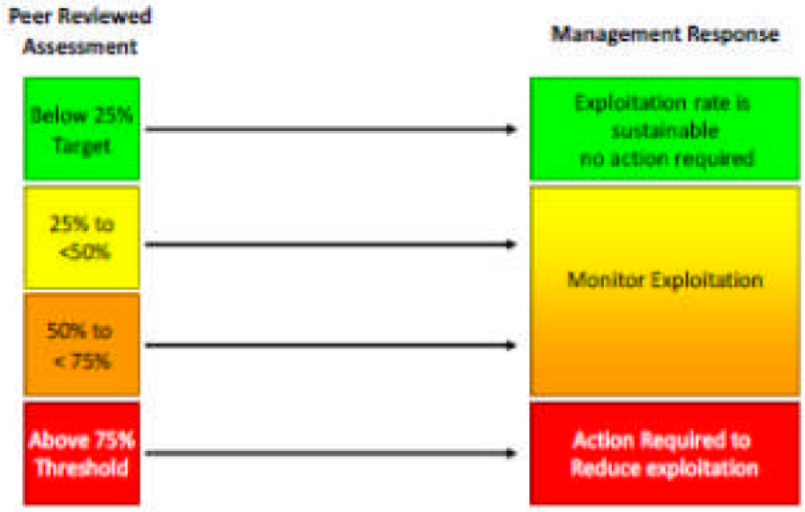
   If model abundance is between the 25th and 75th percentiles, it will either occupy the orange zone (25th to < 50th percentile) or the yellow zone (50th to < 75th percentile), where actions will be triggered if indices of spawning stock or recruitment are below their 25th percentile in the last three years.



c) If model *exploitation rate* is above the threshold 75th percentile of the distribution the stock will be regarded as overfished, and in the red zone where action will be required to reduce exploitation

If model exploitation rate is below the target 25th percentile of the distribution the stock will be in a favourable condition in the green zone where no action is required.

If model exploitation rate is between the 25th and 75th percentiles of the distribution it will either be in the orange zone (50% to < 75%) or yellow zone (25% to < 50%), but as these zones are below the threshold, action to reduce exploitation will only be taken if abundance is also below the target abundance (the 75th abundance percentile).



4.5.3 Empirical indicators

The 2009 Stock Assessment Report listed the 17 fishing mortality (3), abundance (6) and fisheries performance (8) indicators shown below, comprising empirical indices that are independent of the two assessment models. The annual value of these indicators was categorised as negative, neutral or positive based principally on their quartile ranking (the designation was slightly different for sex ratio). Status was assessed from the 2005-07 average of the indicator value (pp 82-86 in ASMFC 2009a). The aim of this approach is to provide a wide range of empirical information that can be used to provide additional perceptions about stock trends and stock status for comparison with the outputs from the assessment models.

Mortality	Abundance	Fishery Performance
Exploitation Rate	Spawning stock abundance	Effort (trap number)
Median Length > 77mm	Full recruit abundance	Landings (pounds)
Recruits as % of exploitable stock	Recruit abundance	Median length
	Sex ratio (full recruits)	Gross CPUE (pounds/traps)
	Sex ratio (recruits)	Set over days
	Recruitment indices	Price per pound
		Revenue
		Revenue per pound

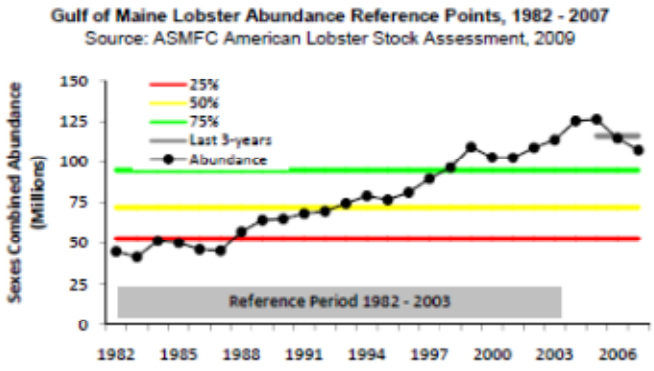
4.6 Productivity, stock indicators and current stock status

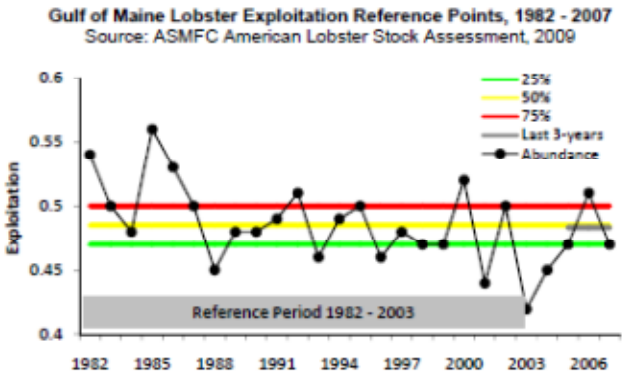
4.6.1 Productivity

Productivity of the North American lobster fishery was low for a prolonged period in the past, but is now very high. Landings from the Gulf of Maine, which comprise most of the lobster landed from US coastal fisheries, oscillated without trend around 20 million pounds (9000 mt) up to 1990, but have since increased almost five-fold to peak at around 95 million points (43000mt) in 2010 (Figure 3).

4.6.2 Stock indicators

The most recent determination of stock status for the Gulf of Maine, current as of January 2012, is illustrated below using trend data presented in the stock status section of the ASMFC website. The stock indicators are outputs from the UMLBM described in the 2009 American Lobster stock assessment (ASMFC 2009a), and the graphs compare the 2005-2007 average reference abundance and E for sexes combined to the four-tier reference criteria described in Section 4.5.2.





4.6.3 Abundance

Reference abundance (lobsters of 78+ mm carapace length (CL) on 1 January, plus the recruits into that size range during the year. 78 mm CL is the start of the size group containing the 81mm CL minimum landing size.) increased from 45 million in 1982 to a peak of 126 million in 2005 then declined to 113 million in 2007. Mean 2005-2007 reference abundance is well above the target 75th percentile derived from the 1982-2003 reference period, and is therefore in the green zone. The stock is not depleted, and if this reference point approach is accepted no management response is required.

4.6.4 Exploitation rate

From 1982 to 1987 exploitation rate E fluctuated around the 75th percentile threshold, but from 1988 it has fluctuated mainly below the 75th percentile threshold, with little trend., and has fallen below the 25th percentile target on several occasions. Currently, $E_{05\text{-}07}$ falls between the 25th and 50th percentile, but as the abundance level is favourable this does not trigger management action.

4.6.5 Stock status

The current evaluation of stock status based on the 2009 UMLBM and the Addendum XVI reference criteria therefore indicates that the Gulf of Maine stock is neither depleted nor overfished.

4.6.6 Spawning biomass and recruitment

UMLBM estimates for female spawning biomass and for recruitment are listed in Table 7.2.1.3 of the 2009 Stock Assessment Report (ASMFC 2009a). Spawning biomass follows a similar trend to the reference abundance, increasing from 3417 mt in 1987 to a 2005-2007 mean of 9242 mt. Recruitment increased from 18.4 million in 1985 to a peak of 117.6 million in 2007.

4.6.7 Empirical indicators

For the record, the 2009 Stock Assessment found that the empirical indicators for mortality were mostly neutral i.e. no trend (Table 7.5.2.1.1 in ASMFC 2009a); the abundance indicators were mostly positive or neutral i.e. stable or increasing (Table 7.5.2.1.2 in ASMFC 2009a); and the fishery performance indicators were mainly positive i.e. increasing (Table 7.5.2.1.3 in ASMFC 2009a).

4.6.8 Other stock determinations

For the record, the 2009 Stock Assessment Report evaluated stock status using the original 2006 - 2009 reference point criteria (the threshold is the median of the historical reference period), and outputs from both the CSM and the UMLBM. Both models describe a long term upward trend in abundance, but the details differ for the most recent three years, and there are differences between the trend in F and E from the CSM (upward in recent years) and the trend in E from the UMLBM (fluctuating without trend). Using these outputs and criteria the 2009 Report found that the Gulf of Maine stock was not depleted but was overfished.

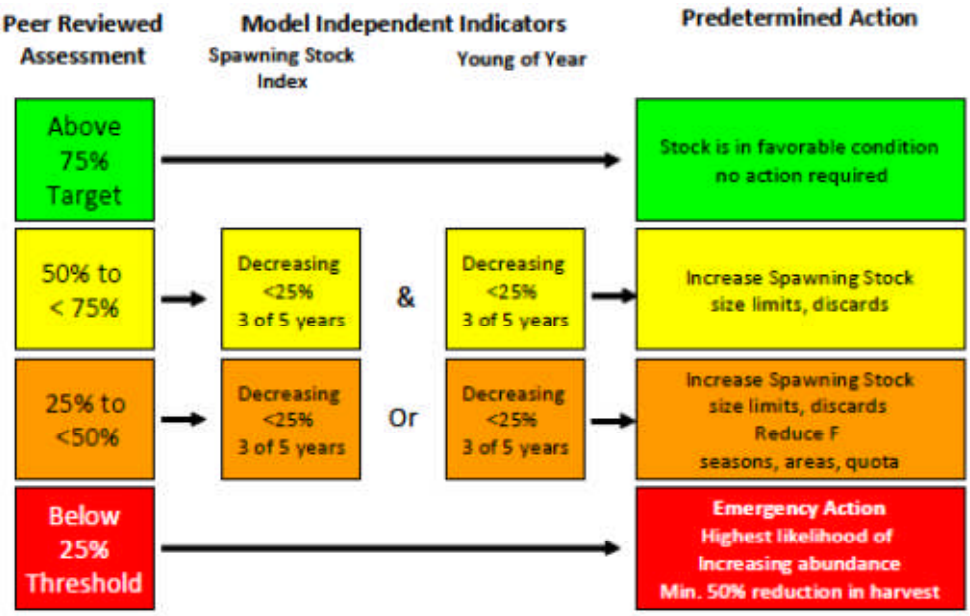
The 2009 Stock Assessment also calculated the values of E equivalent to F_{max} and $F_{0\,1}$ on a Gulf of Maine lobster yield per recruit curve, and $F_{10\%}$ and $F_{20\%}$ of the virgin stock maximum on the egg production per recruit curve (Table 7.2.1.4 and Figure 8.2.1.1 in ASMFC 2009a), for comparison with the $E_{05\text{-}07} = 0.48$ calculated by the UMLBM. Although this is not part of the current assessment procedure it is noted for the record that $E_{05\text{-}07}$ exceeds all the notional per recruit reference values, and would characterise the stock as ovefished by the pre-2006 definition, and exploited above the traditional yield per recruit criteria for optimal harvesting. This is useful information for comparison with other lobster fisheries where trend-based reference points are not used.

E at F max (YPR)	Both sexes	0.34
E at F 0.1(YPR)	Both sexes	0.17
E at F 10% (BPR)	Female	0.30
E at F 20% (BPR)	Female	0.20
$E_{05\text{-}07}$		0.48

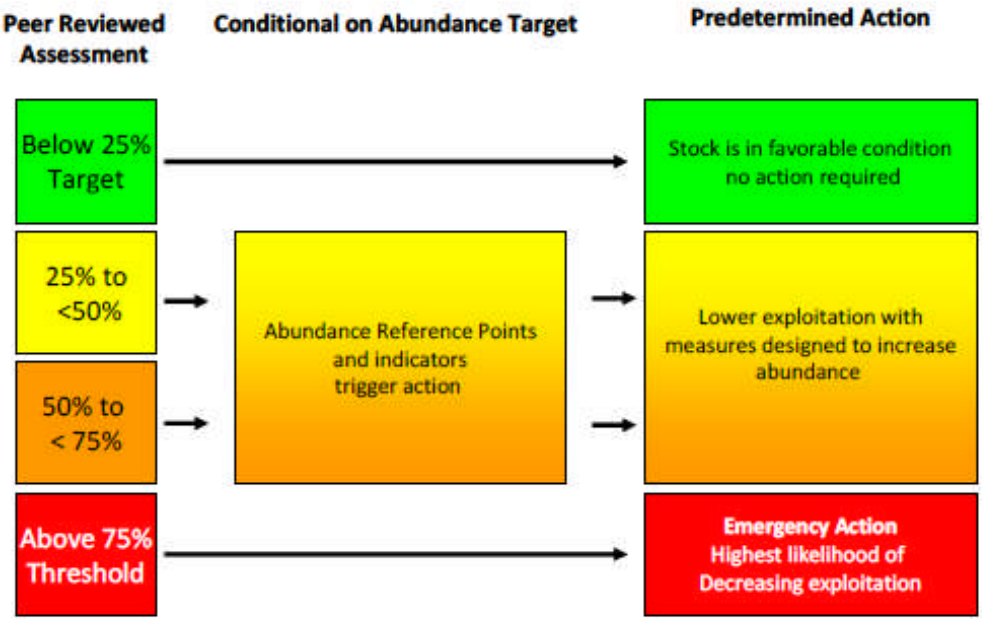
4.5 Management actions

In Technical Committee Memorandum 10-034 (ASMFC 2010a) the reference point proposal assigns predetermined management actions to each quartile of the new framework, as shown below. These can be regarded as analogous to control rules, since they identify the stock or fishery attribute that will feature in the management response, but for institutional reason they do not define or quantify the precise nature of the regulation to be implemented, since the US fisheries management framework requires detailed consultation between managers and stakeholders on a case by case basis.

4.7.1 Abundance reference point and proposed management actions



4.7.2 Exploitation Rate reference point and proposed management actions



4.8 The recruitment regime shift

Since the 1980s the exploitation rate has fluctuated with very little trend, but recruitment and abundance have increased several-fold from a historical low to a high level. Although the causes of this are not fully known it is felt that the current stock and recruitment domain is most likely to be the

result of trophic or environmental change. The assessment model and the trend-based reference points show that the Gulf of Maine stock is currently healthy, but as the 2009 Stock Assessment Report (ASMFC 2009a), the Advisory Report to the Peer Review (ASMFC 2009b) and Technical Committee memorandum 10-034 all make clear, “this is so only if the reference period for the reference point calculation captures the potential of the stock in the future. The current levels of fishing effort and harvest will not be sustainable if the stock returns to a lower recruitment and production” (ASMFC 2009b).

5 FISHERY MANAGEMENT FRAMEWORK

5.1 The Fishery Management Plan

Since 1997 American lobster in U.S. waters are managed under Amendment 3 to the ASMFC Interstate Fishery Management Plan (IFMP) for American Lobster, as well as Addenda I through XIV to the Plan. The management unit is the entire Northwest Atlantic Ocean and its adjacent inshore waters where lobster is found from Maine through North Carolina. The IFMP is written to provide for the management of lobster throughout their range. It is designed to specify a uniform program regardless of lines that separate political jurisdictions, to the extent possible. The different management authorities are expected to take necessary actions to apply the provisions of this FMP in waters under their respective jurisdictions. For management purposes, the management unit is subdivided into seven lobster conservation management areas (LCMAs) that cut across stock boundaries in many cases (Figure 4). Management units do not necessarily correspond to stock units defined in the stock assessment (ASMFC 2009a).

The ASMFC coordinates the efforts of the states and the federal government. "The Commission, under the provisions of the Atlantic Coastal [Fisheries Cooperative Management] Act, decides upon a management strategy as a collective and then forwards that strategy to the states and Federal government, along with a recommendation that the states and Federal Government take action (*e.g.*, enact regulations) in furtherance of this strategy" (NMFS Northeast Region 2009: 11-12). Actions undertaken by the Federal Government, through the National Marine Fisheries Service (NMFS) of the Department of Commerce, must also be consistent with the ten National Standards articulated in the Magnuson-Stevens Fishery Conservation and Management Act – often referred to as the Magnuson Stevens Act (MSA). Additionally, any potential Federal lobster management action must not violate other NMFS trust responsibilities, such as for other species managed under other statutory mandates, including the Endangered Species Act, Marine Mammal Protection Act and Magnuson-Stevens Act." (Ibid: 11).

5.2 Management objectives

Amendment 3, of the ASMFC IFMP for American Lobster, has four general, long-term objectives:

"...to achieve a healthy American lobster resource and to develop a management regime that provides for sustained harvest, maintains opportunities for participation, and provides for the cooperative development of conservation measures by all stakeholders." (Federal Register 2007).

The ASMFC set forth its resource objectives more specifically in the Plan Amendment (ASMFC 1997):

1. Protect, increase or maintain, as appropriate the brood stock abundance at levels that would minimize risk of stock depletion and recruitment failure;
2. Develop flexible regional programs to control fishing effort and regulate fishing mortality rates;
3. Implement uniform collection, analysis and dissemination of biological and economic information and improve understanding of the economics of harvest;
4. Maintain existing social and cultural features of the industry wherever possible;
5. Promote economic efficiency in harvesting and use of the resource;
6. Minimize lobster injury and discard mortality associated with fishing;
7. Increase understanding of biology of American lobster, improve data, improve stock assessment models; improve cooperation between fishermen and scientists;
8. Evaluate contributions of current management measures in achieving objectives of the lobster plan;
9. Ensure that changes in geographic exploitation patterns do not undermine success of

Commission management program;

10. Optimize yield from the fishery while maintaining harvest at a sustainable level; and
11. Maintain stewardship relationship between fishermen and the resource.

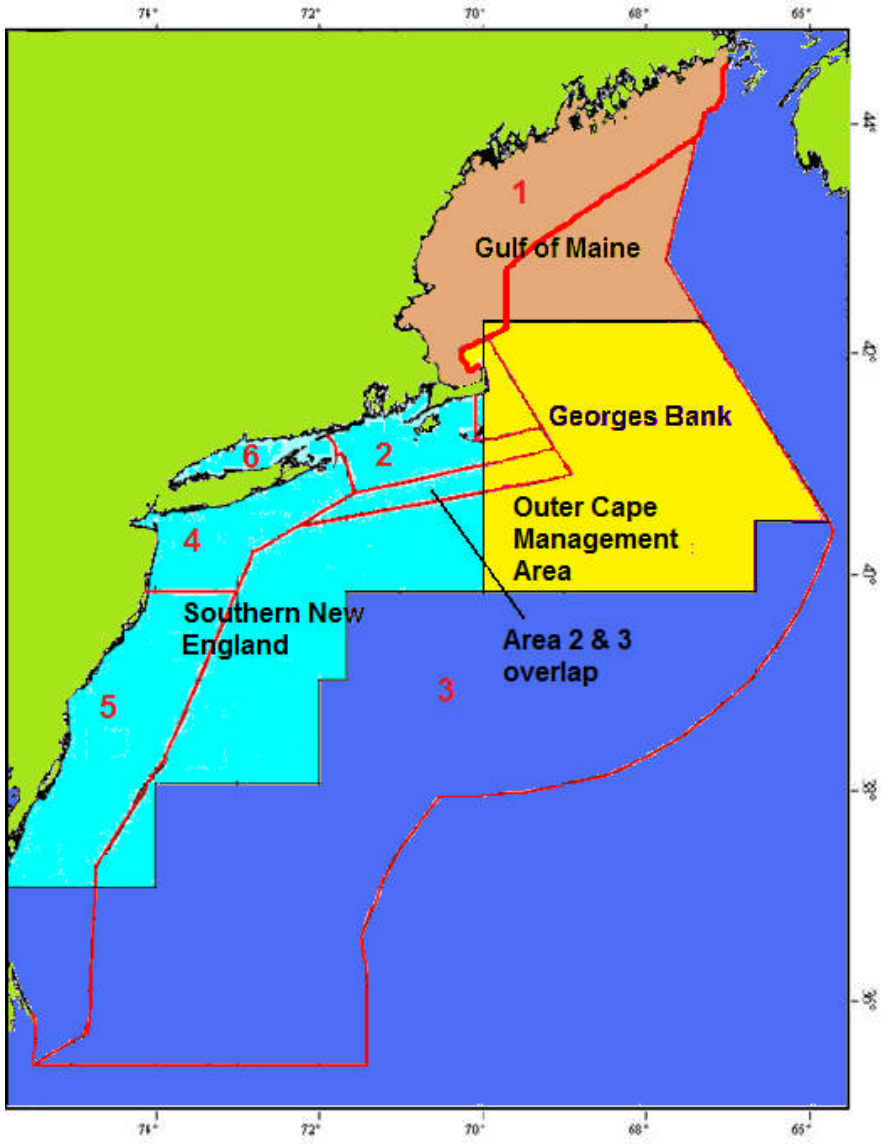


Figure 4. Chart showing: American Lobster Conservation Management Areas 1-6 and the American lobster stock units: Gulf of Maine, Georges Bank, and Southern New England. (Adapted from ASMFC 2009a).

5.3 Advisory committee roles and consultations

5.3.1 Atlantic States Marine Fisheries Commission (ASMFC)

5.3.1.1 Administrative structure

The ASMFC was formed by the 15 Atlantic coast states in 1942. Member states are Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, and Florida. Each is represented by three Commissioners: the director for the state's marine fisheries management agency, a state legislator, and an individual appointed by the governor.

The Commission's Interstate Fisheries Management Program (ISFMP) promotes the cooperative management of marine, estuarine, and anadromous fisheries in state waters of the East Coast through interstate fishery management plans. The Commission serves as a "…deliberative body, coordinating the conservation and management of the states shared near shore fishery resources – marine, shell, and anadromous – for sustainable use."

The ISFMP operates under the direction of the ISFMP Policy Board and the species management boards. The ISFMP Policy Board is composed of one representative from each member state, the District of Columbia, the Potomac River Fisheries Commission, National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Services (USWFS). The Policy Board provides overall guidance and ensures consistency with the ISFMP Charter and between fishery management plans.

The species management boards consider and approve the development and implementation of fishery management plans, including the integration of scientific information and proposed management measures.

Species technical committees provide scientific advice to the management boards and are composed of technical staff from the Commission member states, NMFS and USFWS, and members of the academia.

The advisory panels provide guidance about the fisheries that catch or land a particular species. Members include representatives from the commercial, charter boat, and recreational fishing industries, as well as conservation interests. Members are appointed by the three Commissioners from each state.

Public participation is also afforded in the process through at least four annual public hearings and procedures for submission of written comments to the Commission.

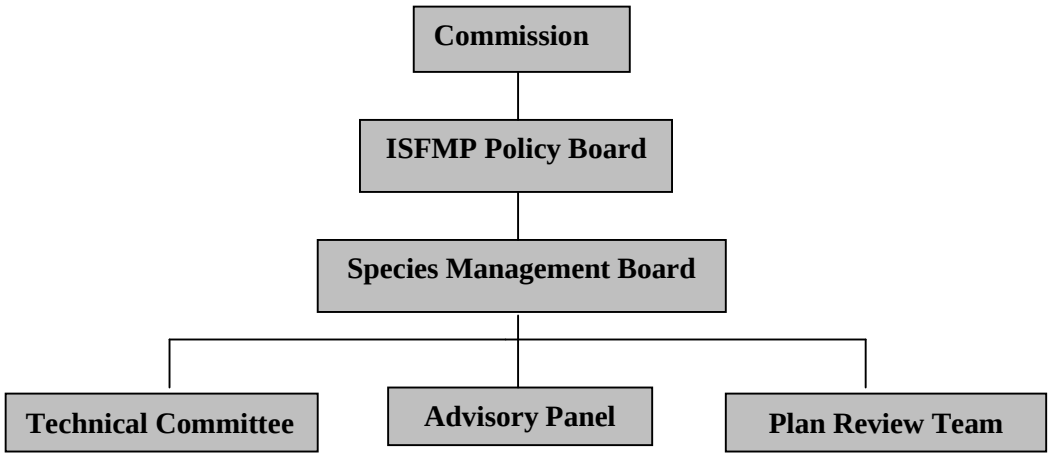


Figure 5. A diagram of the Interstate Fisheries Management Program (ISFMP) structure.

The plan review team members are Commission staff appointed by the management board to ensure that the plan is drafted and takes into account input from the technical committee, the advisory panel and the public.

The management boards also work with three standing committees of the Commission – the Committee of Economics and Social Sciences, the Habitat Committee and the Law Enforcement Committee. The first two committees help provide additional information to the fisheries management process on social and economic impacts of regulatory measures to the commercial and recreational

fishing industries, as well as habitat considerations important to the conservation of the species.

The law enforcement committee, which is composed of state and federal law enforcement representatives, provide guidance on the enforceability of proposed management measures. Joint Enforcement Agreements (JEA) exists with NMFS and the US Coast Guard allowing an enhanced ability to monitor and enforce fisheries laws.

The Commission also works with NMFS to develop compatible regulations for the federal waters of the exclusive economic zone.

5.3.1.2 ASMFC Advisory Panel

At the ASMFC the work of the Lobster Management Board and its committees is accompanied by the work of an Advisory Panel, members of which are appointed and convened by the Lobster Management Board to advise in the development and monitoring of the lobster management program. The Advisory Panel is supposed to work on a coast wide basis in contrast to the Lobster Conservation Management Teams (LCMTs) (see below), which focus on specific areas as well as issues circumscribed by area management, such as effort management. The Advisory Panel may advise on matters such as reference points and whale interaction, but also may advise on issues that emerge from the management areas but have implications for other management areas. Because of the existence of the LCMTs, which provide a large amount of industry input, the Advisory Panel is small. The model is 4 representatives each from the states of ME and MA and 2 each from New Hampshire, Rhode Island, Connecticut, New York and New Jersey. States (through their roles on the Lobster Board) may appoint member who are also LCMT members. Advisors serve 4 year terms and may be reappointed (ASMFC 2002).

5.3.1.3 Lobster Conservation Management Teams (LCMTs)

Amendment 3 established a framework for area management, which includes industry participation through seven LCMT, made up of local fishing industry representatives, which are encouraged to develop area-specific management programs to address the needs of the area. The LCMTs are encouraged to develop management recommendations that address the specific needs of their area and fisheries. The ASMFC Lobster Management Board considers these recommendations when pursuing the objectives of the IFMP. The LCMTs have largely taken over the work of the Advisory Panel, members of the former often serving as members of the latter, which has become smaller in size as well.

5.3.2 National Marine Fisheries Service (NMFS)

5.3.2.1 Management authority and legal mandates

The National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS), or NOAA Fisheries, is the federal agency within the Department of Commerce that has been delegated responsibility for the management, conservation, and protection of living marine resources within the United States Exclusive Economic Zone (EEZ) (NOAA n.d.). It also plays a support and advisory role in the management of living marine resources in coastal areas under state jurisdiction, provides scientific and policy leadership in the international arena, and implements internationally agreed conservation and management measures.

The MSA, under which fisheries within the EEZ are regulated, places responsibility for fishery management jointly with the Secretary of Commerce (through NOAA Fisheries) and eight Regional Fishery Management Councils which it established in 1976. NMFS also supports the management of a number of fisheries based primarily in state waters that are managed by Interstate Marine Fisheries Commissions, such as the ASMFC. With respect to American lobster, the NMFS has responsibilities

that complement those of the ASMFC through the Atlantic Coastal Fisheries Cooperative Management Act.

Fisheries Management Plans (FMP) for fisheries in the EEZ are developed by the Councils and are approved by the Secretary of Commerce, through NOAA Fisheries. Occasionally, FMPs are developed directly by NOAA Fisheries, with advice and comment from the public, including the Councils; this is the case for the FMP for American lobster fisheries in federal waters, which is developed in close coordination with the Atlantic States Marine Fisheries Commission

Under the Endangered Species Act (ESA), NOAA Fisheries, as delegated by the Secretary of Commerce, is responsible for the protection of those marine species listed as threatened or endangered, and for identifying candidate species for such listings. Under the Marine Mammal Protection Act (MMPA), NOAA Fisheries, as delegated by the Secretary of Commerce, is responsible for protecting certain marine mammals, namely cetaceans and pinnipeds, excluding walruses. Various statutes confer on NOAA Fisheries a mandate to reduce and mitigate degradation and loss of living marine resource habitat. These include the Clean Water Act, the Federal Power Act, the Fish and Wildlife Coordination Act, the Oil Pollution Act, and the Coastal Zone Management Act, among others.

NMFS liaises closely with the ASMFC and the state fisheries management institutions through the contribution of fisheries data and stock assessment expertise, mainly from the NEFSC of the NMFS, and through the issuing of permits for vessels fishing in federal waters, through the Regional Office in Gloucester, Massachusetts and through its role in the regulation and management of the lobster fishery. This takes place in conjunction with the ASMFC and with respect to the development and implementation of the Atlantic Large Whale Take Reduction Plan as well as the enforcement of fisheries and "whale plan" regulations through Joint Enforcement Agreements (JEA) with states, NMFS shore-based fishery officers, and the US Coast Guard.

5.3.2.2 Advisory system

NOAA and the NMFS have many advisory groups at different positions in the system. The Atlantic Coastal Fisheries Cooperative Management Act requires that NMFS regulations be compatible with those of the ASMFC and meet the "National Standards" established through the MSA.[1]

[1] The 10 National Standards are:

(1) Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.

(2) Conservation and management measures shall be based upon the best scientific information available.

(3) To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

(4) Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be: (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

(5) Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.

(6) Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

(7) Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

(8) Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to: (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

(9) Conservation and management measures shall, to the extent practicable: (A) minimize bycatch and (B) to

5.3.3 State of Maine

5.3.3.1 Administrative structure: The Maine Department of Marine Resources (DMR)

The Maine Department of Marine Resources (DMR) is organized under the Office of the Commissioner into Bureaus: Marine Patrol, Resource Management and Sea-run Fisheries and Habitats.

The Bureau of Marine Patrol is one of the oldest law enforcement agencies in the State and was established to protect, manage and conserve the renewable marine resources and ensure compliance of fisheries regulations by State of Maine licensed vessels.

The Bureau of Resource Management primary responsibilities are to conduct and sponsor scientific research which may include biological, chemical, hydrological, and technological research and monitoring, provide information on stock levels and environments of commercially and recreationally valuable marine organisms. It also provides technical and scientific information, services and assistance to the public, industry and governments.

The Bureau of Sea-Run Fisheries and Habitat are responsible for the conservation, management and restoration of diadromous fish populations in Maine's rivers.

5.3.3.2 Advisory system

The Department is supported by a number of lobster related advisory councils, committees and boards, some of which are embodied in statute.

The Lobster Advisory Council has specific statutory responsibilities related to advising the commissioner on activities of the department that relate to the lobster industry, they may review lobster research programs and make recommendations, and they may consider disputes between the zone councils and make recommendations. They also make recommendations regarding the use of specific funds. The Advisory Council is comprised in part of representatives from the Zone Councils, but also dealers and other sectors of the fishery

The DMR divides the lobster fishery into seven management zones (see Figure 6). Within each zone, a zone council works with the Maine Lobster Advisory Council and the Commissioner of Marine Resources to enact management tailored to local conditions. Zones run from east (Zone A) to west (Zone G). The zone councils are made up of elected representatives of the lobster license holders in each zone. Created in 1995 as an experiment in co-management, they are empowered to recommend to the Commissioner rules on five different issues: the number of traps an individual fisherman in that zone would be allowed to fish (within an overall maximum of 800), the number of traps on a line, the time when lobster fishing is allowed, the requirements for the apprenticeship program in their zone and, as of 1999, limited entry rules (Acheson n.d.). They also function informally as conduits for advice and information on other matters (pers. Comm. site visit). The zone councils, within the framework that includes both state and federal management authorities, have been more effective in addressing whale encounter problems and in coming up with industry-supported ways of reducing effort (the trap limits) than had been the case prior to 1995, when such matters were up to the legislature (Acheson 2009).

In Maine, there are other bodies that also provide advice (see Figure 7). One is the Maine Lobster Research, Education, and Development Board, which advises on the expenditure of revenue generated

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the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

(10) Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

from lobster special registration plate fees.

There are other formal advisory committees that are used by the Department as a means of securing input from various fisheries with regard to issues that are important to them, (e.g., scallops, urchins, etc.). There are also industry-based organizations, which represent specific industry interests on a species and geographic basis (e.g., Downeast Lobstermen's Association, Maine Clammer's Association, Maine Lobstermen's Association).

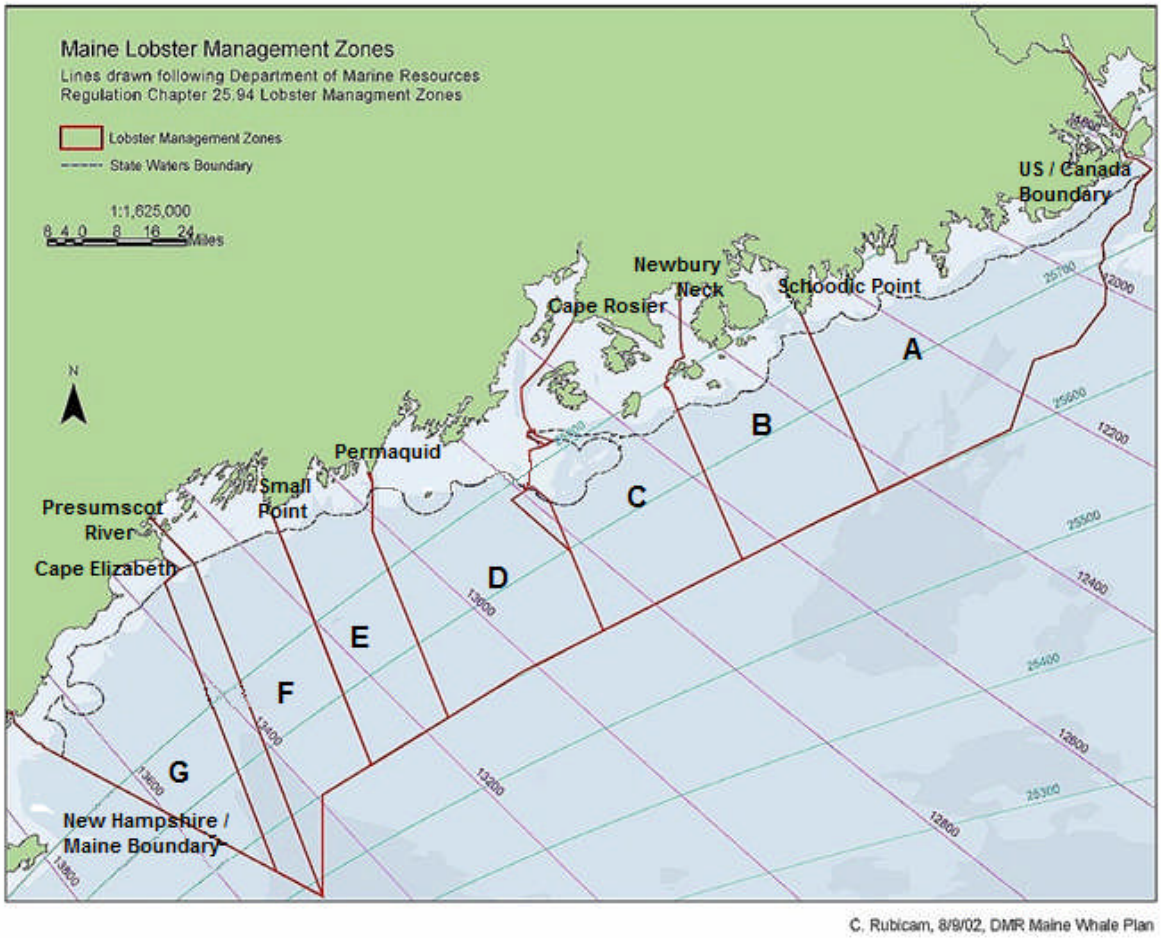

Figure 6. Maine Lobster Management Zones A-G

The advisory and consultative relationship between the lobster industry and managers has been enhanced in recent years through the development of cooperative research projects through the Northeast Consortium, the Lobster Institute, and other venues (Hartley et al. 2008; Hartley and Robertson 2006; Johnson and Van Densen 2007). Region-wide there is a high level of participation in cooperative research on the part of Maine fishers, e.g. 49% of the vessel owners/captains who were involved in Northeast Consortium cooperative fisheries research between 2000 and 2006, as well as 41% of the organizations or businesses involved, were from Maine (out of 4 New England states plus a non-Maine category) (Northeast Consortium 2008: [p.2]). Although Maine is a small state, in terms of population, it has a large presence in fisheries, and this is reflected also in the large number (16) of scientific institutions involved in cooperative research. Virtually all of the institutions involved in marine science are active in the Northeast Consortium and its cooperative research programs:

- Bigelow Laboratory
- Gulf of Maine Ocean Observing System
- Gulf of Maine Research Institute
- Maine Dept. of Marine Resources
- The Island Institute

- The Lobster Conservancy
- Maine Environmental Resources Assn. Corp.
- Maine Sea Grant
- Mt. Desert Island Biological Lab
- Ocean Adventure, Inc.
- Southern Maine Community College
- University of Maine; Lobster Institute
- University of New England
- University of Southern Maine
- Wells National Estuarine Research Reserve

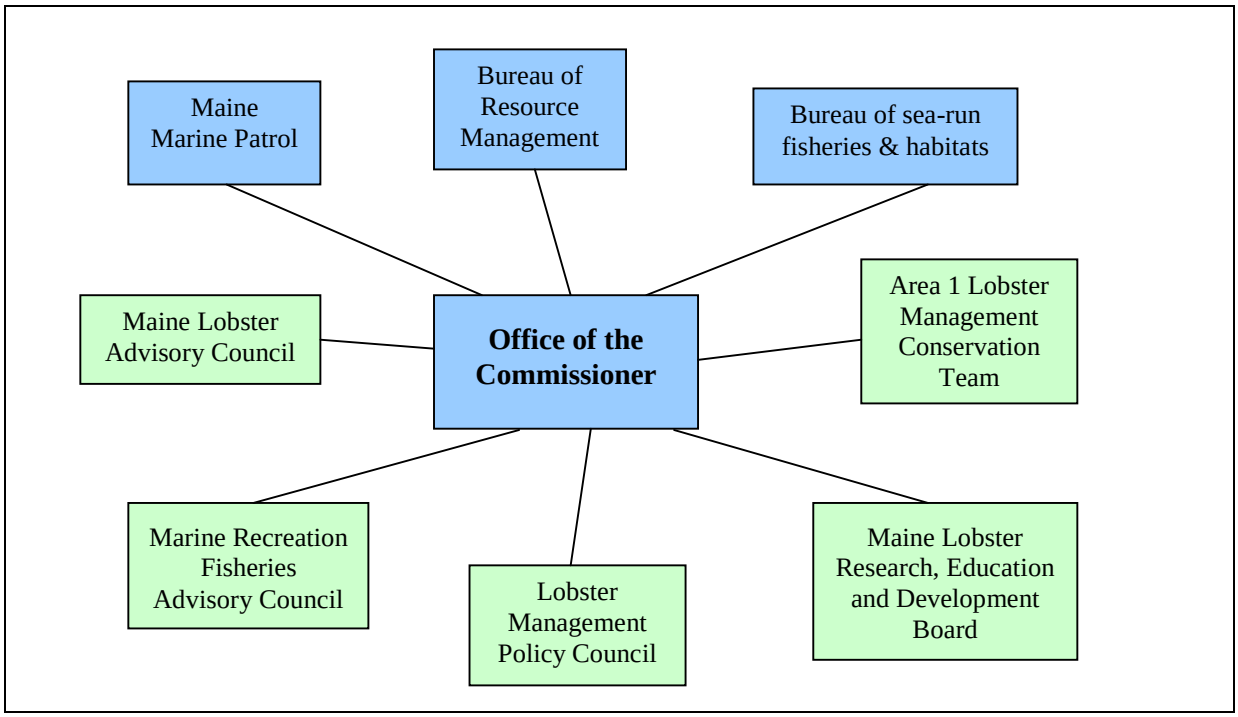

Figure 7. A diagram to show the Maine DMR institutional bodies and some of the stakeholder advisory bodies

5.4 Fisheries management methodology

5.4.1 Limited entry

State waters come within the public trust doctrine, which prioritizes public access for purposes of fishing, navigation, and commerce (Archer et al.1994). This is interpreted locally as the public right of all citizens and is a highly cherished right (McCay 1998). Whether the public trust doctrine applies to federal waters is a matter of controversy (Turnipseed et al. 2009), but for fisheries the MSA is the relevant legislation, and its "National Standards" require that fisheries management systems, "not discriminate between residents of different states; any allocation of privileges must be fair and equitable." Within these parameters, both states and the federal government may limit entry as deemed required for effective conservation of fishery resources, and in the case of federal waters, under requirements for both ecological and social impact analyses. Today all LCMAs and states have limited access licenses for commercial harvest of American lobsters, albeit with differing criteria and degrees of transferability. Moreover, there are informal and local controls on entry in the lobster fisheries.

The DMR is responsible for managing the American lobster fishery under Amendment 3 and Addenda I to XVI of the ASMFC American Lobster IFMP. The state licenses vessels that fish in state waters. All vessels that fish in Maine state waters (within 3 miles of shore) are required to hold a state license and respect state regulations wherever they fish, even when in federal rather than state waters. The licenses for lobsters (and crabs) are limited but they are not transferable. Their allocation is controlled by the state's zone councils and the DMR.

In federal waters (3-200 miles from shore) the fishery is managed by the National Marine Fisheries Service (NMFS) of the U.S. Department of Commerce, under the Atlantic Coastal Fisheries Cooperative Management Act whereby regulations that are complementary to the ASMFC IFMP are implemented. NMFS issues federal permits to vessels that fish in federal waters. However, it should be noted that if a vessel also holds a state permit the vessel is obliged to operate under the most restrictive regulation – commonly referred to as "the most restrictive rule."

In Maine, state regulations control entry based on exit/entry ratios recommended by the lobster zone councils. The number of new zone entrants is based on the number of trap tags retired by individuals who did not renew their commercial permit. This system can be illustrated by the following data on the ratios used for the number of licenses awarded in 2009 for each limited-entry zone based on the exit ratio for that zone:

Zone	Exit ration
A	1:3 Exit Ratio (1 new license for every 2,400 tags)
B	1:5 Exit Ratio (1 new license for every 4,000 tags)
D	1:5 Exit Ratio (1 new license for every 4,000 tags)
E	1:5 Exit Ratio (1 new license for every 3,000 tags)
F	1:5 Exit Ratio (1 new license for every 4,000 tags)
G	1:5 Exit Ratio (1 new license for every 4,000 tags)

Source: Maine DMR, 2009 New Zone Entrant Determination, February 2009 (http://www.maine.gov/dmr/)

Informal and local constraints on effective participation in commercial lobster fishing remain, as documented in "The Lobster Gangs of Maine" (Acheson 1988). Despite the legal protection of citizens' rights to fish throughout state waters, local groups of lobster fishermen maintain territories for the use of members, and acceptance by such groups can be required for use of such more or less bounded territories. The island-based territories tend to be more definitively bounded and defended than are the territories associated with mainland ports (Acheson 1988). Since the 1980s this system has been under pressure to change, in part because of more effective law enforcement and a major increase in effort, as measured by traps used and time spent lobster fishing, and joining a "harbor gang" appears to have become easier (Acheson 2003: 46-53). Territorial boundaries have shifted, there is more "mixed" rather than exclusive fishing in most areas, and the lobster fishing areas have expanded offshore. In the deepwater areas offshore, no territorial boundaries are defended (Acheson 2003: 51). Nonetheless, two of the islands, Monhegan and Swan I., secured legislative backing for their claims to exclusive lobster territories, within which lobstermen have restricted seasons and/or trap numbers, beyond state and zone council restrictions (Acheson 1998, 1997, 203; Princen 2005).

LCMA 1 was the last area to adopt a limited entry program, which was approved in November 2009 through Addendum XV of the ASMFC American Lobster IFMP. The program capped permits at 2004-2009 levels and also prohibited Federal non-trap permit holders that had not fished with traps in the past from fishing with traps in Area 1 in the future.

5.4.2 Harvest restrictions

As of January 2010 maximum size limits and provisions for v-notching are being applied to all of the LCMAs [NOAA/NMFS Press Release, July 29, 2009, NOAA Announces New Rules to Strengthen American Lobster Resource]**.** These latest rules create greater consistency throughout the LCMAs, most of which include a combination of state and federal waters.

5.4.2.1 Size and berried lobster restrictions.

Minimum carapace length for EEZ LCMA 1 is 3 ¼ inches (8.26 cm) for all lobster harvested in or from that area and for all vessels with federal permits who either fish in or have elected to fish in that area. It is slightly larger for other areas: 3 3/8 inches (8.57 cm.) in LCMAs 2, 4, 5, 6 and the Outer Cape, and; 3 ½ inches (8.9 cm) in LCMA 3.

Although a maximum carapace length was once present only in Maine waters, maximum size limits are now present in all LCMAs except the state waters of the Outer Cape Area. Maximum size regulations are: 5 inches (12.7 cm) in LCMA 1; 5 ¼ inches (13.3 cm) in LCMAs 2, 3, 4, 5 and 6, and; 6 ¾ inches (17.1 cm) in LCMA 3 and the federal waters of the Outer Cape Conservation Management Area.

All lobsters must be delivered whole (the anti "mutilation" rule) and there are strict provisions against the removal of eggs and spearing lobsters,

Berried (egg-carrying) females are protected throughout the management areas. In LCMA 1 and Offshore LCMA 3 above 42°30' (that is, the Gulf of Maine), berried females must be v-notched before being returned to the sea. This practice is voluntary elsewhere. In all areas, though, v-notched lobsters must be returned immediately to the sea. Furthermore, in LCMA 1 the v-shaped notches are considered zero tolerance, that is, the proscription applies no matter what the condition of the notch. In other areas, a variable "standard" of the measurable size of the v-notch applies, the most recent version of which is to allow the take of v-notched lobsters if the notch is shallower than 1/8 inch. (The state waters of the Outer Cape Cod management area retains the older standard of ¼ inch).

All lobstermen in the State of Maine participate in a mandatory v-notch program, requiring them to notch all egg-bearing lobsters prior to liberation. The practice of notching a known "breeder" extends the lobsters protection beyond the hatching of its eggs. While viewing the top side, the flipper immediately to the right of the center one is notched using a v-notch tool or a sharp knife. This v-notch will remain through the next few molts allowing the female lobster to reproduce for several years to come.

Photo 3. V-notched lobster tail **(**Source: Guide to Lobstering http://www maine.gov/dmr/guidetolobstering**)**

The revisions to both maximum size and to the landing of v-notched animals are intended to allow additional opportunities for lobsters to produce young and help replenish the population. They will also make state and federal requirements more consistent with each other.

5.4.2.2 Trap limits and gear specifications

Amendment 3 of the IFMP emphasizes controls on effort, and to that end all areas have trap limits with differing degrees and forms of determination and specification. Trap limits in State of Maine waters are set by the zone councils. In EEZ waters of LCMA 1, as for the EEZ waters of LCMA 2 and the Outer Cape, an 800 trap limit is in effect (as of October 2007). There is also a rule that vessels authorized to fish in more than one area are bound by the lowest number of lobster traps allocated for any one area [68 FR 14930, Mar. 27, 2003, as amended at 72 FR 56942, Oct. 5, 2007].

There are also rules about gear identification and marking, escape vents, maximum trap size, and ghost panels (50 CFR 697.21; [64 FR 68248, Dec. 6, 1999, as amended at 66 FR 14502, Mar. 13, 2001; 71 FR 13039, Mar. 14, 2006; 72 FR 56942, Oct. 5, 2007].

Rules about gear identification and marking, including trap trawls, are applied to "Gear areas" which have somewhat different boundaries. The Gulf of Maine gear area is defined as all waters of the EEZ north of 42°20' N. lat. seaward of a line drawn 12 nautical miles (22.2 km) from the baseline of the territorial sea.

In the EEZ LCMA 1, traps must include either of the following escape vents in the parlour section of the trap, located in such a manner that it will not be blocked or obstructed by any portion of the trap, associated gear, or the sea floor in normal use:

i. A rectangular portal with an unobstructed opening not less than 1 15/16 inches (4.92 cm) by 5 3/4 inches (14.61 cm);
ii. Two circular portals with unobstructed openings not less than 2 7/16 inches (6.19 cm) in diameter.

Almost all traps used in lobster fishing are now made of plastic coated metal rather than wood. As described in section 3.1 traps require "ghost panels" in the outer parlour(s) made of one of the following untreated materials: Wood lath, cotton, hemp, sisal or jute twine, with specified sizes. There are also size limits on traps in the EEZ; for LCMA 1 and most other areas, the limit as of May 1, 2003 was 22,950 cubic inches (376,081 cubic cm) in volume, as measured on the outside portion of the trap exclusive of the runners.

5.4.2.3 Atlantic Large Whale Take Reduction Plan (ALWTRP)

Further gear restrictions have emerged from the Atlantic Large Whale Take Reduction Plan (ALWTRP – see section 6.3.2) with the mandatory use of sinking groundlines out with an exemption line close inshore along the Maine coast. NOAA Fisheries Service issued a final rule October 5, 2007, 72 FR 57104, which became effective April 5, 2008. The State of Maine adopted such restrictions to comply with federal requirements. The ALWTRP plans to propose new rules in 2013 to address the issue of vertical lines and their potential interaction with whales (Higgins, 2011). (ALWTRP website: http://www.nero.noaa.gov/whaletrp/).

5.5 Monitoring, control and surveillance

The State of Maine is unusual in separating its marine law enforcement from inland law enforcement for fish and wildlife (Virginia is one of the few other states to do so). The DMRs' division of Marine Patrol and Enforcement ("Marine Patrol") is the oldest law enforcement agency in the State, protecting fish and lobsters since the 1860s (interview, J. Fesssenden, Director of Marine Patrol and Enforcement). The level of compliance is exceptionally high, according to the division. For 2008,

there was 98% compliance from all boardings, for all harvesters (not just lobstermen).

The State's Marine Patrol has 50 officers to cover a large region, with over 22,000 licensed harvesters in total (of which 6,500-7,000 are lobster license holders). It has 9 large patrol vessels, which are used predominantly for the lobster fishery, and another 15-20 boats used seasonally. The patrol officers, or "wardens" as locally known, team up with the U.S. Coast Guard on occasion. The Coast Guard focuses on federally permitted vessels; in state waters it is likely to refer the cases to state enforcement, lacking, for instance, the ability to check gear in the water as well as a strong history of trust and credibility with state fishermen (Fessenden interview 4/24/09). It is important to recognize that the lobster fishery and LCMA 1 extend beyond state waters. The NMFS has management jurisdiction, but the unusual circumstance, supported by the U.S. Supreme Court, is that for vessels that are registered in the State of Maine, Maine's fishery rules apply even when they are fishing in federal waters, 3-200 miles from the coastal baseline, under the "most restrictive rule" policy. For that purpose, Maine's Marine Patrol officers are deputized as federal special agents. However, they do not have jurisdiction over vessels fishing in federal waters that are not registered in Maine, such as Massachusetts's vessels. At this time this is not a major concern, but the Maine industry and marine patrol is always worried about vessels dragging for lobsters in waters outside the state line and the possibility of conflict if that occurs, given how strongly people in Maine feel against the practice (Fessenden interview 4/24/09). Maine's Marine Patrol also has the capacity to monitor federally permitted vessels working in federal waters of LCMA 1 through access to the Vessel Monitoring System (VMS) maintained by the federal government, as of the recent reauthorization of the MSA. Among other things this means that they can monitor mobile gear fishing in areas believed to have high concentrations of lobsters to ensure that the vessels are working within the law, which limits the lobster by-catch to 100 lobsters per day, or 500 per trip.

The state Marine Patrol has developed a high level of insightful and effective monitoring. This has happened over the years, through the development of personal connections with industry and a strong sense of trust, which has contributed to the development of reliable sources of information, particularly in inshore and nearshore waters. Marine Patrol officers are taught that seeking compliance is the main goal, and this has helped craft relatively good relationships with industry in that those who are in compliance are less likely to be hassled (Fessenden interview 4/24/09). Trust and credibility are viewed as extremely important to the effectiveness of the marine patrol and, by extension, its contribution to the sustainability of the fishery. J. Fessenden, relaying an account of an unfortunate incident between the U.S. Coast Guard and a lobsterman, summed it up: "If we conducted ourselves in that way, we'd lose our credibility, it'd become us against them and you'd lose the fishery." (Interview 4/24/09). The Marine Patrol has developed the ability to use discretion in boarding and ticketing, which has furthered good reputation and trust. The Marine Patrol also tries to be present on the water, a challenge for such a large coastline and large number of fishers and others on the water. According to one of the zone council representatives, the lobstermen feel assured of getting boarded at least once a year.

Efforts are made to ensure that the laws or rules that are passed are enforceable at the outset. Thus, the director of the Marine Patrol has been on the lobster management board of the ASMFC for the past 15 years as a law enforcement representative and has attended almost every meeting. There is also a high level of communication with the U.S. Coast Guard and NMFS Enforcement to develop policy positions to bring to the ASMFC.

5.6 Representation and consultation

The entire MSA management system is highly participatory, with multiple opportunities for public and stakeholder engagement in providing advice and responding to proposed FMPs and plan amendments (McCay and Creed, 1999). In the case of American lobster, since 1997 most of that public participation has taken place through the ASMFC and the constituent states, and consultation is often done via the Lobster Conservation Management Teams. The proposed rules are subject to public review, and all comments are responded to in the final Economic Impact Statement (EIS) (for

example, NMFS Northeast Region 2009).

The MSA and ASMFC systems have strong requirements for public consultation throughout the decision-making process. In addition, as noted above, ASMFC's Amendment 3 "... employed a participatory management approach by creating the seven lobster management areas, each with its own lobster conservation management team (LCMT) comprised of industry members. Amendment 3 tasked the LCMTs with providing recommendations for area-specific management measures to the Board to meet the lobster egg production and effort reduction goals of the ISFMP." (Fed Register 2007).

Highly democratized consultation is structured into the Maine lobster fishery through the zonal council system, whereby democratically elected representatives of license holders in each of seven lobster management zones along the coast of Maine have responsibilities for meeting such goals. This system evolved as a way to deal with the difficult issue of controlling effort in the fishery, a requirement of Amendment 3, by setting up a system that could allow for different kinds and degrees of effort control (mainly trap limits). Effort control remains a challenge, and the zone councils have had internal and other difficulties achieving their objectives (Acheson 2003; Acheson forthcoming), but they provide an effective means of communication and consultation (Interviews with G. Lapointe, D. Gilbert; documents).

There is a strong tradition within Maine of direct citizen involvement in state legislation as well as citizen access to state political representatives and state agencies (MPRC n.d.; Palmer et al. 1992; Farmer et al. 2007). Consequently, any one legislative session can have hundreds of bills submitted by citizens, some of which pertain to lobster or other elements of fisheries management. This political tradition has opened possibilities for high-localized management, notably the Monhegan Lobster Conservation Area (State of Maine Marine Resources Law Book (2007) Chapter 619, Subchapter 5; Princen 2005; Acheson 2003), although prospects for other local systems are now greatly reduced by subsequent legislation (Acheson 2003).

6 ECOSYSTEM CHARACTERISTICS

6.1 Ecosystem characteristics

The Gulf of Maine, within which the Maine lobster fishery operates, extends 7,500 miles from Cape Cod (Massachusetts) to Cape Sable (Nova Scotia), and has a surface area of some 36,000 square miles and a mean depth of 150 m (GOMA 2009a). The Gulf is bounded by the mouth of the Bay of Fundy and south-western Nova Scotia to the north, Browns and Georges Bank to the east and southeast, and the coasts of Massachusetts, New Hampshire, Maine and New Brunswick to the west.

On the inner continental shelf off Maine, where the lobster fishery is concentrated, the predominant substrate in waters less than 50 m depth is bedrock (GOMA 2009a), often with high vertical relief and with pockets of softer substrates such as mud filling in depressions (Kelley et al 1998). Gravel plains and sandy areas are also found at depths less than 100 m (GOMA 2009a).

Detailed bottom mapping of coastal waters of Maine, out to about 10 nautical miles from shore, undertaken by the Maine Geological Survey (no date –n..d.) shows a complex mosaic of rock, mud, and (to a lesser extent) sand and gravel in areas where the lobster fishery is concentrated.

Much of the Maine coast is highly irregular, with many peninsulas, islands and pinnacles (Dorsey n.d.).

Waters of the Gulf of Maine originate from two principal sources: the Scotian Shelf, from which relatively fresh, cold water flows into the northern part of the Gulf of Maine, and the offshore slope region from which relatively warm, saline water enters through the northeast channel (Mountain 2004).

Oceanography and productivity of the Gulf of Maine are controlled by several processes: tidal mixing, seasonal heating and cooling, pressure gradients set up by deep water inflows through deep channels and lower salinity waters originating on land, and the influx of cold, relatively low salinity from the Scotian Shelf to the north (GOMA 2009b). Tidal ranges in the Gulf of Maine are among the highest in the world, and contribute to strong local currents and vertical mixing; tidal amplitude decreases from north to south. Circulation in the Gulf of Maine is generally cyclonic (counter-clockwise), with a generally southerly flow along the Maine coast, the Eastern Maine Coastal Current. Primary productivity is high in the Gulf of Maine, and fisheries for a wide range of species have been highly productive for centuries.

Invertebrate and demersal fish communities of the Gulf of Maine have been generally categorised and described (Stevenson et al 2004). Watling (1998, cited in Stevenson et al 2004) indicated that coastal areas of Maine at depths less than 60 m, were characterised by a rich and diverse fauna primarily of polychaetes and crustacea, with several sub-assemblages due to heterogeneity of substrate and water characteristics. At depths of 60-140 m adjacent to coastal waters, bottoms of fine muds are characterized by a fauna of polychaetes, shrimp and cerianthid anemones. Shallow waters of the Gulf of Maine are characterised by an assemblage of demersal fishes including gadoids (Atlantic cod, haddock, pollock), flatfishes (yellowtail flounder, windowpane, winter flounder), skates (winter skate, little skate) and longhorn sculpin (Gabriel 1992 cited in Stevenson et al 2004).

Further detail on invertebrate communities of coastal environments of Maine and New England is available from studies of community dynamics at specific sites. Coastal Maine sub tidal areas are characterised either by kelp forests or by areas of coralline algae, which are considered of relatively low productivity (Ojeda and Dearborn 1989). In the coralline algae areas, green sea urchins and horse mussels (*Modiolus*) were the most abundant species in samples at depths to 18 m off Pemaquid Point, Maine, with invertebrate diversity higher in horse mussel beds than outside these; a variety of other species in 9 phyla were also found in this area (Ojeda and Dearborn 1989). Two clusters of species

associated with different depth ranges were identified in this study, but unlike species in these clusters, green sea urchin did not associate with specific depths. Witman (1987) described communities of rocky substrates to 18 m off northern New Hampshire and southern Maine; kelp forests dominated the communities at depths of 4-8 m, horse mussel beds at 18 m. Complex interactions between kelp and horse mussel abundance were described, with green sea urchins playing a key role through herbivory on kelp.

Trophic relationships in Gulf of Maine ecosystems are generally known (e.g. NMFS n.d.) although no detailed ecosystem descriptions or simulations have been published for the lobster fishery area.

Coastal environments of Maine are subject to substantial natural disturbances from storms and waves (Witman 1998) and are subject to strong tidal currents. Disturbances from storms and waves are experienced to depths of 30 m, although the effects are strongest at depths of 10 m and less; disturbances are most clearly seen in clearance of patches of kelp or horse mussels, which provide habitat for other species (Witman 1998). Erect sessile fauna with significant vertical profile seem to be generally absent from these coastal areas, consistent with a regime of frequent disturbances and strong currents.

Gulf of Maine ecosystems have been subject to profound changes over time, particularly in recent decades. Steneck et al (2004) described three phases in the ecology of coastal waters of the Gulf of Maine: (1) a phase of abundant predatory fishes and kelp, lasting from about 4000 years before present to the mid-1960s (2) a phase where green sea urchins dominated coastal environments, following depletion of large predatory fishes by fisheries, during which kelp forests were substantially reduced over wide areas, leading to a mosaic of kelp beds and "barrens" areas dominated by coralline algae, from the mid 1960s to the mid 1990s (3) a phase during which green sea urchins were reduced by fishing and where crabs (*Cancer* and *Hyas*) and amphipods became more abundant, from the mid 1990s. Depletion of groundfish populations was preceded by a period in which large individuals were removed from populations, initiating the substantial changes in the predation field for many invertebrate species (Steneck et al 2004). The fishery for green sea urchins developed rapidly and was very intense for some years; landings rose from under 100 t/yr to the mid 1980s, to several thousand t/yr from the late 1980s to the early 2000s, with a maximum of 18,000 t in 1992-3 (Hunter et al 2008). Recent landings have been under 2,000 t/yr and survey-based abundance estimates have declined substantially from their maximum values prior to 2000 (Hunter et al 2008). This species has an important role in structuring coastal ecosystems in the Gulf of Maine (Steneck et al 2004, Ojeda and Dearborn 1989, Witman 1987).

Along with ecosystem changes due to human activities, oceanographic trends with potentially significant effects on biota and fisheries have been observed in recent decades. A large-scale freshening of North Atlantic waters from Newfoundland to North Carolina has been observed in the Gulf of Maine (Mountain 2004), which has contributed to increased stratification of the water column. Although recent sea surface temperatures are within historical ranges, a significant increase in annual range in sea surface temperature has been observed in recent years on the continental shelf of the north-eastern USA, including the Gulf of Maine, which could have substantial biological effects (Friedland and Hare 2007). A major change in structure of the zooplankton community of the Gulf of Maine was observed in 1989-90, which may have begun reversing in 2001-2 (Pershing et al 2005).

6.2 Lobster in the ecosystem

Lobster larvae drift in ocean currents between release and settlement. Modelling of drift patterns in the Gulf of Maine circulation has shown the dominant effect of drift in the Eastern Maine Coastal Current on modelled larval distributions (Xue et al 2008). Young lobsters settling into the benthic environmental seek shelters, typically in gravelly or rocky areas, and may spend much of their time in these shelters. With growth, lobsters become more mobile and in adulthood live largely in open environments, retreating to shelters when soft-shelled after moults (Lawton and Lavalli 1995). Patterns of use of habitat by lobsters are complex and research on this topic continues; for example,

Geraldi et al 2009) found that lobster densities as observed by divers are greater on rocky than on unstructured sediments, but that trap catch rates were higher on the latter, and that tagged lobsters caught and released on unstructured sediments moved farther and faster than those caught and released on rocky bottoms. It is clear that lobsters can use a wide range of habitats and that habitat preferences may vary with age and among individuals (Lawton and Lavalli 1995).

Trophic relationships of American lobster are relatively well known from studies in various parts of the range. Very young shelter-dwelling juveniles may be suspension feeders, and suspension feeding may continue with growth (Lawton and Lavalli 1995) but suspension feeding has been found not to be important in one detailed study (Sainte-Marie and Chabot 2001). Juveniles and adults generally prey on the same species, but proportions change with growth: a wide variety of prey items has been reported including gastropods, crabs, polychaetes, fish, echinoderms and other benthic invertebrates (Lawton and Lavalli 1995). Unidentified flesh may be important in the diet, which may come from dead fish, trap bait, or live-captured fish (Lawton and Lavalli 1995, Sainte-Marie and Chabot 2001). Lobsters may also consume plant material (Lawton and Lavalli 1995). Diet may vary seasonally, with the moult cycle (higher calcium prey may be sought after the moult) and by area. Earlier reports that lobsters are scavengers, unspecialised feeders or opportunistic omnivores appear unsupported based on recent studies, which suggest that lobsters are selective feeders. Crab may be a particularly important part of the diet because of its high protein content, and was found to be a high proportion of the diet, particularly of adults, in one study in eastern Canada (Sainte-Marie and Chabot 2001). Juvenile lobsters are preyed on by a variety of inshore species including crabs (*Cancer*), sculpins, flounders, cunners and other lobsters, with predation particularly concentrated on shelter-dwelling juveniles and in the period after moulting (Lawton and Lavalli 1995). Commercial groundfish (for example cod, pollock) have been reported to prey on lobsters but there is little support for this (Lawton and Lavalli 1995). Rates of predation decrease with growth and it appears that adult lobsters are not a significant forage species for predators (Lawton and Lavalli 1995).

The long-term increase in lobster landings in Maine (considered to track abundance), which have remained at levels well above historical averages since the 1990s, remains a remarkable and unexplained phenomenon. Hypotheses to explain this increase include release from groundfish predation, changes to ecosystem productivity characteristics favouring survival and growth, increased settlement of juveniles in response to improved oceanographic conditions, a decline in sea urchins due to fishing and subsequent increase in coastal kelp and algal abundance, a bait subsidy arising from the large number of baited traps in use in the fishery, and changes to fishery management to protect reproductive potential and thus support recruitment.

6.3 Fishery interactions with the ecosystem

6.3.1 Retained catch, Bycatch (discarded), ghost fishing

6.3.1.1 Retained species

Two species of *Cancer* crabs may be retained – Jonah crab (*C. borealis*) and rock crab (*C. irroratus*). These species are landed when market conditions are good; recently demand has been low and landings have declined.

Information is collated on amounts of these species retained and discarded. The weight of landed crab is recorded on DMR sea sampling trips, which collect information on bycatch species that are discarded (see below). The DMR ventless trap program records the number of Jonah and rock crab from experimental traps. Landings information for pooled *Cancer* crabs is available from the Maine DMR web site, but is considered inaccurate (C. Wilson pers. comm.) and does not break down landings by species. Reported landings of *Cancer* crabs increased from a few hundred tons per year to over 2,000 in 2000 and subsequently, reaching a maximum of 4,300 t in 2002. This increase in landings paralleled an increase in abundance of Jonah crab observed in NMFS trawl surveys, and an increase in market demand, in the early 2000's (NFMS/DMR 2004). Fishermen have observed a

decline in Jonah crab abundance since the mid 2000s. This decline is corroborated by landings data: landings in 2008 and 2009 were 1,628 tons and 1,492 tons, respectively, and the preliminary landings for 2010 were only 1,465 tons (Maine DMR statistics).

Lobster permit holders are authorized to land *Cancer* crabs. No biological limits have been set for either species. Fishing practices are such as to minimise impacts of the fishery on populations. Only male crabs 120 mm carapace width or greater are taken, as trap escape mechanisms release crabs smaller than this, which includes all females and a substantial proportion of mature males (width at maturity is 40 mm for rock crab, 75-90 mm for Jonah crab).

6.3.1.2 Bycatch - discarded species

At least 10 finfish species are recorded as discarded bycatch (data provided by C. Wilson, Maine DMR). Information on discarded bycatch has been collected on sea sampling trips in 2006, 2007 and 2008. The sea sampling program targets 3 trips per month in each of the 7 fishery management zones; although the target is not always met, sampling covers areas and seasons well. A total of 542 trips were sampled for bycatch in the three years for which data are available (varying from 171-186 per year), for a total of 123,269 traps sampled (varying from 40,482-41,782 per year). Of the 542 trips sampled, 465 (with 103,439 traps) had observed bycatch.

Finfish bycatch relative to lobster catch, per trip and per trap is very low in this fishery (Table 4 below).

Table 1: Bycatch in the lobster fishery

Species	Individuals taken on 465 sampling trips (3yrs)	Individuals per trip	Total individuals taken in 2008 fishery
Lobster	322,356		
Sculpin longhorn	1,765	3.80	986,882
Sea raven	996	2.14	556,903
Sculpin shorthorn	745	1.60	416,559
Cunner	414	0.89	231,484
Cod	**317**	0.68	177,247
Redfish Acadian	**302**	0.65	168,860
Cusk	**201**	0.43	112,387
Sculpins	140	0.30	78,280
Spiny dogfish	**129**	0.28	72,800
Hake unclassified	**96**	0.21	54,600
Flatfishes unclassified	**77**	0.17	44,200
Mackerel Atlantic	**67**	0.14	37,462
Pollock	**27**	0.06	15,097
Lumpfish	18	0.04	10,065
Horseshoe crab	**16**	0.03	8,946

Note: species in bold are managed species. Total individuals taken is an estimate based on individuals taken per trip from observer program and an estimate of 260,000 trips made for 2008.

Based on numbers, the species most abundant in the bycatch (longhorn sculpin) made up 0.5% of the lobster catch over the three years sampled, and all other species were well below this level. Total numbers of individuals taken and discarded can be estimated based on an estimate of 260,000 trips made in 2008 (the first year for which such an estimate is available). Discard survival rate is

unknown but probably greater than zero, since the fishery operates in relatively shallow waters.

Species that comprise less than 5% of the total catch by weight may normally be considered minor species (not "main"), unless they are of high volume or particular vulnerability (FAM v1 7.3.2). Using this guidance and the information set out in section 6.3.1.2 above, the assessment team conclude that three species are considered to be main bycatch species owing to their vulnerability:

1. The Gulf of Maine Atlantic cod - are overfished (that is, they are below a chosen abundance reference point) and overfishing is occurring (that is, fishing mortality is higher than the chosen reference point) (NEFSC 2011)
2. White hake - are overfished and overfishing is occurring. (NEFSC 2012)
3. Cusk - has been identified as a "species of concern" following a steep decline in trawl survey indices and a Canadian assessment of the shared population indicating an "at-risk" status.

Estimated catches of cod and white hake are very low compared to other sources of mortality, i.e. assuming an average weight of 1 kg per individual (based on the size of cod likely to be able to enter a trap) 177 t of Atlantic cod were discarded in 2008 in the lobster fishery, compared to total landings of Atlantic cod of 3,989 t in 2007 and similar levels in preceding years; there are also recreational catches and discards (NEFSC 2008). Based on the same assumptions, discards of white hake in the lobster fishery (55 t/yr) were low compared to reported landings (1,600 t in 2007, higher in preceding years) (NEFSC 2008). Bycatch of these species is not considered in their assessments, apparently because the levels are so low.

Cusk is taken as bycatch in the Maine lobster fishery are part of a stock shared with Canada, with centre of abundance on the Scotian Shelf (Harris and Hanke 2010). Cusk is not considered a commercial species in either Canada or the USA (although bycatches from groundfisheries may be landed) but has been identified as a "species of concern" for possible listing under the US Endangered Species Act (NMFS 2009). "Species of Concern" are those species about which NMFS has some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the Endangered Species Act (ESA). "Species of concern" status does not carry any procedural or substantive protections under the ESA. The Species of Concern list:

- Identifies species potentially at risk;
- Identifies data deficiencies and uncertainties in species' status and threats;
- Increases public awareness about those species;
- Stimulates cooperative research efforts to obtain the information necessary to evaluate species status and threats; and,
- Fosters voluntary efforts to conserve the species before listing becomes warranted.

Total removals of cusk include fishery landings of the order of 100 t/yr in the US (O'Brien 2006), 800 t/yr from fisheries in Canada and 200 t/yr lobster bycatch in Canada (DFO 2008). Annual Maine lobster fishery bycatch would be around 112 t/yr from the table above. A recent population assessment (Harris and Hanke 2010) indicates that survey abundance catch rates have been stable since the late 1990s; commercial catch rates have declined but this may be due to management restrictions on the fisheries in which cusk are taken as bycatch.

DMR received a federal grant to evaluate the extent and degree of cusk bycatch in the trap and longline fisheries. This project will begin in Spring 2011 and measure the condition and survival of cusk caught in non-directed fisheries. These data will be used in stock assessments and future management of this resource (DMR 2011).

6.3.1.3 Ghost fishing

No records of amount of gear lost are available. Fishermen advise that they make every effort not to lose gear, and to retrieve gear which is lost, because of the high cost of gear (approximately $100 per trap); GPS systems now widely available and facilitate retrieval of lost gear. By regulation traps must

include a biodegradable escape panel; no studies of length of time for these to degrade are available but they are usually replaced annually (C. Wilson, pers. comm.), so a year might be an approximate estimate of the time to degrade.

Diving experience shows wide prevalence of ghost gear on the bottom in shallow water within SCUBA depths (C. Wilson, pers. comm.). In November of 2009, The Gulf of Maine Lobster Foundation initiated the two-year National Fish and Wildlife Foundation-funded *Derelict Lobster Gear Retrieval, Salvage and Disposal project*. The project employs lobstermen from each of Maine's seven lobster management zones to remove derelict lobster gear. Although the project will continue into early 2012, an interim report from October 2011 indicated that of the 3037 traps retrieved during the first two years of the project, the majority held a State tag to indicate the last year fished. Of these, the majority of recently lost traps had closed escape panels while the majority of older traps had open panels. For example, the 2011 report indicated that of those traps recovered with 2010 tags, 223 had closed panels while 66 had open panels. Of those traps recovered with 2009 tags, 38 had closed panels while 72 had open panels (Ludwig, 2011).

6.3.2 Endangered, Threatened, Protected (ETP) species

NMFS (2010) published a biological opinion on whether impacts of the American lobster fishery would be likely to appreciably reduce the likelihood of survival or recovery of endangered, threatened and protected species. The species considered, for which there are documented interactions with the American lobster fishery, were:

- North Atlantic right whale
- humpback whale
- fin and sei whales
- loggerhead turtle
- leatherback turtle

All of the whale species are listed under the Endangered Species Act (ESA) as endangered. The ESA described "distinct population segment" of loggerhead turtle has a "threatened" status and the leatherback turtle an endangered status.

All of the above listed species are listed under Appendix 1 of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Three minke whales were reported entangled in lobster gear in the Maine fishery in 2010 so this species must also be considered. Minke whales are not listed under the ESA but are protected under the US Marine Mammal Protection Act, and are listed on Appendix I of CITES.

The following sections review information available to the assessment team on these species, and concludes with a summary of the results of NMFS (2010) on the potential impacts of the fishery on them. Further detail on the NMFS (2010) analysis as it affects scoring is found in the scoring table.

The population of *North Atlantic right whales* is one of the most critically endangered marine species and is known to interact with the Maine lobster fishery.

Current population size of right whales is estimated at somewhere between 300 and 400 individuals. Annual calf production, and estimated population trend (decreasing, stable or increasing) have been highly variable over the past two decades, with calf production low in the early 2000s and a production of nearly 40 calves in 2008. The most recent population assessment concluded that the population had been increasing in the period 1990-2005 (NMFS 2010a).

North Atlantic right whales are known to regularly frequent three areas in and near the Gulf of Maine: the Great South Channel east of Cape Cod, Massachusetts Bay and Cape Cod Bay, and the entrance to

the Bay of Fundy (NOAA OPR 2009). Right whales typically concentrate in these areas in the spring (Cape Cod areas) and summer (Bay of Fundy), moving out of these areas in winter. The Maine lobster fishery does not operate in these areas, although they are adjacent to the Maine coast and offshore areas where the fishery does operate. Movement between the three areas requires right whales to transit the Gulf of Maine, including waters near the Maine coast where the fishery operates. Knowledge of movements is still incomplete, as effort in aerial and shipboard surveys is concentrated in areas of known concentration and known threats such as ship collisions but the discovery of a concentration of 44 right whales in December 2008 in the Gulf of Maine, 70 miles south of Bar Harbor (Environment New Service 2008) reinforces the need to seek further knowledge, and to be cautious about managing human impacts on this population.

Knowledge of the risks of interactions of right whales with Maine lobster gear available to the assessment team is patchy. In attempting to summarise the existing information, we consider the areas within state waters (up to 3 miles from baselines), nearshore (3-12 miles) and offshore (beyond 12 miles), as the concentration of fishing gear is different in these bands.

With respect to distribution of right whales, the New England Aquarium Right Whale Research Team made available compiled sightings data from the Right Whale Consortium survey database and from opportunistic sightings (information provided by M. Brown, New England Aquarium). Right whales have not been observed on surveys within 3 miles of Maine's coast, and are infrequently observed between 3 and 12 miles (only off eastern Maine in August); however survey effort in these areas has been relatively low. Right whales are regularly observed on surveys outside 12 miles where survey effort is concentrated; sightings in this area correspond well to the general picture of northward migration from the Cape Cod habitat areas in spring to the Bay of Fundy entrance in summer and back southward in fall. Opportunistic sightings data for 1972-2006 show 8 individuals within 3 miles of the coast, as well as one small concentration of 3-5 individuals within 3 miles of the coast (extreme eastern Maine). Of the order of 10-15 individuals and 10-15 small concentrations have been observed during this time period in the nearshore area (3-12 mile band), while hundreds of sightings have been recorded in the offshore area (beyond 12 miles). Most observations in the offshore have been made in two areas, one southeast of the Acadia Peninsula and another near the Maine-New Hampshire border. A radio-tagging study provides additional information: of 18 right whales radio tagged in the Grand Manan Basin, southern Bay of Fundy, and tracked for 6 days or more, 5 subsequently were observed inside the 50 fathom (90 m) contour in near shore waters of Maine (i.e. 3-12 miles) (Baumgartner and Mate 2005; data compiled by New England Aquarium); 1 of these individuals was observed at various locations from eastern to western Maine, while the other 4 were observed in eastern Maine. These individuals, along with several others, were also observed in areas just outside the 50-fathom (90 m) contour. Between 2008 and 2010, a DMR monitoring program employed plankton and water column sampling to evaluate habitat characteristics in Midcoast and Downeast Maine. Data obtained from this program, coupled with ongoing summer and fall plankton surveys were used by collaborators at the University of Maine to determine the inshore/offshore and seasonal distributions of *Calanus finmarchicus*, right whale prey. Preliminary determinations suggest that concentrations of prey can't support right whale feeding inside the 50-fathom contour line (Summers et al, 2011), although this conclusion would be true for most marine waters – whales are better at finding prey concentrations than humans.

The information on right whale distribution in the fishery area, while patchy and incomplete due to distribution of survey and observational effort, suggests that right whales do not consistently use areas within 3 miles, but may make occasional forays into these Maine state waters from areas further offshore which constitute the primary habitat (M. Brown, pers. comm.). Observations in the 3-12 miles nearshore waters are somewhat more frequent but again this does not appear to be an area which is consistently used, with the exception of an area southeast of the Acadia Peninsula where several observations are concentrated. Beyond 12 miles, right whales are more regularly observed, particularly in an area near the Maine-New Hampshire border where observations are frequent.

Two sources of information on distribution of lobster traps or end lines were available to the

assessment team in 2009: a compilation by the Maine Lobstermen's Association (provided by P. McCarron, Maine Lobstermen's Association, MLA) and a study by the DMR covering a broader area but a smaller sample of fishermen (Smith 2006). Both sources show effort to be concentrated inside Maine state waters (very close to shore in the MLA information). The concentration of fishing effort declines beyond 3 miles and further beyond 12 miles. However substantial numbers of lines are found even in the areas beyond 12 miles where right whale observations are relatively frequent: up to 7 lines/km2 beyond 12 miles , and 8-26 lines/km^2 between 3-12 miles, compared to up to 14-50 lines/ km^2 within 3 miles (Smith 2006, Fig. 1). Seasonal pattern of trap distribution is different in state and nearshore waters, with a peak in endlines in summer in the state waters and a peak in fall for the nearshore and offshore waters (Smith 2006). The Atlantic Large Whale Take Reduction Team (ALWTRT) will take up the issue of vertical lines in its next proposed rule, which is scheduled to be completed in 2013. Proposals for reducing numbers of vertical lines were discussed at its most recent meeting in January 2012.

The ALWTRT has recognised that better documenting areas and seasons of high risk for entanglement is an important activity, and in response to this NMFS has initiated work to map whale distributions, fishery distributions, and overlaps between them (ALWTRT 2009). In response to the need for more comprehensive data, DMR expanded its research to define baseline attributes of the lobster fishery, including the density, seasonality and configuration of lobster gear. A comprehensive vertical line gear survey was mailed to all lobster and gillnets license holders in early 2010. Survey results will be used to assess the amounts and configurations of gear being set in different areas by month. DMR is working with NMFS to incorporate these data into their model to assess the risk of entanglement to large whales due to vertical lines in different areas. Beginning in October 2009, annual logs were mailed to all lobster license holders with their annual renewal materials. These logs ask for the maximum number of traps and vertical lines fished in each area by month. In 2009, over 2500 logs were returned, and the consequent data are being compiled in a database that will be compared to comprehensive gear surveys. DMR has also initiated two fisheries-independent programs. Boat-based and aerial gear density surveys were launched in 2010. These surveys were designed to ground-truth data being generated by the lobster industry on the density and seasonality of fishing gear throughout Maine's coastal waters. Both projects will be concluded in 2011, and data analysis will include interpolated densities of fishing gear, seasonal gear shifts and comparison between fishery dependent and independent data collection methods.

Numbers of entanglements are certainly greater than those recorded, although it is impossible to know the number of entanglements in the Maine lobster fishery from available information. Three entanglements of right whales in lobster gear have been documented in Maine coastal waters between 1997 and 2005 (NMFS data compiled by the MLA), one each in 2002, 2003 and 2004. For eastern North America, 48 cases of entanglement in fishing gear have been documented for right whales between 1997 and 2005 (NMFS compilation for ALWTRT). Overall, 60% (Fujiwara and Caswell 2001) or 75% (Myers et al 2007) of right whales have entanglement scarring, indicating that entanglements are an ongoing, important problem and source of mortality,

Right whales are known to be subject to mortality from ship collisions and entanglement in lines from other fisheries.

The Gulf of Maine *humpback whale* population is considered a separate subpopulation within the overall North Atlantic population of this species. A current minimum estimate of population size is around 650 individuals, and this population is estimated to be increasing although at an unknown rate (Waring et al 2003). Sightings information compiled for the Maine Lobstermen's Association (provided by P. McCarron) indicates that humpback whales have been sighted a dozen times within Maine state waters between 1974 and 2005, and are more frequently sighted in the nearshore and offshore zones. Two entanglements in lobster fishing gear in Maine state waters have been documented between 1997-2005, one in 1999, one in 2002 (NMFS data compiled by the MLA). Fishing gear entanglements (including fisheries other than Maine lobster) and ship strikes are sources of mortality (Waring et al 2003). A total of 122 records of entanglement in fishing gear have been

compiled for eastern North America for 1997-2005 (NMFS compilation for Take Reduction Team).

Fin and sei whales appear to be less susceptible to entanglement in fishing gear than right or humpback whales. In fact, fin whales were removed from the National Marine Fisheries Service list of species killed or injured in the lobster fishery. Fin whales had been added to this list in 1997 based on an animal that was thought to have been entangled in lobster gear. Subsequent analysis revealed the interaction was with hagfish pot gear and the LOF was never updated to reflect this analysis. A fin whale has never been reported killed or injured in the Northeast/Mid Atlantic American Lobster Tra/Pot Fishery (NMFS, 2010). For fin whales, a total of 17 entanglements were documented in eastern North America in 1997-2005 (NMFS compilation for Take Reduction Team). Of 5 cases for which gear has been identified, none were from lobster fisheries and 2 were from Maine (fisheries other than lobster). Fin whales are observed in the fishery area roughly at the same level as humpback whales, with a number of sightings in the 0-3 and 3-12 mile zones as well as outside 12 miles (information from ALWTRP Federal Environmental Impact Statement 2007, provided by P. McCarron). A minimum estimate of population size for this species is 2,362 individuals (Waring et al 2003).

Minke whale is a relatively small, abundant and widely distributed species. Minke whales in the fishery area are considered to be part of the Canadian East Coast stock. The best estimate of population size from the most recent status summary is 8,987 animals, while the minimum population estimate is 6,909 animals. PBR for this stock is 69 animals per year. Total estimated mortality for this stock is below 10% of the PBR and is not considered significant (all information from NMFS 2010b).

The Atlantic Large Whale Take Reduction Team (ALWTRT), whose membership is made up from a broad range of stakeholders, was established in 1996 to examine means of reducing takes of large whales from fishing gear. A draft Take Reduction Plan was published in 1997 and rules for reducing takes have subsequently been published based on work of the ALWTRT. A set of initiatives implemented in 2007 includes measures regulating lobster fisheries in the Gulf of Maine, in particular requiring the use of sinking groundlines. Fishermen operating inside an exemption line in coastal Maine are exempted from the sinking groundline requirements (Borggard et al 2008). The ALWTRT will address the issue of vertical lines, and potentially develop additional rules to deal with the threats they pose, in 2013. Maine DMR has developed a Cooperative Management Plan (or recovery plan) addressing threats to large whales, sea turtles and shortnose sturgeon and has implemented a number of measures to address threats to these species (Summers 2009). The measures include establishment of a sightings network and database on sightings, establishment of a disentanglement network, gear research and development, research on large whale foraging patterns, and collection of data to be used to develop an inventory of density, seasonality and configuration of lobster gear, as described above. Annual reports on progress on implementing this plan are published (e.g. Summers and Morris 2008).

Little is known of *loggerhead* or *leatherback turtle* in Maine state waters. Leatherback turtle is observed in most years in the Gulf of Maine (Maine Department of Inland Fisheries and Wildlife DIFW 2009). The team found no records of documented entanglements in Maine lobster fishing gear, and no specific records of this species in lobster fishing areas through 2009. However, in June 2011 DMR staff disentangled two leatherback turtles from lobster gear in Maine state waters. A total of four entanglements were reported to National Marine Fisheries Service in 2011 (with a fifth entanglement in non-specified gear, which could have been lobster gear). Numerous entanglements in nearshore fishing gear have been documented in adjacent waters of Canada (James et al 2005) and Massachusetts (Dwyer et al 2003). Measures to reduce entanglement of large whales under the ALWTRP would probably also help reduce entanglements of leatherback turtles.

The NMFS biological opinion on impacts of the American lobster fishery on these species (NMFS 2010a) is based on a detailed analysis of available information on abundance and distribution of the species, distribution and impacts of the fishery (including a cautious estimate of likely mortality for each species), and in some cases population viability analyses. For all 6 species addressed, the

opinion concluded that while the American lobster has been and is reducing numbers of the species over what would be the case if the fishery did not exist, the serious injury or mortality caused is not likely to reduce appreciably the likelihood of survival and recovery of the populations.

For right whale, NMFS (2010) concludes that the population has been increasing since 2000 and that accordingly, impacts from all sources (including the lobster fishery) have not caused the population to decrease. Population viability analyses indicated a very low extinction probability over the next 100 years, and a low probability of declining population trends. The opinion noted that these conclusions were for a period prior to entry into force of the new ALWTRP mitigation measures which would be expected to further reduce impacts.

Similarly for the other species, NMFS (2010) concluded that populations were generally stable or increasing, such that the recent threat environment (including the lobster fishery) was not such as to impede population growth, and noted that this conclusion applied to a period prior to entry into force of the ALWTRP measures.

6.3.3 Impacts of fishery on habitat

Impact of the fishery on habitat structure and role will depend on impact of individual fishing operations (in this case the trap or trawl of several traps) and the overall "footprint" of the fishery (the total number and distribution of fishing operations). Damage or disturbance to habitat from the fishery must be considered in relation to natural disturbances to the habitat and to sensitivity of the habitat. Impacts on habitat include impacts on substrates and on sessile invertebrates forming part of the lobster habitat.

No studies of the impact of the Maine lobster fishery on habitat structure and function have been undertaken, although inferences on this can be made from available work. A Plan Development Team under the Northeast Fishery Management Council is conducting a vulnerability analysis on damage to habitats by fisheries and this is expected to include the lobster fishery (J. Grabowski, pers. comm.).

The impact of trap gear on bottom habitats has generally been considered to be much lower than that of towed gear, although information on trap impacts is very limited. Several studies have provided observations of trap impacts on benthic habitats. Eno et al (2001) studied impacts of trap fishing on emergent fauna (sponges, bryozoans, ascidians, soft corals and tube worms) at three sites off the British Isles, concluding that impacts were generally low. Soft, erect fauna (sea pens) tended to bend as traps descended, and although some were uprooted, recovery was relatively rapid. Impacts on other emergent fauna were limited. However impacts of dragging ground ropes over the bottom were greater than those of traps alone. Further, the authors noted that the study did not assess the impacts of long periods of repeated fishing which could have been more significant. Adey (2007) (*Nephrops* creel impact on soft-bodied emergent fauna, Scotland) Stone (2006) (crab pot impact on corals, Alaska) and Troffe et al (2005) (prawn trap impacts on sea pens) all concluded that traps can damage emergent fauna, but did not provide assessments of the degree of damage. Troffe et al (2005) observed that prawn traps caused more damage to emergent fauna (sea whips) than beam trawls, while Stone (2006) observed less damage from crab pots to corals than longlines and trawls.

A workshop on effects of fishing gear on marine habitats in the north-eastern US (NEFMC 2002) concluded that the degree of impact caused by pots and traps to biological and physical structure and to benthic species in mud, sand and gravel habitats was low. Impacts were expected to be greater in rocky habitats where emergent epifauna or biogenic structures are present. Impacts from dragging a trap along the bottom, or from ground ropes linking several traps, could increase the impact over that of a single trap. The general conclusion that trap gear is likely to have lower impacts on bottom habitats than towed gear was confirmed by the detailed review of NEFMC (2011a). Stevenson et al (2004) reviewed impacts of fishing gear on bottom habitats off the north-eastern USA, citing Eno et al (2001) as the only available study of trap impacts on bottom habitats at that time. The recent requirement to use sinking ground ropes in parts of the Maine lobster fishery area to reduce potential

for whale entanglements could potentially contribute to increasing damage to bottom habitats, since dragging ground ropes increase the risk of trap fishery damage to habitats.

The actual footprint of the Maine lobster trap fishery, in terms of distribution of trap hauls, is not well known, although studies have provided improved information on this. Trap fishing effort appears to be extremely intensive, with high trap densities throughout state waters (at least in the summer) and relatively frequent hauling of gear. In total something over 3 million trap tags are issued annually by the Maine DMR, but not all of these are used. A study of vertical line distribution and abundance, based on information from a survey of all federal permit holders in Maine (Smith 2006), provided estimates of numbers of vertical lines in the water by season and by fishing area along the coast of Maine, along with information on trap fishing configurations (singles, pairs, trawls etc), which could be used to estimate number of trap contacts with the bottom. Generally trap densities are much greater within state waters, lower in the nearshore area (3-12 mile zone) and lower still offshore (outside 12 miles); densities are greatest in summer months, peaking in July and August, in state waters but greatest in the fall beyond 12 miles. Pairs and singles are the dominant fishing configuration inside 12 miles, while trawls of 10 to 20 traps (which have the potential to cause more damage to benthic fauna than pairs and singles) are much more important outside 12 miles. Information on distribution of fishing compiled by the MLA, based on logbook information, shows fishing to be strongly concentrated in the state waters peaking at over 100 traps per km^2 in July-September. Traps are hauled several times per week during summer when weather is favourable, less frequently in spring and fall when storms may impede fishing operations.

The inner continental shelf off the Maine coast has been mapped using sidescan sonar and related data (Barnhardt et al 1998; Maine Geological Survey n.d.). Surficial geology in this area is extremely complex, a mosaic of rock, gravel, and mud habitats often changing over short distances (Barnhardt et al 1998). Fishermen report that fishing areas are primarily on rocky and muddy bottoms which are the predominant bottom types in the area within 3 miles where the fishery is concentrated (Maine Geological Survey data provided by the MLA). Natural disturbance from storms and currents (including strong tidal currents) is high down to 30 m depths (Witman 1998), so one would not expect to see development of the complex, long-lived erect fauna which are particularly sensitive to fishery impacts including trap fishery impacts. Kelp and horse mussel beds are characteristic of sub tidal areas, with a variety of associated invertebrate species (Ojeda and Dearborn 1989; Witman 1987). More complex, emergent fauna might be expected to occur at greater depths and lower-energy environments; fishing does occur at depths beyond 30 m where natural disturbances would be less pronounced.

The recent high abundance of lobster in this area suggests that impacts of the fishery on lobster habitat, at least, are not substantial. Young lobsters depend on crevices and shelters, and although older age groups are more mobile and less habitat dependent, they require shelters when soft-shelled. Lobster prey species would presumably depend on a healthy and relatively unimpacted habitat. If the fishery were having significant impacts on the habitat elements on which lobster and its prey species depend, one would expect to see a negative trend in abundance, rather than the high abundance levels recently observed.

6.4 Ecosystem impacts

Several potential interactions of this fishery with ecosystems, which might impact ecosystem structure, trophic relationships, or biodiversity, have been identified for assessment:

- impacts of use of bait, both impacts on the species used as bait, and the impact of a “bait subsidy” on abundance of lobster and associated species and communities
- impacts of removal of lobster on trophic relationships
- bycatch, discards, ghost fishing and other impacts of the fishery on biodiversity, communities and ecosystems

6.4.1 Bait – impacts of use

The lobster fishery requires substantial quantities of bait. Saila et al (2002) estimated bait requirements in the inshore fishery (inside 3 miles, where 70% of the Maine lobster was stated to be caught) at 116,000 t/yr (assuming 200 traps/km^2 for 210 days per year; this may overestimate bait use but in any case the amounts required are certainly in the tens of thousands of tons). The preferred bait is herring, either fresh or (more commonly) brined. Dockside surveys by the DMR indicate that herring made up some 95% of bait prior to 2008, but has decreased since then (C. Wilson, pers. comm.). In 2007, herring comprised 78.4% of lobster bait by trap haul. That number declined each year with herring comprising 60% of bait by trap haul in 2010 (DMR data). Other species that may be used when herring is unavailable include menhaden, redfish, groundfish heads and carcasses, and artificial bait. Fishermen interviewed indicated that there has generally been no problem in obtaining herring bait in recent years, although supplies may become short during periods of peak demand in August-September, at which time other species may be used. Although some fishermen harvest alewives to use for bait in the Spring each year, the majority of fishermen buy 100% of their bait.

Fisheries supplying herring to the Maine lobster fishery (principally purse seine, midwater trawl, and pair trawl fisheries in the Gulf of Maine and Georges Bank areas) are managed under the Atlantic States Marine Fisheries Commission (ASMFC 2006a; Amendment 2 to the Management Plan is the most recent substantive version of the management plan). The management plan includes a number of measures to ensure sustainable harvesting including quotas, spawning area closures, and effort limitation. Stock assessments are conducted jointly by Canada and the USA since Gulf of Maine stocks are shared (Shepherd et al 2009 provide the most recent update). Herring stocks in this area have shown strong recovery following a period of low abundance, due to good recruitment and survival (Shepherd et al 2009). The stocks are not overfished, and overfishing is not occurring (Shepherd et al 2009). The requirement to maintain a level of herring abundance as forage for predators is recognised in the management plan and the assessment models take predator consumption into account. Management plans based on biological assessments for redfish and menhaden are also in place and neither species is considered overfished.

6.4.2 Bait – impact on coastal ecosystems

Many fishermen believe that the large quantities of bait used in the fishery are having a positive impact on lobster populations by providing additional food; the opinion that lobsters are now being farmed, rather than simply harvested as a wild stock, was expressed by several fishermen interviewed. The argument is that undersized lobsters, along with other species such as crabs, can move in and out of traps through meshes and escape vents and feed on the bait. One hypothesis for the increase in lobster abundance over the past two decades invokes the importance of this "bait subsidy". Bait use has increased fourfold since the 1970s in the Maine lobster fishery (Grabowski et al 2009).

The estimates of Saila et al (2002) indicate that the bait subsidy could indeed be a significant factor in coastal ecosystems. The estimated annual contribution of bait use within 3 miles is equivalent to an import of 0.8 gm C/m^2, equivalent to an 80% increase in primary production in coastal areas if obtained from natural production. This increase could potentially support 1/4 to 1/3 of the increases in lobster landings observed in the 1990s (Saila et al 2002). These estimates were preliminary and could no doubt be refined but point to a substantial potential effect.

Two subsequent studies (summarized by Grabowski et al 2009) attempted to determine whether growth of sublegal lobsters differed between fished and non-fished areas, as a means of examining whether bait from traps was having a local effect. One study found that sublegal lobsters in central Maine grew 15% more per molt in fished areas (with trap bait) than in closed areas, suggesting an effect of the bait subsidy, but another in eastern Maine found that lobsters at unfished sites grew faster than those at fished sites. The latter result was probably influenced by differences in natural diets at the two study sites, demonstrating the difficulty of controlling for all factors in experiments in natural settings. Grabowski (pers. comm.) has suggested based on observations during these studies that

about 2/3 of bait in traps is used by lobsters, 1/3 by crabs and other invertebrate species.

One fisherman indicated to the team that lobsters in areas where trap bait was the predominant food were of poorer condition and hardened up more slowly after the molt than lobsters in areas where trap density was lower and the relative importance of natural food greater.

Overall, while there are good arguments to indicate that the bait subsidy could be changing ecosystems in the fishery area, available studies are inadequate to assess effects or pathways of these effects. Increasing use of lobster bait is one of many substantial changes to the ecosystem in the fishery area over the past several decades (see below).

6.4.3 Impact of removal of lobster on trophic relationships

Lobsters are preyed upon by a variety of species of fish and invertebrates (notably crabs), particularly as juveniles, but are not reported to be an important forage species making up a high proportion of the diet, or a preferred forage species, for any of these (in contrast to such species as herring or capelin which are key forage species for a range of other species). Adult lobsters of the sizes removed by the fishery may be preyed upon by large fishes when soft-shelled after moulting, but again are not reported to be a critically important prey species for any other species. As such, it would appear that removals of lobsters by the fishery would not create trophic problems for other species.

Lobsters prey on a wide variety of species and are apparently able to switch prey species as conditions dictate. They may play the role of keystone predator in ecosystems in which they occur, although such a role has not apparently been documented to date (as, for example, the role of green sea urchin in structuring coastal ecosystems in the Gulf of Maine has been documented). As such, removal of lobsters by the fishery, and the resulting reduction in predation on other species, may not be having a substantial impact on ecosystems in this area.

These conclusions should be considered preliminary, based on available evidence, and valid for the current regime under which lobsters are at very high abundance compared to historical levels. Should lobster abundance decline, and fishery removals contribute to substantially lower abundance, these conclusions would have to be revisited.

6.4.4 Fishery impacts on biodiversity, communities, ecosystem structure

In general, the lobster fishery is a relatively “clean” fishery causing relatively low levels of mortality to non-target species. However there are several gaps in knowledge of impacts, which must be considered in drawing this overall conclusion.

Incidental catch is generally low and mortality to fish species from incidental catch probably low relative to other sources of mortality. Post-release survival has not been studied for most fish species in the bycatch but is probably greater than zero and possibly relatively high, since most releases would be in relatively shallow water. The principal unknown here is impact on sculpins, sea raven, and cunner, the most common species in the bycatch, whose biology and population dynamics are little known. There may be impacts on other little-known non-commercial species although bycatch levels would be very low.

The impact of the lobster fishery on populations of Jonah and rock crabs is not documented in detail, although there is some information on catch levels. This may be one of the key uncertainties with respect to ecosystem impacts of the fishery. These *Cancer* species are common components of coastal communities and may have a role in structuring these ecosystems as predators and as prey. Their relative importance in coastal ecosystems has increased in the past decade, with the decline in green sea urchins (Steneck et al 2004). The design of traps and escape vents ensures that all females of these species, most male rock crab, and a proportion of male Jonah crab, would not be taken in the lobster fishery.

The lobster fishery operates in what must be considered a highly modified ecosystem that has been undergoing constant, substantial changes at least for several decades (see above). Assessing the ecosystem impacts of the fishery relative to the background changes in the recent past poses significant challenges.

7 OTHER FISHERIES AFFECTING THE TARGET STOCK

Within the unit of certification (i.e. LCMA 1 lobsters landed in Maine) there is no provision for landing lobsters by means other than trap. With respect to the Gulf of Maine stock, lobster may be taken in otter trawls, gill nets and dredges (ASMFC 2009 draft asst). Amounts taken by non-trap fisheries are estimated to be very low compared to the trap catches, 2% of the total (ASMFC 2009); however information on non-trap catches is apparently not very reliable and non-trap catches are not compiled in the stock assessment. A bycatch of 500 individuals per trip is permitted for otter trawlers operating in the Gulf of Maine. Recreational fishing (trap only) is allowed in Maine and landings are incorporated within the 10% harvester requirement.

8 STANDARD USED

The MSC Principles and Criteria for Sustainable Fisheries form the standard against which the fishery is assessed and are organised in terms of three principles. Principle 1 addresses the need to maintain the target stock at a sustainable level; Principle 2 addresses the need to maintain the ecosystem in which the target stock exists, and Principle 3 addresses the need for an effective fishery management system to fulfil Principles 1 and 2 and ensure compliance with national and international regulations. The Principles and their supporting Criteria are presented below.

8.1 Principle 1

A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.[2]:

The intent of this principle is to ensure that the productive capacities of resources are maintained at high levels and are not sacrificed in favour of short-term interests. Thus, exploited populations would be maintained at high levels of abundance designed to retain their productivity, provide margins of safety for error and uncertainty, and restore and retain their capacities for yields over the long term.

Criteria:

1. The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.
2. Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within a specified time frame.
3. Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.

8.2 Principle 2

Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.

The intent of this principle is to encourage the management of fisheries from an ecosystem perspective under a system designed to assess and restrain the impacts of the fishery on the ecosystem.

Criteria:

1. The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.

2. The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimises mortality of, or injuries to endangered, threatened or protected species.

[2] The sequence in which the Principles and Criteria appear does not represent a ranking of their significance, but is rather intended to provide a logical guide to certifiers when assessing a fishery. The criteria by which the MSC Principles will be implemented will be reviewed and revised as appropriate in light of relevant new information, technologies and additional consultations

3. Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.

8.3 Principle 3

The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

The intent of this principle is to ensure that there is an institutional and operational framework for implementing Principles 1 and 2, appropriate to the size and scale of the fishery.

A. Management System Criteria:

1. The fishery shall not be conducted under a controversial unilateral exemption to an international agreement.

The management system shall:

2. Demonstrate clear long-term objectives consistent with MSC Principles and Criteria and contain a consultative process that is transparent and involves all interested and affected parties so as to consider all relevant information, including local knowledge. The impact of fishery management decisions on all those who depend on the fishery for their livelihoods, including, but not confined to subsistence, artisanal, and fishing-dependent communities shall be addressed as part of this process.

3. Be appropriate to the cultural context, scale and intensity of the fishery – reflecting specific objectives, incorporating operational criteria, containing procedures for implementation and a process for monitoring and evaluating performance and acting on findings.

4. Observe the legal and customary rights and long-term interests of people dependent on fishing for food and livelihood, in a manner consistent with ecological sustainability.

5. Incorporates an appropriate mechanism for the resolution of disputes arising within the system[3].

6. Provide economic and social incentives that contribute to sustainable fishing and shall not operate with subsidies that contribute to unsustainable fishing.

7. Act in a timely and adaptive fashion on the basis of the best available information using a precautionary approach particularly when dealing with scientific uncertainty.

8. Incorporate a research plan – appropriate to the scale and intensity of the fishery – that addresses the information needs of management and provides for the dissemination of research results to all interested parties in a timely fashion.

9. Require that assessments of the biological status of the resource and impacts of the fishery have been and are periodically conducted.

[3] Outstanding disputes of substantial magnitude involving a significant number of interests will normally disqualify a fishery from certification.

10. Specify measures and strategies that demonstrably control the degree of exploitation of the resource, including, but not limited to:
    a) setting catch levels that will maintain the target population and ecological community's high productivity relative to its potential productivity, and account for the non-target species (or size, age, sex) captured and landed in association with, or as a consequence of, fishing for target species;
    b) identifying appropriate fishing methods that minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;
    c) providing for the recovery and rebuilding of depleted fish populations to specified levels within specified time frames;
    d) mechanisms in place to limit or close fisheries when designated catch limits are reached;
    e) establishing no-take zones where appropriate.

11. Contains appropriate procedures for effective compliance, monitoring, control, surveillance and enforcement which ensure that established limits to exploitation are not exceeded and specifies corrective actions to be taken in the event that they are.

B. Operational Criteria

Fishing operation shall:

12. Make use of fishing gear and practices designed to avoid the capture of non-target species (and non-target size, age, and/or sex of the target species); minimise mortality of this catch where it cannot be avoided, and reduce discards of what cannot be released alive.

13. Implement appropriate fishing methods designed to minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas.

14. Not use destructive fishing practices such as fishing with poisons or explosives;

15. Minimise operational waste such as lost fishing gear, oil spills, on-board spoilage of catch etc.

16. Be conducted in compliance with the fishery management system and all legal and administrative requirements.

17. Assist and co-operate with management authorities in the collection of catch, discard, and other information of importance to effective management of the resources and the fishery.

9 BACKGROUND TO THE EVALUATION

9.1 Evaluation Team

Lead Assessor: Paul Knapman

Paul is a lead assessor with Intertek Moody Marine and is the General Manager for Intertek Moody Marine. He has extensive experience of the fishing industry in North America and Europe. He was previously Head of an inshore fisheries management organisation, a senior policy advisor to the UK government on fisheries and environmental issues, a fisheries officer and a fisheries consultant working in Europe and Canada.

Expert Advisor: (Principle 1) Colin Bannister

Colin is the former Head of the Shellfish Resource Group at the Centre of Environment, Fisheries and Aquaculture Science (Cefas), Lowestoft, in the United Kingdom (UK) and from 2001 until retirement in 2004 was the Senior Fisheries Science Advisor at CEFAS, providing high level advice to the UK Department of Environment, Food and Regional Affairs (DEFRA) and industry on all aspects of the assessment and management of finfish stocks. He has extensive knowledge and experience of the management of wild shellfish stocks, both crustacean and molluscan, and of scientific research and advice on the same. Since 2004, he has acted as a scientific member of the Canadian Government Review Panel for the Snow Crab fishery in the Gulf Region of Canada; a member of the Committees and Council of the Shellfish Association of Great Britain; and recently completed a report "Towards a Development Strategy for the Shellfish Industry in England" for the DEFRA Inshore Group. Colin has been involved in the assessment of a number of fisheries both as a team member and as a peer reviewer.

Expert Advisor: (Principle 2) Howard Powles

Howard has worked in fishery science, stock assessment, and conservation and management of fishery resources since the mid-1960s, as a working scientist, science manager, program manager, and consultant, with a recurrent focus on crustacean resources. Prior to retiring from the Department of Fisheries and Oceans (DFO) he was Director of Fisheries Science and of Biodiversity Science and was involved on developing ecosystem- based approaches to ocean management. During his DFO career he led on DFO responsibilities for CITES (Convention on International Trade in Endangered Species), the Convention on Biological Diversity and World Conservation Union (IUCN), was a member of the Committee on Status of Endangered Wildlife in Canada (COSEWIC) and also a Canadian observer to International Whaling Commission. Howard is a member of a number of assessment teams used by Moody to assess crustacean fisheries.

Expert Advisor: (Principle 3) Bonnie McCay

Bonnie teaches at Rutgers University, New Jersey, where she is a professor in the Department of Human Ecology and member of graduate programs in anthropology, geography, ecology and evolution. She received her Ph.D. at Columbia University in 1976 and has focused her research on the human dimensions of common pool resources and environmental change, especially in marine fisheries. Among her books are "The Question of the Commons" (with J. Acheson), "Oyster Wars and the Public Trust" and "Enclosing the Commons" (with R. Apostle and K. Mickelsen). She has participated in many committees at the intersection of science and policy, including the Ocean Studies Board of the National Academy of Sciences, the Board of Scientific Counsellors of the U.S. Environmental Protection Agency, and the scientific committee of the Mid-Atlantic Fisheries Management Council.

9.2 Previous certification evaluations

The fishery has not been previously assessed against the MSC standard.

9.3 Inspections of the fishery

Inspection of the fishery focused on the practicalities of fishing operations, the mechanisms and effectiveness of management agencies and the scientific assessment of the fisheries.

Meetings and conference calls were held as follows. Some of the key issues discussed have been identified for each meeting and detailed notes of each meeting are provided in Annex D.

Table 2 A list of individuals and/or organisations that were interviewed or provided information in the course of the site visit to the fishery.

Name	Affiliation	Date	Key Issues
Rick Wahle	Bigelow Laboratory	20/4/09	Oceanography, lobster recruitment, larval transport and settlement
John Williamson	Ocean Conservancy	20/4/09	Cetacean entanglement, mitigation measures
Vicki Cornish	Ocean Conservancy	20/4/09	Cetacean entanglement, mitigation measures
Sharon Young	The Humane Society of the United States	20/4/09	Cetacean entanglement, mitigation measures
Jonathan Grabowski	The Gulf of Maine Research Institute	20/4/09	Ecosystem impacts, bait augmentation.
John Ready	Client Group	20/4/09	Fishing, marketing.
Moe Brown	New England Aquarium	20/4/09	Cetacean entanglement, mitigation measures, ALWTRT
Peter McAleney	Maine Import Export Dealers Association	20/4/09	Markets
Jim Acheson	University of Maine	21/4/09	Overview of the industry, survey of fishermen, management, science
Jim Wilson	University of Maine	21/4/09	Overview of the industry, survey of fishermen, management, science
Teressa Johnson	University of Maine	21/4/09	Overview of the industry, survey of fishermen, management, science
Young Chen	University of Maine	21/4/09	Overview of the industry, survey of fishermen, management, science
Carl Wilson	Maine DMR	21 & 24 /4/09	Science and management
Erin Summers	Maine DMR	21/4/09	Cetacean interaction
Sarah Cotnoir	Maine DMR	21& 22/4/09	Science and management
James Henderson	Maine Lobstermen's Association (South)	21/4/09	The industry and local management
Toni Kearns	ASMFC	21/4/09	Management
Larry Knapp	Zone E	21/4/09	The industry and local management
Lew Incze	The Gulf of Maine	21/4/09	Oceanography, recruitment,

Name	Affiliation	Date	Key Issues
	Research Institute		
Elliot Thomas	Client Group	22/4/09	The industry and local management
Patrice Mc Carron	Maine Lobstermen's Association	22/4/09	The role of the MLA, the industry, local management, cetaceans
Dane Somers	Maine Lobster Promotion Council	22/4/09	The role of the Council, the industry, management
Michael Dawson	Zone D	22/4/09	The industry and local management
Bob Baines	Lobster Advisory Council	22/4/09	The industry and local management
David Cousens	Maine Lobstermen's Association	22/4/09	The industry and local management
Gerry Cushman	Maine Lobstermen's Association	22/4/09	The industry and local management
Deirdre Gilbert	Maine DMR	22/4/09	Management engagement with the industry
Linda Bean	Port Clyde Lobster	22/4/09	The industry developing the Maine brand
Sheila Dassatt	Downeast Lobstermen's Association	23/4/09	The role of the Association, The industry and local management
Cynthia Fisher	Look's Gourmet Food Co.	23/4/09	Marketing and promotion
Michael Cote	Look's Gourmet Food Co.	23/4/09	Marketing and promotion
Bob Bayer	Lobster Institute	23/4/09	The role of the Institute and supporting the industry
John Drouin	Zone A	23/4/09	The industry and local management
Daniel MacDonald	Zone C	23/4/09	The industry and local management
Dana Rice	D.B. Rice Fisheries	23/4/09	The industry and local management
Stephen Robbins III	Stonnington Lobster Coop	23/4/09	The role of the Coop, the industry and local management
Nick Lemieux	Downeast Lobstermen's Association	23/4/09	The industry and local management
Norbert Lemieux	Downeast Lobstermen's Association	23/4/09	The industry and local management
Joe Fessenden	Maine DMR	24/4/09	Monitoring, control and enforcement
George Lapointe	Maine DMR	24/4/09	Management and administration

10 STAKEHOLDER CONSULTATION

A total of 32 stakeholders were identified and consulted specifically by Intertek Moody Marine. Information was also made publicly available at the different stages of the assessment shown in Table 6, below.

Table 3 Assessment timeline for the Maine Lobster Trap Fishery.

Date	Purpose	Media
4th December 2009	Announcement of assessment	Direct E-mail/letter Notification on MSC website Advertisement in press
4th February 2009	Notification of Assessment Team nominees	Direct E-mail Notification on MSC website
19th February 2009	Notification of Assessment Team	Direct E-mail Notification on MSC website
19th February 2009	Notification of intent to use MSC FAM Standard Assessment Tree	Direct E-mail Notification on MSC website
3rd March 2009	Notification of assessment visit and call for meeting requests	Direct E-mail Notification on MSC website
20-25th April 2009	Assessment visit	Meetings
14th May 2010	Notification of Proposed Peer Reviewers	Direct E-mail Notification on MSC website
18th January 2012	Client provides updated information in relation to the management of the fishery.	Direct E-Mail
27th November 2012	Notification of Public Comment Draft Report	Direct E-mail Notification on MSC website
TBC	Notification of Final Report	Direct E-mail Notification on MSC website

10.1 Stakeholder issues

Stakeholders were offered opportunities to input to the certification process prior to the site visit in April 2009. Written submissions were received on behalf of the Whale and Dolphin Conservation Society, the Ocean Conservancy and the New England Aquarium.

Detailed notes of stakeholder meetings held during the course of the site visit are included in Appendix C.

Further stakeholder contributions were received in response to the consultation on peer reviewers. These are also included in Appendix D along with the response from the Intertek Moody Marine assessment team.

11 OBSERVATIONS AND SCORING

11.1 Introduction to scoring methodology

The MSC Principles and Criteria set out the requirements of certified fishery. These Principles and Criteria have been developed into a standard (Fishery Assessment Methodology) assessment tree - Performance Indicators and Scoring Guideposts - by the MSC, which is used in this assessment.

The Performance Indicators (PIs) have been released on the MSC website. In order to make the assessment process as clear and transparent as possible, each PI has three associated Scoring Guideposts (SGs) which identify the level of performance necessary to achieve 100, 80 (a pass score), and 60 scores for each Performance Indicator; 100 represents a theoretically ideal level of performance and 60 a measurable shortfall.

For each PI, the performance of the fishery is assessed as a 'score'. In order for the fishery to achieve certification, an overall weighted average score of 80 is necessary for each of the three Principles and no Indicator should score less than 60. As it is not considered possible to allocate precise scores, a scoring interval of five is used in evaluations. Average scores for each Principle are given to one decimal place.

Scores for the fishery are presented in the scoring table (Appendix A).

12 LIMIT OF IDENTIFICATION OF LANDINGS FROM THE FISHERY

Traceability of product from the sea to the consumer is vital to ensure that the MSC standard is maintained. There are several aspects to traceability that the MSC require to be evaluated: Traceability within the fishery; at-sea processing; at the point of landing; and subsequently the eligibility of product to enter the chain of custody. These requirements are assessed here.

12.1 Traceability within the fishery

Traceability of fishing activity within this fishery is provided through implementation and enforcement of administrative measures. Only state and federally licensed vessels may participate in the fishery. Maine licensed vessels are not permitted to fish in other state waters or in Canadian waters. This is enforced through regular shore and at-sea inspections by DMRs' Division of Marine Patrol and Enforcement and the U.S. / Canadian Coastguard and regular patrols along the Maine / New Hampshire state and U.S. / Canada national boundaries.

The size of the vessels employed and the 'day trip' nature of the fishery ensure that the vast majority of vessels only fish within LCMA 1, i.e. the geographic extent of the unit of certification. Therefore the vast majority of the Maine licensed vessels only catch lobster from LCMA 1 and the need for tracking, tracing or segregating systems for these vessels will not be necessary. However, we were made aware that a very few vessels occasionally fish beyond the seaward extent of LCMA 1 and into LCMA 3. Given that this creates a potential risk that lobsters from the unit of certification could be mixed with lobster from outside, these vessels would need to implement systems to ensure that mixing and traceability would not be compromised.

12.2 At-sea processing and transhipping

All lobsters are processed ashore. Transhipping is not allowed within the fishery.

12.3 Point of landing

There are many landing places throughout the state of Maine. The traceability of lobsters is provided by the mandatory requirement for dealers to report 100% of landings per trip on a harvester basis. If the fishery were to be successfully certified any dealer eligible to benefit from labelling or promoting lobster product as having originated from the MSC certified fishery will need to be chain of custody certified and be able to demonstrate that the origin of the lobster was from the certified fishery.

As indicated above, there appears to be a risk that lobster from the small number of vessels that fish in LCMA 3 could be mixed with lobster from LCMA1. If the fishery in LCMA 1 was to be certified those vessels that are eligible to fish in LCMA 3 would need to implement a system to ensure that lobster from the two LCMAs is not mixed either at sea or at the point of landing. Similarly, dealers that trade with these vessels would need to adopt handling systems that ensure lobster is not mixed.

This assessment only covers vessels that are licensed by the State of Maine. Any dealer that purchases lobster from any other fishery (e.g. State of New Hampshire or Massachusetts) would need to ensure and be able to demonstrate that lobster is not mixed with lobster originating from the certified fishery.

12.4 Eligibility to enter chains of custody

The scope of this certification ends at the points of landing in the state of Maine. Where there is a change in ownership of the lobster and the owner is eligible to benefit from labelling or promoting lobster product as having originated from the MSC certified fishery they will need to be chain of

custody certified and be able to demonstrate that the origin of the lobster was from the certified fishery. Certification of downstream storage and handling facilities would be required.

12.5 Target eligibility date

The client has chosen the target eligibility date to be 6 months prior to the date of publication of Public Comment Draft Report. This target date will be fixed on publication of the Public Comment Draft Report.

13 ASSESSMENT RESULTS

The Performance of the Fishery in relation to MSC Principles 1, 2 and 3 is summarised below:

MSC Principle	Fishery Performance	
Principle 1: Sustainability of Exploited Stock	Overall : 90.6	Pass
Principle 2: Maintenance of Ecosystem	Overall : 82.7	Pass
Principle 3: Effective Management System	Overall : 86.6	Pass

The fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any Performance Indicator. It is therefore recommended that the Maine Lobster Trap Fishery be certified according to the Marine Stewardship Council Principles and Criteria for Sustainable Fisheries.

The scores for the individual Performance Indicators (PI) are summarised in Table 4. The scoring commentary and justification for the scores is set out in Appendix A.

Table 4. MSC scoring table for the Maine Lobster Trap Fishery.

Scores highlighted lie in the 60 - < 80 range and have Conditions associated with them.

Principle	Component	Performance Indicator		Weight	Score
1	Outcome	1.1.1	Stock status	0.50	100
		1.1.2	Reference points	0.50	90
		1.1.3	Stock rebuilding	0	n/a
	Management	1.2.1	Harvest strategy	0.25	90
		1.2.2	Harvest control rules & tools	0.25	80
		1.2.3	Information & monitoring	0.25	80
		1.2.4	Assessment of stock status	0.25	95
2	Retained species	2.1.1	Outcome	0.33	80
		2.1.2	Management	0.33	90
		2.1.3	Information	0.33	90
	Bycatch	2.2.1	Outcome	0.33	80
		2.2.2	Management	0.33	80
		2.2.3	Information	0.33	80
	ETP species	2.3.1	Outcome	0.33	90
		2.3.2	Management	0.33	90
		2.3.3	Information	0.33	85
	Habitats	2.4.1	Outcome	0.33	80
		2.4.2	Management	0.33	60
		2.4.3	Information	0.33	80
	Ecosystem	2.5.1	Outcome	0.33	90

Principle	Component	Performance Indicator		Weight	Score
		2.5.2	Management	0.33	80
		2.5.3	Information	0.33	90
3	Governance and policy	3.1.1	Legal & customary framework	0.25	100
		3.1.2	Consultation, roles & responsibilities	0.25	95
		3.1.3	Long term objectives	0.25	70
		3.1.4	Incentives for sustainable fishing	0.25	80
	Fishery specific management system	3.2.1	Fishery specific objectives	0.20	70
		3.2.2	Decision making processes	0.20	90
		3.2.3	Compliance & enforcement	0.20	95
		3.2.4	Research plan	0.20	90
		3.2.5	Management performance evaluation	0.20	90
				Overall Score	
Principle 1 – Target Species				**90.6**	
Principle 2 – Ecosystem				**83.0**	
Principle 3 – Management				**86.6**	

13.1 Conditions

The fishery attained a score of below 80 against 3 Performance Indicators. The assessment team has therefore set Conditions for continuing certification that the client is required to address. The Conditions are applied to improve performance to at least the 80 level within a period set by the certification body but no longer than the term of the certification.

As a standard Condition of certification, the client shall develop an 'Action Plan' for meeting the Conditions.

The Conditions are associated with 3 key areas (components) of performance of the fishery and are set out in tabular form below along with the narrative of the relevant PI, Scoring Guideposts (SG), the assessment team score, their scoring rationale and/or scoring commentary (taken from the scoring table in Appendix A) the Condition and details regarding the client action plan and how the Condition will be met.

CONDITION 1	
Habitat Strategy	**2.4.2**
PI	There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types.
SG 60	There are measures in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance. The measures are considered likely to work, based on plausible argument (e.g general experience, theory or comparison with similar fisheries/habitats).
SG 80	There is a partial strategy in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above. There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or habitats involved. There is some evidence that the partial strategy is being implemented successfully.
SG 100	There is a strategy in place for managing the impact of the fishery on habitat types. The strategy is mainly based on information directly about the fishery and/or habitats involved, and testing supports high confidence that the strategy will work. There is clear evidence that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its objective.
Score	**60**
Scoring Commentary / Rationale	The mode of operation of the fishery and the characteristics of the habitats in the area in which it operates suggest that the Habitat Outcome level of 80 will continue to be achieved (see PI 2.4.1). However, it cannot be stated that the fishery has no impact on habitat, and as such, measures or a partial strategy are considered to be required (FAM v1 7.1.25). Traps are considered to be a gear which has low impacts relative to mobile gear types, and habitats in much of the fishery area are considered to be of low vulnerability to damage from trap gear. As such, measures can be considered to be in place to achieve the 80 scoring guidepost for the outcome performance indicator 2.4.1. Under US fisheries legislation, essential fish habitat must be identified and protected by fisheries management plans. The New England Fishery Management Council (NEFMC) has identified essential fish habitat for a wide range of species, and protection measures for these portions of habitat are identified in fishery management plans and in the EFH Omnibus Amendment 1 published in 1999 (NEFMC 2011b). The Omnibus Amendment was further amended in 2007 and is currently undergoing further revision. Lobster fisheries have apparently not, to date, been subject to restrictions for protection of

	essential fish habitat. A review of impacts of different fishing gears on fish habitat conducted as part of the current revision of the Omnibus Amendment (NEFMC 2011) indicates that lobster traps have relatively low impacts on fish habitat, at least compared to mobile gear. The lobster fishery could be subjected to restrictions if it was found to be harming essential fish habitat, under the US legislation. However, it cannot be stated that a "partial strategy" is in place as there has apparently been no explicit consideration of potential habitat impacts of the fishery, and of how fishing operations should be changed if the measures in place proved to be unsuitable for meeting the 80 scoring guidepost for outcome 2.4.1. A score of 60 is therefore assigned.
Condition 1	The client is required to present evidence by the fourth annual audit that shows : • There is a partial strategy in place that is expected to at least achieve the SG 80 level of performance for PI 2.4.1, i.e. "*The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm*". • There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or habitats involved. • There is some evidence that the partial strategy is being implemented successfully.
Milestones	• By the first annual audit the client is required to provide documented evidence that a plan for the assembly of available information and a program for evaluation has been developed and data collection and assembly for this purpose has commenced. • By the second annual audit the client will provide documented evidence showing the information that has been assembled and the results of analysis to date. • By the third annual audit the client will provide documented evidence to show the likely significance of the potential cumulative impacts on habitats and, if necessary, implement a partial strategy. • By the fourth annual audit the client will provide evidence that the partial strategy, if warranted, is being implemented successfully. The above provides incremental steps in achieving the condition. It is possible that the condition could be rescored and closed out by the third annual audit, if the outcome of evaluating the cumulative effects of hauling and setting lobster traps on sea bed habitats shows insignificant impacts on habitats. If the outcome of evaluation shows a need for a partial strategy this will be reviewed at the fourth annual audit with the expectation that a minimum score of 80 will be achieved.
Client Action Plan	The client will meet this Condition through the following Actions: A.) The client will conduct research on the Maine lobster fishery's potential spatial and temporal impacts on habitat. Research will account for the frequency and intensity of impacts on marine habitats found where the fishery is conducted, and will consider the question of cumulative effects. The client will assess impacts to biodiversity as a proxy for ecosystem resilience and develop a

	strategy, if warranted, to mitigate these impacts. The client will: 1. Identify the spatial and temporal extent and intensity of lobster fishing by habitat and depth (2013/2014). 2. Conduct habitat stratified Before After Control Impact (BACI) experiments on biodiversity and ecosystem resilience that may be impacted by traps. These studies will account for trap placement and different hauling practices (2014/2015). 3. Develop a spatial, temporal and intensity model of lobster fishing impacts on habitat for the assessment area similar to or expanded from the SASI model including identification of habitats of particular concern (2016). 4. Using the data from the research listed above, consider the lobster fishery's impact on habitat and determine if a strategy to mitigate these impacts is warranted (2016). 5. If warranted, develop and begin to implement a partial strategy or strategies to mitigate impacts on habitat (2017). The client will work with DMR to ensure research results are considered and incorporated as the state's management plan for lobster is developed. The client will also work with DMR and the ASMFC in the event that it becomes necessary to investigate and assess strategies to mitigate impacts on habitat. B.) The ASMFC's Habitat Committee has recommended the habitat section of the Lobster management plan be updated in 2013, and this recommendation was approved at the Commission's October 2012 meeting, creating an excellent opportunity to address the concerns raised by the MSC review. In 2012, the habitat committee will proceed with developing an updated habitat section for the Lobster FMP. Generally, when a species' habitat section is updated, the Habitat Committee will seek an author from one of the states or may contract out for a comprehensive literature review and report describing the important habitat for each life stage (of the species in question), as well as a description of the habitat condition and any relevant threats to these habitat areas of concern. Some of those threats may be other fisheries or other anthropogenic causes. This review is examined by the habitat committee, and any new information is incorporated into the habitat section of the management plan. As part of this review, the habitat committee will make management recommendations, as well as provide a list of research recommendations for future research. The Client will advocate for the consideration of the lobster fishery's impact on habitat throughout the process of updating the lobster habitat section. The client will work with DMR's appointee to the Habitat Committee to ensure he is familiar with the type of research needed to better understand the lobster fisheries impact on habitat, and is prepared to advocate for such types of research. Additionally, the client will advocate for the explicit consideration of the (MSC) reviewer's concerns as the literature review moves forward. The client will correspond with members of the habitat committee and the author of the literature review, and will attempt to influence the literature review *if and as appropriate*. The client will also attempt to influence the update of the lobster habitat section *as appropriate*. Although it is likely the ASMFC will continue to focus their research on how other factors influence lobster habitat rather than how the lobster fishery itself impacts habitat, the client will advocate for research on and consideration of the lobster fishery's impact on habitat in the Gulf of Maine, and will advocate for an examination and determination of this

impact by the ASMFC.

Milestones:

By the first annual audit, the client will provide documented evidence that a plan for the assembly of available information and a program for the evaluation has been developed and data collection and assembly for this purpose has commenced. The client will accomplish this by:

- Working with DMR, and possibly other research entities in Maine, to design and implement the research listed in A1 and A2 (listed above). By the first annual audit, the client will provide a written update of where these projects stand, including identification of investigators, research plans, and results to date.
- Providing written documentation of the progress made at the ASMFC concerning the update to the lobster habitat section and identification of research priorities (as outlined in section B above).

By the second annual audit, the client will provide documented evidence showing the information that has been assembled and the results of the analysis to date. The client will accomplish this by:

- Sharing the results of A1 and A2 with auditors.
- Providing the updated habitat section to the ASMFC lobster management plan and any research recommendations resulting from the update.
- Providing a summary of all habitat research to date, including, if relevant, the literature review conducted by the ASMFC habitat committee.
- Sharing with the reviewers the planned approach for accomplishing A3.

By the third annual audit, the client will provide documented evidence to show the likely significance of the potential cumulative impacts on habitats and, if necessary, implement a partial strategy. The client will accomplish this by:

- Providing a final report of the results of A1 and A2.
- Providing a report on A3, which may or may not be a final report depending on the research timeline.
- Providing an initial determination, based on these studies, of the lobster fishery's impact on habitat, which will include justification for that determination.
- Sharing the initial plan for a partial strategy to mitigate that impact, if warranted, OR providing justification for a determination that a partial strategy is not necessary.

By the fourth annual audit, the client will provide evidence that the partial strategy (if warranted) is being implemented successfully. The client will accomplish this by

- Providing a final determination of the impact of the fishery's impact on habitat.
- Providing documentation of the partial strategy
- Providing written documentation that shows the partial strategy is being implemented successfully.

Note 1: The fourth annual audit milestone listed above indicates the client will provide documentation of the steps being taken to implement the partial strategy. If such a strategy is warranted, it will be implemented in cooperation with DMR. Implementation would likely be conducted through the DMR

	rulemaking or Maine state legislative process. Once the strategy is identified, outreach will need to be conducted with the lobster zone councils, and possibly with other stakeholders. This outreach may result in slight changes to the strategy. Once the final strategy is identified, changes required through rulemaking will take at least 120 days, and changes required through the legislative process will take up to 18 months, depending on when the process starts. Draft legislation must be submitted in October in order to be considered in the upcoming session. If the legislation is not submitted by October, it must be submitted in the subsequent session. It is not uncommon for significant changes to require several attempts prior to adoption. For that reason, the client believes it is reasonable to provide a progress report by the fourth annual audit on where things stand, rather than guaranteeing such strategies will be fully implemented. **Note 2:** In earlier correspondence, the review team indicated a determination of "No Impact" would be cause to reconsider the score on PI 2.4.2. If such a determination is made by the ASMFC or NOAA Fisheries, the client will present the determination and the data used to make it to auditors. If it is determined that the lobster fishery has no adverse impact on habitat, the client will request the score for 2.4.2 to be raised to 80, which would obviate the need for further pursuit of the action plan.
Consultation on Condition	A letter of support from the Commissioner for DMR in relation to this action plan is appended at Appendix F to this report

CONDITION 2	
Long term objectives	**3.1.3**
PI	The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Principles and Criteria, and incorporates the precautionary approach.
SG 60	Long-term objectives to guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are implicit within management policy.
SG 80	Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within management policy.
SG 100	Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within and required by management policy.
Score	**70**
Scoring Rationale	The ASMFC's lobster management plan has clearly stated long-term objectives; they are not explicitly consistent with a precautionary or ecological approach, although it is clear that the plan has precautionary and ecological (specifically habitat) measures in it and the ASMFC's strategic plan includes a proactive strategy. Moreover, the ASMFC has a Habitat Program, with a strategic plan that refers to ecosystem-based fisheries management while focusing on habitat (ASMFC 2007b). Within the broader state-federal management structure, a precautionary approach is required through the reauthorized Magnuson-Stevens Act. However, it is unclear the extent to which this applies to LCMA 1, and there is no explicit statement about a precautionary approach in the ASMFC plan. These uncertainties about the formal commitment to a precautionary approach for lobster management and the somewhat restricted incorporation of ecosystem objectives keep the score from fully achieving the single scoring issue under the 80 scoring guidepost.
Condition 2	The client is required to show by the third annual audit that clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within management policy.
Milestones	• By the first annual audit the client will provide evidence that action has been taken and a commitment has been made by the management organisations to incorporate explicit long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, within management policy. • By the second annual the client will provide evidence of progress made by the management organisations to incorporate explicit long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, within management policy. • By the third annual audit the client will provide evidence that explicit long-term objectives that guide decision-making, consistent with MSC

	Principles and Criteria and the precautionary approach have been incorporated within management policy.
Client Action Plan	This condition will be met through the following actions. The first action deals with adoption of a precautionary approach; the second focuses on goals to guide decision-making; and the third, the advocacy and adoption of clear long term ecosystem related objective. A.) The client will advocate for the adoption of biological-based reference point within the ASMFC's management plan. The client will also advocate for the continued analysis of stock and fishery health relative to these reference points, and for the adoption of conservative management measures when necessary. The next American lobster stock assessment is scheduled to be completed in 2014. The Lobster Management Board and Lobster Technical Committee have indicated a desire to adopt biological-based reference points during this process. In a memo dated April 5 (see attachment), the Lobster Technical Committee recommended a number of terms of reference for the assessment and subsequent peer review. Of particular interest are the recommendations to: • Develop simple, empirical, indicator-based trend analyses of reference abundance and effective exploitation for stocks and sub-stock areas. • Characterize uncertainty of model estimates, reference points, and stock status. This Technical Committee has recommended that the Lobster Management Board adopt biological-based reference points and explicitly consider the potential impacts of uncertainty. In an August 2012 discussion, Fisheries Management Plan Coordinator for American Lobster Toni Kerns indicated the board is currently moving forward with this recommendation. Biological based reference points and an explicit consideration of uncertainty will likely be adopted by 2016, although the interactive nature of ASMFC processes precludes identifying a definite implementation date. Maine representatives to the ASMFC will participate in discussions in which the adoption of biological based reference points and an explicit consideration of uncertainty are deliberated. Maine representatives participate in all forums where this issue will be addressed, including the lobster technical committee, the lobster advisory panel, the plan review team, the species management board, the Interstate Fisheries Management Policy Board, and/or either of the annual meetings of the Commission itself. B.) The Client will advocate through the Maine representatives to the ASFMC the adoption of clear long term ecosystem related objectives consistent with MSC Principles Criteria within the ASFMC's management plan. C.) Maine's lobster fishery is managed under a number of regulations designed to accomplish specific (but not always explicitly articulated) goals. DMR has stated an intention to proceed with the development of management plans for state water fisheries, containing clearly defined resource and ecosystem related goals and objectives. The high degree of stakeholder involvement in lobster management will make the lobster management plan even more interactive and time consuming than other plans, further augmenting the time necessary to incorporate management

	changes. The client will continue to meet with DMR to ensure the MSC Conditions and recommendations are considered as they develop a state management plan for lobster. DMR has reviewed and endorsed the client's Action Plan (see letter), and is aware of the importance of clearly articulating long term objectives and acknowledging the impact of uncertainty in the state management plan. **Milestones:** By the first annual audit, the client will provide evidence that action has been taken and a commitment has been made by the management organizations to incorporate explicit long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, within management policy. The client will do this by: 1.) Providing evidence that Maine representatives at the ASMFC have participated in the deliberations regarding the development and adoption of biological-based reference points and an explicit consideration of the impacts of uncertainty. 2.) Providing a letter of commitment from DMR to incorporate explicit short and long term resource and ecosystem related management objectives into its management program for the lobster fishery. This letter will also include a commitment to acknowledge uncertainty where it exists and consider these impacts to the extent practicable as they proceed with management. As noted above, DMR is just beginning to develop management plans for Maine's fisheries. During the consultation phase of the Lobster Management Plan the Client will advocate for an explicit consideration of the lobster fishery's interaction with the ecosystem, including habitat, non target and ETP species as the lobster plan is developed. The Client will provide evidence of this advocacy and an update of progress at the first annual audit. 3.) Providing evidence of advocacy for the adoption of clear long-term ecosystem related objectives consistent with MSC Principles and Criteria within the ASMFC management plan. By the second annual audit, the client will provide the review team with an update of progress at the ASMFC as they deliberate adoption of biological based reference points, incorporation of an explicit consideration of uncertainty and the adoption of clear long-term ecosystem related objectives consistent with MSC Principles and Criteria. The client will also provide a report of progress in DMR's development of a management plan for lobster (see action plan for Condition 2 for details). By the third annual audit, the client will show that biological-based reference points have been adopted, and that the precautionary approach, in the form of an explicit consideration of uncertainty, is embedded within ASMFC management policy. They will also provide evidence that the ASMFC and state management plans for lobster include clear long term goals for the resource and ecosystem related aspects of the fishery as well as an explicit consideration of the impacts of uncertainty (see action plan for Condition 3 for details).
Consultation on Condition	A letter of support from the Commissioner for DMR in relation to this action plan is appended at Appendix F to this report

CONDITION 3	
Fishery Specific Objectives	**3.2.1**
PI	The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2.
SG 60	Objectives, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are implicit within the fishery's management system.
SG 80	Short and long term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.
SG 100	Well defined and measurable short and long term objectives, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.
Score	**70**
Scoring Rationale	The explicit objectives for management under the ASMFC FMP are written to be readily measurable and are quite detailed and appropriate in relation to Principle 1. None refer explicitly to habitat, ecosystem, and by catch considerations and therefore does not fully meet the 80 scoring issue for Principle 2. However, the Magnuson Stevens Act/Sustainable Fisheries Act provisions for habitat protection and minimizing bycatch, which explicitly reflect Principle 2, can influence management decisions for American lobsters in the state waters covered by the ASMFC ISFMP, insofar as there must be consistency between federal and state waters' management. However, there is some uncertainty about the application of MSA/SFA principles to state management of American lobster, via the ASMFC, leading to a score of 70 to be assigned.
Condition 3	The client is required to show by the fourth annual audit that short and long term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.
Milestones	• The client is required to provide evidence by the first annual audit that action has been taken and a commitment has been made by the management organisations to incorporate short and long term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, within the fishery's management system. • The client is required to provide evidence at the second and third annual audits of progress toward a commitment by the management organisations to incorporate short and long term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, within the

	fishery's management system. • By the fourth annual audit the client will provide evidence that short and long term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.
Client Action Plan	As noted in the action plan for Condition 2, DMR will soon be developing a management plan for lobster. This condition will be met by working with DMR as this process moves forward. **Milestones:** <u>By the first annual audit,</u> the client will present evidence that action has been taken and a commitment has been made by the management organizations to incorporate short and long term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, within the management system. The client will accomplish this by providing a letter of commitment from DMR to incorporate explicit short and long term management objectives into its management program for lobster. This letter will also include a commitment to incorporate the information resulting from the habitat impact analysis (see condition 1) and, to the extent practicable, to include MSC's Principle 2 issues in the management plan as appropriate. <u>By the second annual audit,</u> the client will provide evidence that the process is underway. This may include but is not limited to: • Minutes from meetings of the Lobster Advisory Council, and Zone Councils • Any relevant testimony to the Legislature's Joint Standing Committee on Marine Resources Committee at which standards for fisheries management plans were discussed. • DMR policy memos and other evidence of internal DMR discussions indicating progress in the development of management objectives. • Correspondence between industry associations, DMR, and other lobster stakeholders indicating progress in the development of management objectives. <u>By the third annual audit,</u> the client will provide documentation and a written summary of the steps taken to incorporate Principle 1 and 2 issues into the state management plan for lobster. This summary will include a draft management plan if it is available at that time. <u>By the fourth annual audit,</u> the client will provide evidence that the goals and objectives, consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the management system. This will be done by providing a copy of the state management plan for lobster.
Consultation on Condition	A letter of support from the Commissioner for DMR in relation to this action plan is appended at Appendix F to this report

14 APPENDICES

Appendix A: Scoring Table

Appendix B: Peer Review Reports

1. Peer Reviewer Biographies
2. Peer Review Report A
3. Peer Review Report B

Appendix C: Notes From Stakeholder Meetings

Appendix D: Stakeholder Comments in Response to Assessment Notifications

Appendix E: Draft Client Action Plan

Appendix F: Letter of Support for the Client Action Plan from the Commissioner of the Department of Marine Resources, State of Maine.

APPENDIX A

Scoring Table

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Principle 1	A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.

1.1	Management Outcomes:

1.1.1	**Stock Status**: The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing	It is likely that the stock is above the point where recruitment would be impaired.	It is highly likely that the stock is above the point where recruitment would be impaired. The stock is at or fluctuating around its target reference point.	There is a high degree of certainty that the stock is above the point where recruitment would be impaired. There is a high degree of certainty that the stock has been fluctuating around its target reference point, or has been above its target reference point, over recent years.

Scoring Comments

Section 4.6 of this Report describes the trends in productivity from the Gulf of Maine since 1982 using landings data, and the corresponding trends in exploitation rate, abundance, recruitment and spawning biomass estimated by the University of Maine length based model (UMLBM) as described in the most recent (2009) American Lobster stock assessment report (ASMFC 2009a). Section 4.6 also describes the determination of stock status by comparing the mean abundance and exploitation rate for 2005-2007 against new reference criteria specified in Addendum XVI of Amendment 3 of the Interstate Lobster Fishery Management Plan (ASMFC, 2010b). The new four-tier reference points (ASMFC 2010a, ASMFC 2010b) are defined as percentiles of the statistical distribution of abundance and E in the reference period 1982-2003.

Since 1982, exploitation rate, E, estimated by the 2009 UMLBM has fluctuated around 0.5 with little or no trend, but landings have increased five-fold from 20 million pounds (9000 mt) in 1990 to a peak of circa 95 million pounds (43000mt) in 2010. Productivity is therefore high. This has been sustained by corresponding increases in abundance, recruitment and spawning biomass:

- Reference abundance (defined as the number of lobsters of 78+ mm carapace length (CL) on 1 January, plus the recruits into that size range during the year) increased from 45 million in 1982 to a peak of 126 million in 2005 then declined to 113 million in 2007.
- Recruitment increased from 18.4 million in 1985 to a peak of 117.6 million in 2007.
- Spawning biomass increased from 3,417 mt in 1987 to a 2005-2007 mean of 9242 mt.

Using the new reference points, E is well below the threshold reference point and reference abundance is well above both the threshold and the target reference points so both are in a favorable condition that does not require management action. This is illustrated in Section 4.6.2 of the Report, based on the latest stock status section of the ASMFC website, current as of January 2012. Because exploitation rate estimated by the 2009 UMLBM has fluctuated since 1982 without trend, the pronounced increases in abundance and recruitment are most likely to have been caused by ecological changes. There is no published stock and recruitment relationship for this stock, and it cannot be shown directly at what level of abundance there is likely to be a fishery-induced impairment of recruitment, but since abundance is well above the target reference point, it is highly unlikely that recruitment or reproductive capacity are currently impaired. As the 2009 Stock Assessment Report (ASMFC 2009a), the Advisory Report to the Peer Review (ASMFC 2009b), and Technical Committee memorandum 10-034 (ASMFC 2010 a) all make clear, the caveat is that the long term validity of these conclusions depends on the continuation of the current ecological regime favouring high recruitment.

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Score: 100

The assessment model and the latest trend-based reference points (ASMFC 2010b) show that productivity, stock abundance and recruitment are all high, and that the Gulf of Maine stock is currently in a favorable condition that does not require management action. Abundance has been in the green zone at or above the new target reference point since 1999. In the green zone it is highly certain that recruitment is well above the point where reproductive capacity and recruitment are likely to be impaired by the fishery. The fishery therefore meets the two elements of SG100, justifying a score of 100.

The current stock status is conditional on the current recruitment regime, however, so if the recruitment regime reverses in the future, this performance indicator will have to be reassessed.

Audit Trace References

ASMFC 2009a
ASMFC 2009b
ASMFC 2010a
ASMFC 2010b

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
1.1.2	**Reference Points:** Limit and target reference points are appropriate for the stock.	Generic limit and target reference points are based on justifiable and reasonable practice appropriate for the species category.	Reference points are appropriate for the stock and can be estimated. The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity. The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome. For low trophic level species, the target reference point takes into account the ecological role of the stock.	The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity following consideration of relevant precautionary issues. The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome, or a higher level, and takes into account relevant precautionary issues such as the ecological role of the stock with a high degree of certainty.

Scoring Comments

As described in Section 4.5 of this report, the original F10 egg-per-recruit definition of lobster overfishing has been replaced by a trend-based approach using stock indicators, and threshold and target reference point values, determined from the outputs of a stock-specific assessment model, currently the UMLBM. Indicator values averaged for the three most recent years are compared to threshold (limit) and target reference values derived from the statistical distribution of indicator values for a historical reference period, in this case 1982 to 2003.

Preliminary statistical criteria and trend-based reference values were originally recommended by the stock assessment in 2006 (ASMFC 2006), and amendments proposed by the 2009 stock assessment (ASMFC 2009a) and it's Peer Review Panel (ASMFC 2009b). These have now been overtaken by the approach defined in Addendum XVI to Amendment 3 of the Interstate Lobster Fishery Management Plan (ASMFC 2010b), based on Technical Committee Memorandum 10-034 (ASMFC 2010a). The current stock indicators are the reference abundance (defined as the number of lobsters of 78+ mm carapace length (CL) on 1 January, plus the recruits into that size range during the year) and the exploitation rate E, derived from the UMLBM.

As described in Section 4.5.2, Addendum XVI specifies that reference abundance and E will be averaged for the three most recent years (currently 2005-2007) and compared to percentiles and colour-coded quartiles of the statistical distribution of these indicators for 1982-2003.

- The abundance threshold is the 25th percentile. Abundance in the lower quartile is below the threshold, and therefore depleted, and is in a red zone requiring immediate management action. The abundance target is the 75th percentile. Abundance at or above this is in the upper quartile, a favorable green zone where no management action is required. Abundance in the intermediate orange quartile (25th to <50th percentile) or yellow quartile (50th to < 75th percentile) will trigger management action if, but only if, spawning biomass or recruitment are also below their 25th percentiles in the last three years.

- The exploitation rate threshold is the 75th percentile. Exploitation rate at or above this percentile is above the threshold, and the stock is overfished and in the red zone requiring immediate management action. The exploitation rate target is the 25th percentile. E at or below this percentile is in a favorable green zone where no management action is required. E in the intermediate orange quartile (50th to <75th percentile) or yellow quartile (25th to < 50th percentile) will trigger management action only if spawning biomass or recruitment are also below their 25th percentiles in the last three years.

As of January 2012, the ASMFC website compares the trends and recent average in abundance and exploitation rate to the four-tier reference point values for the reference period. It is shown that lobster abundance in the Gulf of Maine is in the green zone well above the target reference point, and that E is below the threshold reference point and in the yellow zone just below the 50th percentile. Management action is currently not required, and the stock is designated as neither depleted nor overfished (Section 4.6.2 and Section 4.6.5 of this Report).

For the record, the 2009 Stock Assessment also carried out a trend-based analysis using the 2006 reference point criteria (ASMFC 2009a), and stock indicator values derived from both the CSM and the UMLBM. These produced slightly different conclusions (stock overfished, but not depleted). It also updated the suite of 17 empirical indicators originally estimated by the 2006 stock assessment (Section 4.5.3 and 4.6.7 of this Report), as well as a set of life history reference points (Section 4.6.8 of the Report). The current mean E exceeds all of the life history criteria (stock depleted and overfished).

Technical Committee Memorandum 10-034 (ASMFC 2010a) and Addendum XVI (ASMFC 2010b) acknowledge that the current trend based approach is an interim solution until an appropriate biologically-based alternative can be developed, and that it depends on assuming that the productivity supporting the fishery is maintained.

It is noted that the use of E as a metric of fishing pressure in place of the fishing mortality coefficient F was defended by the 2009 Stock Assessment Report (ASMFC 2009a, p 90, 91) on the grounds that E is a metric that only ranges from zero to 1and is therefore more understandable to stakeholders. This is countered by the fact that E varies in response to both fishing pressure and recruitment, and that in different parts of the range of E the same percentage change does not equate to the same proportional change in the coefficient F. This could mislead stakeholders in the future if it becomes necessary to discuss the severity of the management response required at high levels of effort and low abundance.

Score: 90

From 2006 to 2010, the US Lobster Stock Assessment, Peer Review Panel, Technical Committee and stakeholders have worked hard to develop stock indicators, trend-based threshold and target reference points (derived from the historical time series of stock indicators), and color-coded ‘stop-light’ criteria, in order to determine objectively whether the stock is depleted or overfished. The current approach using the four-tiered ‘stop-light’ criteria is that advocated by Technical Committee Memorandum 10-034 (ASMFC 2010a) and Addendum XVI (ASMFC 2010b). The data are derived from a length based stock assessment model developed specifically for the American lobster (the UMLBM). Having been developed through two stock assessments (2006 and 2009), peer reviews, and consultation with stakeholders, these elements are now considered to be appropriate for the stock and its current ecological regime, thus meeting the first element of SG80.

The reference point values are considered to be conservative (precautionary) because they derive from indicator data for the period 1982-2003, during which abundance increased dramatically in line with what is presumed to be a changing ecological regime. The reference values are very precautionary because the abundance threshold (set at the 25th percentile of the distribution of abundance in the reference period) is potentially artificially high owing to the regime shift, and when abundance falls below the threshold it will trigger management action irrespective of whether this is due to overfishing or a reversal of the recruitment regime. Furthermore, the tiered approach ensures that when abundance is above the threshold, but in the yellow and orange zones below the target, management action will again be triggered if recruitment or spawning stock declines below their 25th percentile in the last three years. This should trigger an early response based on a fall in recruitment or spawning biomass. Management action will therefore be triggered conservatively and well above any point where reproductive capacity is likely to be impaired, which meets issue 2 of SG80 and issue 1 of SG100.

Target abundance, determined by the high end of the statistical distribution in the reference period, is also highly precautionary relative to what would apply in a weaker recruitment regime. Thus although Bmsy has not been defined at present for this stock, the target reference point is considered to be consistent with a measure or surrogate with

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

similar intent or outcome. This meets the third scoring issue of SG80.

These reference points are new and there has been insufficient time to evaluate how well they perform under changing circumstances, especially bearing in mind the ecological uncertainties. The second scoring issue of SG100 is therefore not met and the fourth scoring issue does not apply.

In summary, the new reference points meet all of the applicable issues for SG80, and one of two issues for SG100, giving a score of 90.

Audit Trace References

ASMFC 2009a
ASMFC 2009b
ASMFC 2010a
ASMFC 2010b
FRCC 1995
FRCC 2007

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
1.1.3	**Stock Rebuilding:** Where the stock is depleted, there is evidence of stock rebuilding.	Where stocks are depleted rebuilding strategies which have a reasonable expectation of success are in place. Monitoring is in place to determine whether they are effective in rebuilding the stock within a specified timeframe.	Where stocks are depleted rebuilding strategies are in place. There is evidence that they are rebuilding stocks, or it is highly likely based on simulation modelling or previous performance that they will be able to rebuild the stock within a specified timeframe.	Where stocks are depleted, strategies are demonstrated to be rebuilding stocks continuously and there is strong evidence that rebuilding will be complete within the shortest practicable timeframe.

Scoring Comments
The stock is not currently in need of recovery or rebuilding so this PI does not apply at present, although it should be noted that in respect of PI 1.2.3 a decision rule would include one for recovery.
Score: Not Applicable

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

1.2	Harvest Strategy (management)

1.2.1	Harvest Strategy: There is a robust and precautionary harvest strategy in place	The harvest strategy is expected to achieve stock management objectives reflected in the target and limit reference points. The harvest strategy is likely to work based on prior experience or plausible argument. Monitoring is in place that is expected to determine whether the harvest strategy is working.	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points. The harvest strategy may not have been fully tested but monitoring is in place and evidence exists that it is achieving its objectives.	The performance of the harvest strategy has been fully evaluated and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels. The harvest strategy is periodically reviewed and improved as necessary.

Scoring Comments

A harvest strategy is defined in the guidelines as the combination of monitoring, stock assessment, harvest control rules, and management actions, and may include a management plan.

The American lobster harvest strategy for the Gulf of Maine stems from the goal of the Interstate Fishery Management Plan for American Lobster, as quoted in paragraph 2 of the Executive Summary of the 2009 American Lobster Stock Assessment Report (ASMFC 2009a): ‘ the plan is designed to minimise the chance of population collapse due to recruitment failure. The goal of Amendment 3 (of the Management Plan) is to have a healthy American lobster resource and management regime, which provides for a sustained harvest, maintains appropriate opportunities for participation, and provides for the cooperative development of conservation measures by all stakeholders’.

The Interstate FMP itemises the objectives and management measures that the individual states should incorporate in their own regulations for their licensed lobster fisheries. Published Amendments and Addenda specify improvements or developments as problems arise and are resolved. For example, Amendment 3 established limited entry controls on fishing effort for each LCMA . Fishers who operate in more than one lobster fishing area must operate under the ‘most restrictive rule’ e.g. they can only use one set of gear with the most restrictive trap limit, not a set in each area. Similarly a fisher with both a state and a federal lobster licence can only use one fishing history for the purpose of trap allocation.

Management objectives
Amendment 3 of the IFMP (ASMFC 1997) adopts 11 Fisheries Management Objectives which are itemised in Section 5.2 of this Report. The objectives apply not just to the Gulf of Maine, but to all of the management units in the US lobster fishery, and are implemented by the elements described below.

The operational framework
ASMFC implements the lobster management plan through the Lobster Management Board, with the support of the Technical Committee, Stock Assessment Committee, Advisory Panel, a Lobster Conservation Management Team for each of 7 lobster management areas, and a Plan Review Team. The Lobster Conservation Management Teams

ensure stakeholder participation in the discussion and implementation of management measures in the lobster management areas.

Stock monitoring and assessment, reference points and harvest control rules
Based on the monitoring programme outlined under PI 1.2.3, a comprehensive stock assessment is carried out roughly every five years, of which the two most recent are the assessments of 2006 (ASMFC 2006) and 2009 (ASMFC 2009a). The assessments are subject to comprehensive peer review (e.g. ASMFC 2009b). The assessments now use a customised length based model, the UMLBM, producing a time series of stock indicator data for evaluating stock status. As described and scored under PI 1.1.2 the evaluation uses new trend-based four-tiered stop-light reference points advocated in 2010 by Addendum XVI to Amendment 3 of the ILMP (ASMFC 2010b). The four-tiered reference points are associated with management actions that can be considered to be equivalent to harvest control rules, as described and scored under PI 1.2.2

Implementation
Implementation to date has been achieved by:

- State and Federal management measures, surveillance and enforcement. Harvesting is controlled by a suite of management measures including input controls (limited entry licensing, trap limits and trap tagging), broodstock protection (ovigerous and v-notched females regulations), and technical measures (trap vents and biodegradable panels, minimum and maximum sizes, and their local lobster area variants)
- State and Federal stock monitoring programmes comprising the collection of fisheries dependent and fisheries independent data (see PI 1.2.3)
- A periodic comprehensive stock assessment that is peer reviewed, and is the basis for advice to managers (Section 4, and PI 1.2.4)
- Management responses by the ASMFC in consultation with the local area councils and management teams

Evolution of the framework
The IFMP, monitoring programmes, stock assessments, reference points, stock determination and enforcement programme are continuously reviewed and amended as required.

Score: 90

A comprehensive lobster management plan and programme is in place, supported by a substantial operational framework with comprehensive stakeholder participation, scientific research, stock monitoring, comprehensive assessments and peer reviews, reference points, control rules and management actions. Fishermen, officials and agencies that we spoke to gave vivid expression to their commitment to lobster fishing, their engagement in the management process, and their faith and support for the current regulations controlling inputs, protecting broodstock, and controlling selectivity through MLS and vents. There was a universal feeling from all sides that the regulations are properly enforced (see PI 3.2.3). All participants and elements of the programme appear to be working towards the objective of maintaining stock above the threshold abundance and below the exploitation threshold.

As described in Sections 4.5 and 4.6 of this Report, the 2009 Stock Assessment shows that productivity, abundance and recruitment have all increased to a high level. There has been a regular review and amendment of the assessment and reference point procedures over time to take into account new factors. The new four-tiered reference points advocated recently (ASMFC 2010a, ASMFC 2010b) shows that management action is currently not required for the Gulf of Maine, where lobster abundance is above the target reference point, and exploitation rate is below the threshold (ASMFC website, January 2012). The harvest strategy is therefore at present achieving a stock status consistent the the management objectives, taking into account the beneficial effects of the recruitment regime change. There is therefore strong evidence that the fishery meets all the scoring issues under SG80, and that it meets the second issue of SG100.

On the first issue of SG100, the stock currently does not require management action, but it is too early to say how the new reference point/management action framework will respond if in the coming years stock indicators deteriorate to the point where management action is required (e.g. if exploitation increases or if recruitment suddenly falls), and whether the management tools can effectively restore stock status. Therefore the first scoring issue of SG100 is not met, and a score of 90 is given.

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Audit Trace References

ASMFC 2006a
ASMFC 2009a
ASMFC 2009b
ASMFC 2010a
ASMFC 2010b

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
1.2.2	Harvest control rules and tools: There are well defined and effective harvest control rules in place	Generally understood harvest control rules are in place that are consistent with the harvest strategy and which act to reduce the exploitation rate as limit reference points are approached. There is some evidence that tools used to implement harvest control rules are appropriate and effective in controlling exploitation.	Well defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached. The selection of the harvest control rules takes into account the main uncertainties. Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules	 The design of the harvest control rules take into account a wide range of uncertainties. Evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the harvest control rules.

Scoring Comments

As described for PI 1.2.1, the US lobster fishery has a comprehensive harvest strategy covering all the required elements. For this PI, the key features of the strategy are a set of management tools or measures that are in place, plus the stock indicators and reference points described under PI 1.1.2. The new four-tiered reference points are accompanied by conditional criteria and pre-defined management actions that can be considered to be harvest control rules.

The lobster management tools include input controls (limited entry licensing, trap limits and trap tagging), broodstock protection (ovigerous and v-notched females regulations), and technical measures (trap vents and biodegradable panels, minimum and maximum sizes, with local lobster-area variants). These tools are consistent with the goals and objectives of the IFMP and comprise measures that are widely used elsewhere to manage crustacean fisheries. The tools can be regarded as successful. Abundance is well above the target reference point, albeit benefiting largely from a recruitment regime shift. E, which has mainly fluctuated below the threshold reference point (75th percentile) since 1989, and has been below the target reference points (25th percentile) in several years, is currently in the yellow zone below the 50th percentile.

Regarding control rules, Technical Committee Memorandum 10-034 (ASMFC 2010a) shows that the reference point proposal assigns predetermined management actions to each quartile of the new framework, as illustrated in Section 4.7 of this Report using the colour-coded diagrams copied over from the Memorandum. For example, when abundance falls into the red zone, managers are required to take pre-agreed action in the form of an immediate 50% reduction in exploitation. If abundance falls into the precautionary orange or yellow zones, and the concurrent indicators for spawning stock and or recruitment also trigger action, the pre-agreed requirement is to increase spawning stock (by changing size limits and discarding) and/or to reduce F (using season, area, or quota regulations). Similarly the red zone for E requires an immediate decrease in exploitation, and the yellow and orange zones for E require measures to increase abundance. These rules identify the stock or fishery attribute that will feature in the required management response. For institutional reasons they do not specify or quantify the precise regulation to be implemented, since in the US fisheries management framework these can only be implemented by consultation between managers and stakeholders on a case by case basis.

The assessment team was told repeatedly that there is a strong conservation ethic in the lobster industry and a strong commitment by managers to take action should the reference points be approached or breached. To date there is no experience of how well or effectively these harvest rules will be implemented in the Gulf of Maine. The only available experience is found in the SNE stock, where recruitment has failed and abundance is below the threshold, and Board action is required to rebuild the stock. The current outcome is Lobster Management Board approval to commence rebuilding the SNE stock by implementing a 10% reduction in exploitation in all sectors from 1 January 2013 in line with Draft Addendum XVII (ASMFC 2011a). This requires States to submit plans by end of 2011 for Technical Committee review. The reduction is to come from changes in the minimum and maximum sizes, and/or closed seasons. This is a watershed agreement, but it is too early to observe the outcome of this first phase of the stock

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

rebuilding programme, or to know whether additional or more stringent measures will later be required and taken in order to achieve the required outcome.

Score: 80

Within the lobster management framework there is a comprehensive suite of management tools (trap limits, broodstock protection, and technical measures), and a new stock-specific four-tiered reference point system that is color-coded and requires pre-agreed management actions in response to the status of the stock. These actions constitute a harvest control rule. It quantifies the emergency response required (minimum 50% reduction in exploitation rate) when stock abundance or E pass through the threshold into the red zone, and it identifies the semi-quantitative objectives (increase spawning stock; decrease exploitation) and tools required in response to the conditional indicators in the orange and yellow zones. In the context of the Gulf of Maine lobster fishery, where the specifics of regulations cannot be agreed without consulting stakeholders in the Lobster Conservation Management Teams, this control rule is regarded as well-defined and sufficient to meet the first issue of SG80.

The reference points and control rule are based on a stock assessment model that takes into account model and data uncertainty, and reference point values that take into account measurement error and the statistical distribution of the trend-based stock indicators. The threshold reference points are considered to act conservatively with respect to the recruitment regime shift (see PI 1.1.2). Therefore the control rule takes into account the main uncertainties and meets the second issue of SG80.

The pre-agreed management actions prescribed in the control rule provide an appropriate basis for rectifying any pejorative decrease in abundance or increase in exploitation rate, and the available management tools (limited entry, trap limits, and technical conservation measures) are known to be appropriate for lobster stocks. Although the reference points and control rule are as yet too new for their efficacy to have been tested in the Gulf of Maine, there is equally no evidence to suggest that they will be ineffective, and the control rule is therefore considered to meet the third scoring issue of SG80. At present the only known implementation of this new framework is in the SNE stock, which has fallen below the threshold abundance, and where managers and stakeholders have agreed to implement a preliminary 10% reduction in exploitation by changing size limits and the length of fishing season, which is proposed to be implemented in 2013 (ASMFC 2011, Addendum XVII). It is recommended that future audits of the Gulf of Maine lobster fishery should therefore monitor and evaluate the efficacy of this initial stock rebuilding program in SNE in order to check the suitability of the new control rule once evidence becomes available.

The control rule currently meets the three scoring issues for SG80 therefore a score of 80 is given.

Audit Trace References

ASMFC 1997
ASMFC 2002
ASMFC 2007c
ASMFC 2010a
ASMFC 2011

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
1.2.3	**Information / monitoring:** Relevant information is collected to support the harvest strategy	Some relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy. Stock abundance and fishery removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.	Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy. Stock abundance and fishery removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule. There is good information on all other fishery removals from the stock.	A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, fishery removals and other information such as environmental information), including some that may not be directly relevant to the current harvest strategy, is available. All information required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of the inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty.

Scoring Comments

The Gulf of Maine lobster fishery is monitored and the stock assessed using a combination of fishery dependent and independent data collected by the states of Maine, New Hampshire and Massachusetts, and by the NMFS, as described in Section 5 of ASMFC 2009a, and listed in Section 4.2 of this Report as follows:

Fishery Dependent Data - Composition of the fleet; landings and effort; a mix of dealer reports, vessel log books, and annual and trip level data (some mandatory, some voluntary) collected by NMFS and the states of Maine, New Hampshire and Massachusetts.

- Discards/by catch - Limited information for the lobster fishery on regulatory and market driven discards based on sea sampling and targeted studies. Small recreational catch (fishers with 5 traps or less) is collected by Maine, NH and MA
- Biological sampling - Contributing CPUE, and catch at length estimation by sex and maturity stage
- NEFSC Observer program since 1991
- NEFSC Port sampling since 1983 - Targeting 50 trips across Gulf of Maine, Georges Bank, and Southern New England
- Atlantic Offshore Lobsterman's Association - Voluntary standardised at sea sampling of biological data since 2001 for 20 vessels
- Maine-DMR program - Port sampling of dealers on 10 days per month since 1967. At-sea sampling by observers on lobster boats since 1985
- New Hampshire - At sea sampling since 1991. Port sampling since 2005
- Massachusetts - At sea recording and sampling once a month since 1981

The total number of licences issued by each state is known (Table 3.2.1.1 in ASMFC 2009a), and the data collection programmes in each state operate independently to produce estimates of annual landings (Table 3.2.2.1 in ASMFC 2009a) and the total number of traps in operation (Table 3.2.2.2 in ASMFC 2009a) for The Gulf of Maine stock, the George Bank stock, and the Southern New England stocks. There is no overall statistic of effort or index of catch per effort for these stocks, however, but indices of abundance are derived from fishery independent data.

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Fishery Independent data

Trawl Surveys*

- NMFS NEFSC - Lobster data from the fall standardised trawl survey since 1982
- Maine/New Hampshire- Joint ME/NH fall inshore trawl survey since 2000.
- Massachusetts - Spring and fall bottom trawl survey in territorial waters since 1978
- Abundance indices calculated as: standard delta mean catch per tow at length by sex for Gulf of Maine for NEFSC, MA surveys, and the geometric mean catch per tow by sex for ME/NH.

Other surveys

- Ventless trap survey 2006 and 2011** - ASMFC funded time-limited study. Commercial fishers contracted to fish with a 6-pot trawl or 2 trawls of 3 pots, with alternate vents or no vents. Stratified design. At-sea samplers record catch, effort, and biological data.
- Settlement indices - Stage IV lobsters are sampled in the plankton by neuston nets, but mainly in standardised quadrats on cobble substrate by divers using suction samplers to produce a standard settlement index for the mid-coast of Maine (and other areas along the US coast). (Wahle and Incze 1997) to produce long term trends (Palma et al 1999, for Maine).

*Regular multi-use bottom trawl surveys have the advantage that they cover a significant portion of the coast at different depths in spring and/or fall (fall surveys are the most reliable for lobster) using a standard gear and a routine random stratified sampling protocol that is amenable to statistical treatment (stratified geometric mean catch per tow by sex and size class, with year effect). For lobster, the disadvantages are that rough ground and the most inshore parts of the lobster distribution tend to be poorly sampled, and that abundance estimates could be biased by catchability and gear selectivity issues that cannot be corrected. Conversely, attempting to estimate lobster abundance from the very large number of single traps in operation in this fishery is affected by major data gathering problems, and by the very real difficulty of interpreting trap catch per trap haul owing to poor knowledge of how behaviour and soak time influence trap catchability, selectivity, and retention/escape. Even if data could be mustered from traps at an appropriate scale and intensity, extensive research is still required to interpret such data, so survey data remain the only viable option at present.

**The ventless trap survey aims to provide improved catch rate estimates, especially for the recruit size classes, but coverage is low intensity and sparse, and there are major manpower and funding issues. Ventless traps are a valuable research tool but their extension to estimate abundance for the stock as a whole cannot yet be envisaged.

Biological information for stock assessment - There is a large literature on the biology, demography and assessment of the American lobster, summarized in Factor, 1995. Specific information on the following aspects of lobster biology in the Gulf of Maine stock were compiled for use in the assessment:

- Growth (P 6-9 in ASMFC, 2009a, including new information on ageing using lipofuscin pigment)
- Maturity (p10-12 in ASMFC 2009a)
- Fecundity (p12 ASMFC 2009a)
- Natural mortality (p16-17 ASMFC 2009a)
- Stock Definition (p 16 ASMFC 2009a)

Predicting Recruitment - A special feature of research in the Gulf of Maine area is the extensive series of studies on time-space patterns in the transport and abundance of pelagic lobster post-larvae (Wahle & Incze, 1997, Incze et al, 2006), patterns in young-of- year along the coast (Wahle & Steneck, 1992), recruitment to the fishable stock (Steneck & Wilson, 2001, Wahle, Incze & Fogarty, 2004), and models of particle delivery pathways from real time oceanographic data and wind inputs (Xue et al, 2008). These are relevant to long-term questions about stock structure and the effect of ecological processes on recruitment to the fishery, although they do not yet feature in the stock assessment.

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Score: 80

The lobster fleet contributes 98% of known removals (para 2, p 22 of ASMFC 2009a).

Sufficient fishery-dependent and independent information is collected to estimate removals by the lobster fishery, to obtain abundance estimates and confidence intervals from surveys, and to estimate biological structure and demographics using size composition, sex ratio, growth, maturity and fecundity data. The ventless trap survey is studying the relative abundance of small lobsters to lay the foundation for a recruitment index, but it is time limited. The information is used by the stock assessment to estimate stock status relative to reference points in support of the overall harvest strategy. Extensive background research has been carried out in the Gulf of Maine on various aspects of lobster biology and stock structure, and in particular on the production and distribution of larvae, and the settlement and dynamics of juveniles in coastal waters and bays. The latter studies are not used in the assessment directly, but they contribute to long-term studies on stock structure and on the factors affecting stock and recruitment.

The range of the data that underpins the stock assessment is good, and stands comparison with that obtained for any lobster fishery elsewhere. From this viewpoint the data being collected and the frequency of monitoring are sufficient to facilitate an effective stock assessment. Information and monitoring therefore fully meet the scoring issues in the 80 scoring guidepost.

The Stock Assessment Report (ASMFC 2009a), the Advisory Report for the Lobster Stock Assessment Peer Review (ASMFC 2009b), and a peer review of the State monitoring programme by the Maine Department of Marine Resources (DMR) have identified the issues associated with the quality of the lobster monitoring and stock assessment programmes. It is apparent that given the high value of the fishery, the amount of money spent on monitoring removals (probably about 1%) is small, and that mandatory reporting should be applied universally. It is also clear that more information is required in relation to a) the spatial coverage of surveys, b) the likely causes of the recruitment regime shift, c) the likely effectiveness of the management system under uncertainty and under a scenario of declining recruitment. These, and other issues raised by the peer review, suggest that although the information base for the assessment is good, it does not reach a standard that meets either of the scoring issues in the 100 scoring guidepost.

Audit Trace References

ASMFC 2009a, 2009b
Incze et al, 2006
Palma et al 1999
Steneck & Wilson, 2001
Wahle and Incze 1997
Wahle, Incze & Fogarty, 2004
Wahle & Steneck, 1992
Xue et al, 2008

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
1.2.4	**Assessment of stock status:** There is an adequate assessment of the stock status	The assessment estimates stock status relative to reference points. The major sources of uncertainty are identified.	The assessment is appropriate for the stock and for the harvest control rule, and is evaluating stock status relative to reference points. The assessment takes uncertainty into account. The stock assessment is subject to peer review.	The assessment is appropriate for the stock and for the harvest control rule and takes into account the major features relevant to the biology of the species and the nature of the fishery. The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way. The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored. The assessment has been internally and externally peer reviewed.

Scoring Comments

As described in section 4.4 of this Report, a good quality assessment is carried out at regular intervals based on data of the type described under PI 1.2.3. The assessment has the following features:

- It is carried out at regular intervals (1996, 2000, 2006, 2009)
- Data, models and results are fully described in detailed reports that are peer reviewed (e.g. ASMFC 2006, ASMFC 2009a, ASMFC 2009b)
- The 2009 Stock Assessment used the CSM (change in ratio of recruits / post recruits) and the UMLBM (catch at length projection based on a growth transition matrix)
- Each model is based on length distribution inputs, and the growth, maturity, fecundity and natural mortality data described under the previous PI. The data are good by lobster standards
- The University of Maine model is still under development but is a major step forward
- The models are tuned using survey data
- Model outputs are tested for uncertainty by using alternative runs and assumptions
- A retrospective analysis discards the recent years successively back to -7 years from now, to see how well the model estimated yesteryear when it was in yesteryear. The retrospective pattern shows that the models tend to overestimate F and underestimate stock, which is a common failing that is on the precautionary side
- The main outputs were described under PI 1.1.1, and outputs in relation to reference points were described under PI 1.1.2
- Outputs capture the major trends in productivity. They do less well in capturing the individual survey trends because of the weightings given to different surveys in the models. The CSM indicates a more serious recent decline in stock and increase in F, then the UMLBM. Outputs from the UMLBM are illustrated in Figures 2a and 2c of ASMFC 2009b. Based on the UMLBM and the new four-tiered reference points, stock abundance is not depleted, and is well above the target. E is below the threshold reference point, and is just in the yellow zone just below the 50^{th} percentile
- Assessments have evolved from a yield per recruit and egg per recruit basis, through the CSM model to the UMLBM, and there is scope for further development of

the latter.

Comments on the assessment

The assessment is based on the compilation of survey data and biological data for each stock, for input to the Colllie-Sissenwine depletion model (CSM) and the University of Maine length-based projection model (UMLBM) producing a time series of outputs from 1982 for the reference abundance, E, spawning biomass, and recruitment.

The data from each State are merged into an assessment for each of the three stocks (Gulf of Maine, Georges Bank and Southern New England). The assessment results are very dependent on the survey data. The CSM can only accommodate one survey series, and uses the fall NMFS survey indices for recruit and post-recruit lobsters. The UMLBM integrates the mean catch per tow by 1mm length group for the NMFS, Maine and Massachusetts surveys. In general the trends in the survey indices conform to the overall perception of the great increase in the Gulf of Maine stock depicted by the upward trend in lobster landings since 1980, and by independent estimates of settlement of young of year lobster from collectors that have been deployed at coastal sites since the 1990s.

A Peer Review Panel evaluates the status of every assessment, and identifies a range of technical and strategic issues. Topics for improvement identified by the 2009 Peer Review Panel, and by the Moody assessment team, include:

- Improvements in landings and effort data are desirable, and mandatory reporting should be applied universally
- The contribution made by the current management regulations to current stock status should be investigated. .
- The effects of poor recruitment in the future, and the management response to it, should be explored by simulation, and a practical index of recruitment should be implemented to give an early warning of problems. It would be valuable to continue and extend the ventless trap surveys, and to continue research on the settlement and survival of the pre-recruit stages.
- It is important to determine whether changes in recruitment in the last twenty years are wholly density independent, or whether lobster density dependence has been involved.

Score: 95

By lobster standards there is a comprehensive good quality lobster assessment for the Gulf of Maine stock, which fully meets all the scoring issues in SG80. For SG 100, the assessment fully meets scoring issue 1(length based assessment, with appropriate stock survey, size composition, and biological data, plus a particularly extensive background literature on the biology of *H. americanus* in the Gulf of Maine), scoring issue 3 (comparison between the results of the CSM and UMLBM models, whose outputs are consistent with the known changes in productivity and trends in landings) and scoring issue 4 (each assessment is given a detailed and robust scientific peer review as shown by ASMFC 2009b). For scoring issue 2 of SG100, the reference point values are derived from the statistical distribution of the stock indicators in the 1982-2003 reference period thus allowing for the regime change, and the current stock indicators are averaged over the recent three years to account for measurement error. The assessment explores uncertainty qualitatively using alternative runs but does not calculate variances, and the impact of proposed management measures and their likely interaction with recruitment uncertainty has not yet been investigated using management strategy simulation. Therefore there is some scope for improvement with regard to issue 2, which is not yet fully met.

The assessment fully meets 3 of the 4 scoring issues for SG100, and a score of 95 is given.

Audit Trace References

ASMFC 2006
ASMFC 2009a
ASMFC 2009b
ASMFC 2009b

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Principle 2	Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends

2.1	Retained non-target species

2.1.1	***Status:*** The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species.	Main retained species are likely to be within biologically based limits or if outside the limits there are measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding of the depleted species. If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the retained species to be outside biologically based limits or hindering recovery.	Main retained species are highly likely to be within biologically based limits, or if outside the limits there is a partial strategy of demonstrably effective management measures in place such that the fishery does not hinder recovery and rebuilding.	There is a high degree of certainty that retained species are within biologically based limits. Target reference points are defined and retained species are at or fluctuating around their target reference points.

Scoring Comments

The main retained species in this fishery are Jonah crab and rock crab. While they constitute less than 5% of the total catch of lobster these species are retained and sold when market conditions are favorable. Combined landings of these species have declined to approximately 2,500 t/yr since reaching a maximum of 4,300 t in 2002 (Maine DMR statistics), and market conditions are currently unfavourable so a relatively low proportion of the catch is currently retained and landed. Jonah crab makes up the majority of the combined landings (because of its larger size) but the two species are not separated in landings statistics.

The use of escape vents provides a partial strategy for both species ensuring that all females, and a substantial proportion of mature males, remain unharvested. Only male crabs 120 mm carapace width or greater are taken, as the smaller crabs are able to escape through the vents. . Width at maturity is estimated at 40 mm for rock crab, 75-90 mm for Jonah crab, in this area (C. Wilson pers. comm.). In adjacent areas, rock crab 50% maturity is at 62 mm for males, 49 mm for females (Nova Scotia: Campbell and Eagles 1983, cited in Robichaud and Frail 2006). Jonah crab males are functionally mature at 128 mm on the Scotian Shelf, while gonadal maturity is at 69 mm; females are mature at 92 mm (Moriyasu et al 2002, cited in Robichaud and Frail 2006). Off the Chesapeake Bay, Jonah crab males mature at 90-100 mm, females at 85 mm (Wenner et al 1992 cited in Robichaud and Frail 2006).

Information on status of these species and on the fishery's impact suggests that the species are within biologically based limits, and a partial strategy is in place to favour their conservation. No assessment has been done to demonstrate that they are highly likely to be within biologically safe limits.

The need to monitor the effects of management measures and modify these if necessary has been recognised (Wilson 2005).

These species are not generally used as bait, as in some other lobster fishing areas.

The lobster fishery requires substantial quantities of bait, of the order of 100,000 tons/yr (Saila et al 2002). The preferred bait is Atlantic herring (*Clupea harengus*), either fresh

or (more commonly) brined. Dockside surveys by the DMR indicate that Atlantic herring made up some 95% of bait prior to 2008, but has decreased since then (C. Wilson, pers. comm.). In 2007, Atlantic herring comprised 78.4% of lobster bait by trap haul. That number declined each year, with Atlantic herring comprising 60% of bait by trap haul in 2010 (DMR data). Other species that may be used when Atlantic herring is unavailable include menhaden, redfish, groundfish heads and carcasses, and artificial bait. Fishermen interviewed indicated that there has generally been no problem in obtaining Atlantic herring bait in recent years, although supplies may become short during periods of peak demand in August-September, at which time other species may be used. Although some fishermen harvest alewives to use for bait in the Spring each year, the majority of fishermen buy 100% of their bait, which is predominantly Atlantic herring.

Fisheries supplying Atlantic herring to the Maine lobster fishery (principally purse seine, midwater trawl, and pair trawl fisheries in the Gulf of Maine and Georges Bank areas) are managed in state waters under the Atlantic States Marine Fisheries Commission (ASMFC 2006a; Amendment 2 to the Management Plan is the most recent substantive version) and in federal waters by the New England Fishery Management Council (currently Amendment 4 to its FMP). The management plans include a number of measures to ensure sustainable harvesting including quotas, spawning area closures, and effort limitation. Stock assessments are conducted jointly by Canada and the USA since Gulf of Maine stocks are shared (Shepherd et al 2009). Atlantic herring stocks in this area have shown recent strong recovery following a period of low abundance, due to good recruitment and survival (Shepherd et al 2009). The stocks are not overfished, and overfishing is not occurring (Shepherd et al 2009). The requirement to maintain a level of herring abundance as forage for predators is recognized in the management plan and the assessment models take predator consumption into account. Uncertainty in stock assessment has resulted in stronger restrictions on the fishery in recent years, raising the price of herring bait. Management plans based on biological assessments for redfish (NEFSC 2012) and menhaden (ASMFC 2011b) are also in place and neither species is considered overfished although the 2010 stock assessment for menhaden indicates that overfishing is occurring (ASMFC 2011b).

Score: 80

Available information suggests that the two retained crab species are likely to be within safe limits, and a partial strategy is in place to ensure that the fishery does not hinder recovery or rebuilding of these species. The partial strategy includes demonstrably effective measures (escape vents) to protect females and most males of both species, there is an understanding that this will work to conserve reproductive potential of the species, and an awareness of the need to change measures in future should they cease to be effective. As a result both species are considered to meet the 80 scoring guidepost.

Bait species are highly likely to be within biological limits and are the subject of management strategies to ensure that they remain within these limits, meeting the 80SG.

Audit Trace References

Maine DMR catch statistics, *Cancer* crabs;
Wilson (2005)
Wilson pers. comm.;
DFO 2009;
Moriyasu et al 2002;
Robichaud and Frail 2006.
ASMFC 2007a
ASMFC 2011b.
NEFMC 2010.
Shepherd et al. 2009.
NEFSC 2012

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.1.2	***Management strategy:*** There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species.	There are measures in place, if necessary, that are expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding. The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is a partial strategy in place, if necessary that is expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding. There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved. There is some evidence that the partial strategy is being implemented successfully.	There is a strategy in place for managing retained species. The strategy is mainly based on information directly about the fishery and/or species involved, and testing supports high confidence that the strategy will work. There is clear evidence that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its overall objective.

Scoring Comments

Lobster trap configurations are such as to only take large mature males Jonah crab (C. Wilson pers. comm.), leaving all females and smaller mature males in the water. For rock crab, essentially all mature individuals would be left in the water by current fishing practices. Development of an experimental Jonah crab fishery, using modified lobster traps, includes a minimum landing size (5 inches or 127 mm carapace width), and a prohibition on landing females (Wilson 2005). This represents a partial strategy to keep the retained species within safe biological limits. Knowledge of the effects of the escape vents is based on information on the biology of the species (maturation rates) and fishery (escape vents), and it is known that the strategy is being implemented successfully since enforcement patrols are undertaken regularly and show a high degree of compliance with regulations.

Market conditions are presently unfavourable so a relatively small proportion of *Cancer* crabs taken are landed. Discards are likely to have relatively high survival, since the fishery is in relatively shallow areas and relatively high discard survival is indicated for related *Cancer* species by good returns from tagging programs (Fahy 2004). These species are not used as bait, as in some other lobster fisheries.

Formal strategies are in place for the most important bait species (primarily herring, but also includes redfish and menhaden) in the form of fishery management plans based on sound stock assessments and regular performance reviews (see 2.1.1).

Score: 90

A partial strategy is in place for both main retained *Cancer* species to ensure that the fishery will maintain the retained species within safe biological limits, and to ensure that the fishery would not hinder their recovery or rebuilding if necessary, by protecting reproductive potential. The partial strategy includes demonstrably effective measures

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

(escape vents) to protect females and most males of both species, based on an understanding that this will work to conserve reproductive potential of the species, and there is an awareness of the need to change measures in future should they cease to be effective. There is an objective basis for confidence that the partial strategy for both species will work, and evidence that it is being implemented successfully. Thus meeting all of the scoring issues under the 80 scoring guidepost for both species.

Formal management strategies for key bait species are in place and bait for the fishery is harvested under these strategies. These would ensure that the fishery does not cause serious or irreversible harm to bait species; measures in the strategies are considered likely to work; and there is evidence that these are being implemented successfully (bait species are not overfished). As such the 100 scoring guidepost is met.

An overall score of 90 is therefore assigned.

Audit Trace References

C. Wilson pers. comm;
Wilson 2005;
Fahy 2005
ASMFC 2007a
ASMFC 2011b.
NEFMC 2010.
Shepherd et al. 2009.
NEFSC 2012

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.1.3	***Information / monitoring:*** Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species.	Qualitative information is available on the amount of main retained species taken by the fishery. Information is adequate to qualitatively assess outcome status with respect to biologically based limits. Information is adequate to support measures to manage main retained species.	Qualitative information and some quantitative information are available on the amount of main retained species taken by the fishery. Information is sufficient to estimate outcome status with respect to biologically based limits. Information is adequate to support a partial strategy to manage main retained species. Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy).	Accurate and verifiable information is available on the catch of all retained species and the consequences for the status of affected populations. Information is sufficient to quantitatively estimate outcome status with a high degree of certainty. Information is adequate to support a comprehensive strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective. Monitoring of retained species is conducted in sufficient detail to assess ongoing mortalities to all retained species.

Scoring Comments

Quantitative information is available on total annual landings of the two C*ancer* species (Jonah and rock crab) combined (Maine DMR Statistics), but this is not broken down by species. Jonah crab is likely to predominate in landings as this species is larger and fishing practices are such as to target larger individuals. Landings continue to be monitored such that changes in removals can be followed, although changes in proportions of the two species would not be picked up. Catches are not subject to routine biological monitoring, which would allow tracking of size fractions landed and of the two species separately. DMR at-sea monitoring trips record species and weights caught on approximately 175 trips per year.

Information is available on size at maturity of the two *Cancer* species which supports implementation of a partial strategy to protect reproductive potential by leaving mature females and a large proportion of mature males unharvested (see 2.1.1).

Information on Jonah crab abundance trends is available from a NMFS trawl survey but has not recently been analyzed. A 4-fold increase in Jonah crab abundance was observed in this survey from 1999 to 2002 (Leland 2002); however fishermen state that abundance is currently relatively low. Information is also recorded in the DMR inshore trawl survey, DMR ventless trap survey, DMR urchin dive survey, and DMR settlement survey, but this has not been analyzed and published. Jonah crab abundance has declined substantially in an adjacent area (offshore of southwest Nova Scotia) following several years of landings of ca. 700 t/yr, raising the possibility that this species can be depleted by fishing (DFO 2009).

With respect to bait used in the fishery, estimates of the quantity used annually are available (Saila et al. 2002). Composition of the bait species used is known from fishermen's information (C. Wilson pers. comm.). Bait species used (mostly herring, occasionally menhaden and redfish) are harvested from managed stocks subject to detailed stock assessments and regular performance reviews. The species used as bait are within biologically based limits, based on the stock assessments.

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Score: 90

With respect to bycatch species, some quantitative information is available, and considerable qualitative information is available, on the amounts of *Cancer* species taken. Information on maturation rates and sizes released by escape vents is adequate to assure that both species will remain within biologically based limits, and to support the partial strategy. Data collected on landings are sufficient to detect an increase in risk level, thus, meeting all of the scoring issues under the 80 scoring guidepost for both species

With respect to bait use and status of bait stocks, scoring issues 1, 3, and 4 of the 100 SG are met, since there are stock assessments and management plans for these species: accurate and verifiable information on catch in fisheries which contribute bait and on the consequences of these fisheries for the species is available; information is adequate to support management strategies and to evaluate whether the strategies are achieving their objectives; and monitoring of these species is continuing in sufficient detail to assess ongoing mortalities in these fisheries. With respect to the 2nd scoring issue, it is probably not accurate to say that status is known with a high degree of certainty as there remain uncertainties in these stock assessments (notably for herring, the most important bait species). Bait species alone would be assigned a score of 95.

Accordingly an overall score of 90 is assigned.

Audit Trace References

Maine DMR catch statistics, *Cancer* crabs;
C. Wilson pers. comm.
Leland, 2002.
ASMFC 2007a
Mayo et al. 2006;
ASMFC 2011b.
NEFMC 2010.
Shepherd et al 2009.
NEFSC 2012

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

2.2	Discarded species (also known as “bycatch” or “discards”)

2.2.1	***Status*** The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups.	Main bycatch species are likely to be within biologically based limits, or if outside such limits there are mitigation measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding. If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the bycatch species to be outside biologically based limits or hindering recovery.	Main bycatch species are highly likely to be within biologically based limits or if outside such limits there is a partial strategy of demonstrably effective mitigation measures in place such that the fishery does not hinder recovery and rebuilding.	There is a high degree of certainty that bycatch species are within biologically based limits.

Scoring Comments

Lobster traps are not specifically designed to catch finfish and their operation minimises bycatch. This is demonstrated by the fact that all species in the bycatch are well below (generally an order of magnitude or more below) 5% by weight of the total catch.

Species of fishes that are discarded from lobster traps have been collated by Maine DMR, and an estimate of total removals by species can be made (see Introductory Section 6.3.1.2 on bycatch-discarded species). Species in this category include commercial, assessed species (Atlantic cod, redfish, hakes and others) and non-commercial species about whose status a limited amount is known (cusk, longhorn and shorthorn sculpins, sea raven, cunner).

The scoring guideposts under this PI refer to “main” bycatch species, the MSC Fisheries Assessment Methodology (FAM v1) defines main bycatch species by weight or vulnerability. Species that comprise less than 5% of the total catch by weight may normally be considered minor species (not “main”), unless they are of high volume or particular vulnerability (FAM v1 7.3.2). Using this guidance and the information set out in section 6.3.1.2 above, the assessment team conclude that three species are considered to be main bycatch species owing to their vulnerability:

1. The Gulf of Maine Atlantic cod - are overfished (that is, they are below a chosen abundance reference point) and overfishing is occurring (that is, fishing mortality is higher than the chosen reference point)
2. White hake - are overfished and overfishing is occurring.
3. Cusk - has been identified as a “species of concern” following a steep decline in trawl survey indices and a Canadian assessment of the shared population indicating an “at-risk” status.

The estimated discards of Atlantic cod from the lobster fishery are very low compared to other sources of mortality, i.e. assuming an average weight of 1 kg per individual (based on the size of cod likely to be able to enter a trap) approximately 177 t of Atlantic cod were discarded in 2008 in the lobster fishery, compared to the total catch for the past five years which has ranged from approximately 5,000 mt in 2005 to 11,000 mt in 2010 (NEFSC 2011). It is therefore considered that the fishery does not hinder recovery and rebuilding of the cod stock.

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

The estimated bycatch of white hake is very low compared to other sources of mortality. Assuming an average weight of 1 kg per individual, discards of all hakes in the lobster fishery (55 t/yr) were low compared to reported landings of white hake (1,800 t in 2010) (NEFSC 2012). Some of the hakes in the bycatch may be red hake (C. Wilson, pers. comm.). It is therefore considered that the fishery does not hinder recovery and rebuilding of the white hake stock.

The cod and hake stock are also managed under the Northeast Multispecies (Groundfish) Fishery Management Plan and so are subject to measures to limit fishing effort, address bycatch issues and protect Essential Fish Habitat. This is considered to constitute a further partial strategy.

The bycatch of cusk is estimated to be 112 t assuming a mean individual weight of 1 kg and is close to the estimated US landings of around 100 t in 2003 and 2004 (landings were higher in preceding years) (O'Brien 2006), and much lower than Canadian removals from the same stock of the order of 1000 t/yr in the most recent years for which information is available (2004-2007) (DFO 2008). It is therefore considered that the fishery does not hinder recovery and rebuilding of the cusk stock. A recent assessment (Harris and Hanke 2010) of this species indicates that survey catch rates have in fact been stable since the late 1990s and that spatial distribution has not declined in this period (commercial catch rate has declined but this is thought to be due to management restrictions on target species in fisheries in which cusk is bycatch).

Score: 80

Lobster traps are not specifically designed to catch finfish and their operation minimises bycatch and, as such, is considered to constitute a partial strategy.

The quantities of bycatch species in this fishery are well below the 5% of the total weight guideline for "main" species. However species considered to be vulnerable – cod, white hake and cusk - are present and are considered to be "main" bycatch species.

Cod is overfished and overfishing is occurring, however, the bycatch levels in this fishery are low and are not considered likely to hinder recovery or rebuilding.

White hake is outside safe biological limits they are overfished and overfishing is occurring, however, the bycatch levels in this fishery are low and are not considered likely to hinder recovery or rebuilding.

Both cod and white hake are managed under the Northeast Multispecies (Groundfish) Fishery Management Plan which is considered to constitute a further partial strategy.

As a result both species meet the 80 scoring guidepost.

For cusk, bycatch mortality in the lobster fishery is of the order of 10% of recent removals from the stock as a whole and fishing practices are such that the fishery would not cause the species to be outside biologically based limits or hinder recovery. Abundance has apparently been stable since the late 1990s.

As a result the 80 scoring guidepost is met by all three species.

Audit Trace References

Bycatch information from observer trips, Maine DMR, provided by C. Wilson;
Mayo and O'Brien 2006;
Sosebee 2006;
Mayo et al 2006;
O'Brien 2006;

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Bigelow and Schroeder 1953;
Scott, W. B. and M. G. Scott. 1988. Atlantic Fishes of Canada. University of Toronto Press, Toronto. xxx + 731 pp
NEFSC 2008.
NEFSC 2011
NEFSC 2012
NEFMC 2011c. Northeast Multispecies (Groundfish) Fishery Management Plan. http://www.nefmc.org/nemulti/. Accessed July 18, 2011.
DFO 2008
Harris, L. E. and A. R. Hanke 2010. Assessment of the status, threats and recovery potential of cusk (*Brosme brosme*). Can. Sci. Adv, Sec. Res. Doc. 2010/004, 29 pp.

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.2.2	***Management strategy:*** There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations.	There are measures in place, if necessary, which are expected to maintain main bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery. The measures are considered likely to work, based on plausible argument (e.g general experience, theory or comparison with similar fisheries/species).	There is a partial strategy in place, if necessary, for managing bycatch that is expected to maintain main bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery. There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or the species involved. There is some evidence that the partial strategy is being implemented successfully.	There is a strategy in place for managing and minimising bycatch. The strategy is mainly based on information directly about the fishery and/or species involved, and testing supports high confidence that the strategy will work. There is clear evidence that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its objective.

Scoring Comments

A partial strategy exists in that lobster traps are not designed to catch fish and their operation minimises bycatch, this is demonstrated by the fact that all species in the bycatch are well below the 5% weight guideline for “main” species. However vulnerable species – cod, white hake and cusk - are present and are considered to be “main” bycatch species.

Cod and white hake are managed under the Northeast Multispecies (Groundfish) Fishery Management Plan. Bycatches in the lobster fishery are very low compared to other sources of mortality (directed fisheries). Bycatch in the lobster fishery is not considered in the assessments or, management plan for these species, because mortality is considered so low as to be negligible. It appears clear that under the fishery management plan, and current fishing practices in the lobster fishery, bycatch mortality is not such as to put these species outside safe biological limits or to hinder their recovery.

Cusk bycatch removals in the lobster fishery (ca 112 t/yr) are approximately 10% of removals from other fisheries in recent years. This species is under review by National Marine Fisheries Service as a “species of concern”. Cusk is a widespread, relatively common species, and is very common in lobster traps in Canada as well as in the USA (Harris and Hanke 2010). Although abundance indices showed a steep decline in to the mid-1990s (O’Brien 2006; DFO 2008), survey catch per unit effort on the Scotian Shelf (the centre of distribution for this species) has been stable since the late 1990s (Harris and Hanke 2010). Removals of the order of 100 t/yr in the lobster fishery would not appear to put this species outside safe limits or to hinder recovery. DMR received a federal grant to evaluate the extent and degree of cusk bycatch in the lobster trap and groundfish longline fisheries. This project began in Spring 2011 and will measure the condition and survival of cusk caught in non-directed fisheries. These data will be used in stock assessments and future management of this resource (DMR 2011)

Score: 80

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

A partial strategy exists in that lobster traps are not designed to catch fish and their operation minimises bycatch, this is demonstrated and evidenced by the fact that all species in the bycatch are well below the 5% weight guideline for “main” species. However vulnerable species – cod, white hake and cusk - are present and are considered to be “main” bycatch species.

With respect to the commercial species, a fishery management plan is in place which is expected to maintain these species within safe limits and/or ensure their recovery; there is a basis for confidence that the strategy will work, and evidence that it is being implemented. This is considered a further partial strategy (as opposed to a strategy, because lobster fishery bycatch is not explicitly addressed in the management plan because lobster fishery bycatch is considered so low as to be negligible).

With respect to cusk, the gear and fishing operation are such as to ensure that bycatch is low, much lower than that observed in other fisheries and, as such, is not considered likely to hinder their recovery. Survey abundance has apparently been stable since the late 1990s.

Gear specification and operation is strictly monitored and the implementation and effectiveness of the groundfish management plan is annually reviewed.

Accordingly the three scoring issues under the 80 scoring guidepost are met for all three main bycatch species.

Audit Trace References

See references under 2.2.1, 2.2.3
DMR 2011

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.2.3	***Information / monitoring*** Information on the nature and amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch.	Qualitative information is available on the amount of main bycatch species affected by the fishery. Information is adequate to broadly understand outcome status with respect to biologically based limits. Information is adequate to support measures to manage bycatch.	Qualitative information and some quantitative information are available on the amount of main bycatch species affected by the fishery. Information is sufficient to estimate outcome status with respect to biologically based limits. Information is adequate to support a partial strategy to manage main bycatch species. Sufficient data continue to be collected to detect any increase in risk to main bycatch species (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy).	Accurate and verifiable information is available on the amount of all bycatch and the consequences for the status of affected populations. Information is sufficient to quantitatively estimate outcome status with respect to biologically based limits with a high degree of certainty. Information is adequate to support a comprehensive strategy to manage bycatch, and evaluate with a high degree of certainty whether a strategy is achieving its objective. Monitoring of bycatch data is conducted in sufficient detail to assess ongoing mortalities to all bycatch species.

Scoring Comments

Bycatch information has been collected by at-sea samplers since 2006 and results have been compiled by Maine DMR (C. Wilson pers. comm. – see Table 4 in Introduction section on bycatch). All species in the bycatch are identified. A relatively low proportion of total fishing trips is sampled: 542 trips in three years for an average of 181 trips/year, relative to an estimated total of 260,000 trips/year in the fishery in 2008 (C. Wilson, pers. comm.). However, sampling is well distributed among areas and seasons; the target is 3 trips per month in each of the 7 fishing areas, which would work out to about 200 trips per year (assuming a 10-month fishery). Although this information could be improved by increasing coverage, by examining seasonal and areal trends in the bycatch, and by focusing sampling on seasons and areas of highest bycatch and highest variability in bycatch, the information available is considered to provide an adequate understanding of the impact of the fishery on all bycatch species,.

Information on the status of cod and white hake (i.e. main bycatch species) is good both of which have stock assessments and confirms that the impact of the lobster fishery on these species is very low relative to other sources of mortality (NEFSC 2011 and NEFSC 2012).

Information on status of the other main bycatch species, cusk, in this area is relatively limited. The stock is shared by the USA and Canada with the centre of abundance on the Scotian Shelf (Harris and Hank 2010). Cusk was identified as a species of concern by the NMFS in 2004 and a status review under the Endangered Species Act was initiated in 2007 (NMFS 2009). This review has not yet been completed. Substantial decline in trawl survey indices prior to the mid-1990s, and a Canadian assessment of the same population indicating significant concern, are the main reasons for concern about status of this species (DFO 2008; NMFS 2009). Recorded landings in the US were of the order of 100 t in 2003 and 2004, higher in preceding years (NMFS 2009). Canadian removals from the stock in 2004-2007 (most recent years available), including both landings and lobster fishery bycatch, were around 1200-1300 t/yr (lobster fishery bycatch: 400-500 t/yr; landings 800-900 t/yr) (Harris and Hanke 2010). A recent assessment

(Harris and Hanke 2010) indicates that survey catch rates on the Scotian Shelf have been stable since the late 1990s; commercial catch rates have declined but this is likely due to restrictions on the fisheries in which cusk is taken as bycatch. Species distribution has not declined since the late 1990s (Harris and Hanke 2010). Lobster and other fishermen in Canada consider the species abundant and widespread (Harris and Hanke 2010)

DMR received a federal grant to evaluate the extent and degree of cusk bycatch in the lobster trap and groundfish longline fisheries. This project began in Spring 2011 and will measure the condition and survival of cusk caught in non-directed fisheries. These data will be used in stock assessments and future management of this resource (DMR 2011)

Information on status of other non-commercial species (sculpins, cunner) bycatch species is not available in detail although it can be inferred from general knowledge of their distribution, abundance, and ability to survive discarding that they are abundant and that fishery bycatch is not having a substantial impact on these species. Strengthening information on these species, including assessments (even if rough) of current status and some form of monitoring, would strengthen management of this aspect of the fishery and information on discard mortality rates would also help to better assess impact of the fishery on bycatch species and likely result in some of the scoring issues under the 100 scoring guidepost being met.

Score: 80

Qualitative information and good quantitative information are available on the amounts of the main bycatch species (cod, white hake, cusk), thus meeting the first scoring issue of the 80 scoring guidepost. Good information (stock assessments) is available to assess outcomes on cod and white hake. The recent Canadian assessment of cusk indicating stable abundance in recent years indicates that current fishery removals are not contributing to decline, and the removals in this fishery are a small proportion of total removals.

For non-commercial species, information on distribution, abundance, and probable ability to survive discarding is sufficient to support an inference that the fishery is unlikely to move these species outside biologically based limits. Information is adequate to indicate that no additional strategy is needed to manage bycatch, or that current fisheries practices represent an adequate strategy for keeping bycatch low. Sufficient data are collected annually to detect any increase in risk.

Qualitative information and good quantitative information are available on the amounts of main bycatch species (cod, white hake and cusk) affected by the fishery.

Stock assessments of the two commercial species provide sufficient information to estimate the outcome status of both species with respect to biologically based limits. The recent Canadian assessment of cusk indicating stable abundance in recent years indicates that current fishery removals are not contributing to decline, and the removals in this fishery are a small proportion of total removals.

Information is adequate to indicate that no additional strategy is needed to manage bycatch, or that current fishing practices represent an adequate strategy for keeping bycatch low.

Sufficient data continue to be collected annually to detect any increase in risk to main bycatch species.

As a result the 80 scoring guidepost has been met.

Audit Trace References

C. Wilson, pers. comm., April 24 2009
References under 2.2.1
DMR 2011
Harris and Hanke 2010
NEFSC 2011

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

NEFSC 2012

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

2.3	Endangered, Threatened and Protected (ETP) species

2.3.1	***Status:*** The fishery meets national and international requirements for protection of ETP species. The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species.	Known effects of the fishery are likely to be within limits of national and international requirements for protection of ETP species. Known direct effects are unlikely to create unacceptable impacts to ETP species.	The effects of the fishery are known and are highly likely to be within limits of national and international requirements for protection of ETP species. Direct effects are highly unlikely to create unacceptable impacts to ETP species. Indirect effects have been considered and are thought to be unlikely to create unacceptable impacts.	There is a high degree of certainty that the effects of the fishery are within limits of national and international requirements for protection of ETP species. There is a high degree of confidence that there are no significant detrimental effects (direct and indirect) of the fishery on ETP species.

Scoring Comments

The ETP species of concern with respect to this fishery are right whale, humpback whale, fin whale, sei whale, minke, loggerhead turtle and leatherback turtle.

All of the whale species except minke whale are listed under the Endangered Species Act (ESA) as endangered. The ESA described “distinct population segment” of loggerhead turtle has a threatened status and the leatherback turtle an endangered status. Minke whale is not listed under the ESA but is protected under the US Marine Mammal Protection Act.

All of the above listed species are listed under Appendix 1 of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Estimating effects of this fishery on large whales is difficult and subject to a number of uncertainties. A recent NMFS biological opinion (NMFS 2010a) on impacts of the American lobster fishery (in which this fishery is included) on species listed under the ESA contains detailed analyses of potential impacts based on a thorough review of the available information.

Known entanglements in Maine lobster gear are few, as are documented observations of whales in areas where the fishery is concentrated (i.e. areas closer than 12 miles from shore). On the other hand, relatively high proportions (in relation to total population size) of right whales and a lower but significant proportion of humpback whales are known to have been entangled in fishing gear from all fisheries; there have probably been undocumented entanglements due to the Maine lobster fishery; and gear in the Maine lobster fishery is fished beyond 12 miles from shore where whales are observed more frequently. Four entanglements of leatherback turtles were reported in Maine lobster gear in 2011, and three of minke whales were reported in 2010. Details for individual species follow.

Right whales do not appear to use Maine state waters consistently; observed individuals in state and nearshore waters are probably vagrants from known areas of habitat use (Cape Cod, Bay of Fundy) and from migration pathways between these areas in offshore waters (beyond 12 miles) (New England Aquarium, M. Brown pers. comm.). No whales have been observed in surveys inside 3 miles, few in the 3-12 mile zone (although survey effort has been low in these areas). However, right whales are regularly observed outside 12 miles. A compilation of opportunistic sightings shows 8 individuals and one small concentration of 3-5 individuals within 3 miles, 10-15 individuals and

10-15 small concentrations in the 3-12 mile zone, and hundreds of observations outside 12 miles (New England Aquarium, compilation of opportunistic sightings). Most observations outside 12 miles are concentrated in two areas: southeast of the Acadia Peninsula, and near the Maine-New Hampshire border. Five of 18 right whales (28%) radio tagged in the mouth of the Bay of Fundy were subsequently observed inside the 50-fm (90 m) contour in coastal Maine (Baumgartner and Mate 2005).

Lobster fishing gear is concentrated in state and nearshore waters (Smith 2006, Maine Lobstermen's Association information provided by P. McCarron). Based on a 2008 survey of harvesters and dealers, 80% of the catch in the Maine lobster fishery is in State waters (within 3 miles) and distribution of effort would probably be similar (C. Wilson, pers. comm.). Lobster gear is also set outside 12 miles where right whale observations are more common. Very high densities of vertical lines are present in the fishery area, during seasons when right whales are in the area. Lobster gear is generally set closer to shore in summer months, when right whales are in the area, due to summer shoreward migration of lobsters (E. Summers, pers. comm.). For right whales, 3 entanglements in lobster fishing gear have been documented in the period 1997-2005.

North Atlantic right whale is considered one of the most critically endangered marine populations. Population level is low (the most recent estimate gives a minimum population size of 345, NMFS 2010a). The population has been increasing in recent years (NFMS 2010a), although calf production and abundance trends have been variable over the years.

A strategy to further reduce mortality from entanglement in fishing gear has been developed and is being implemented, including measures in the Maine lobster fishery (see below, 2.3.2). Sources of mortality other than the Maine lobster fishery include other fisheries using vertical lines (trap, gillnet) and ship strikes.

In assessing the impact of the American lobster fishery on this species, NMFS (2010) assumed, based on a cautious interpretation of available information, that the American lobster fishery would kill or seriously injure one individual per year (the estimate was for all American fisheries but the assumption was made that this would apply to the American lobster fishery, to be cautious) (p 114). The most recent stock assessment has shown the right whale population to have been increasing at 1.8% per year in the 1990-2005 period (p 114). Population viability analysis (PVA) showed no extinctions or quasi-extinctions in 1000 projections under these conditions, and a very low probability of population decrease over a 100 year period (p 115). The opinion noted that these results applied to a period prior to implementation of significant new measures to reduce fisheries interactions (ALWTRP) and ship strikes (p 117). The opinion concluded that serious injury or mortality of 1 individual per year as a result of fisheries entanglement is not likely to reduce appreciably the likelihood of both survival and recovery of the North Atlantic right whale population (p 119).

For ***humpback whales***, two entanglements in lobster fishing gear in nearshore Maine have been documented in 1997-2005 (average 0.2/yr). Humpbacks have been sighted a dozen times between 1974 and 2005 within 3 miles, more frequently in the 3-12 mile zone, and relatively frequently outside 12 miles. Although occurrences are more frequent than for right whales, documented entanglements are slightly lower or comparable; abundance of this population is higher than for right whales, which may explain the higher occurrence level. As with right whales, nearshore Maine does not appear to be a preferred habitat but a location where vagrant individuals may occur. The Potential Biological Removal (PBR) for Gulf of Maine humpback whales is 1.3 individuals per year.

NMFS (2010) summarised various estimates of potential mortality in entanglements (p 119). They noted that the Gulf of Maine humpback whale stock is steadily increasing in size (p 120) and that, accordingly, the current levels of fishery impacts do not appear to be causing an appreciable reduction in survival. The North Atlantic humpback population has also been increasing steadily (p 121). NMFS (2010a) concludes that while takes of this species continue to be possible, level of take is not expected to reduce appreciably the likelihood of survival and recovery of this species (p 122).

Fin and sei whales appear to be less susceptible to entanglement in fishing gear than right or humpback whales (NMFS entanglement data). The NMFS (2010) opinion notes that serious injury entanglements of these species have been documented but occur at a level below the PBR for both species (p 122). ALWTRP measures are expected to further reduce risk. Accordingly, the continued operation of the American lobster fishery is not expected to reduce appreciably the likelihood of both survival and recovery of these species (p 122).

Minke whales in the fishery are from the Canadian east coast stock, for which the best abundance estimate currently is 8,897 animals (minimum population estimate is 6,909

animals) (NMFS 2010b). Estimated total annual mortalities for this species are currently below 10% of the PBR of 69 animals per year, which is considered to be insignificant. Accordingly it does not appear that the fishery being assessed is causing significant mortality to this species.

Little is known of ***leatherback turtle*** in Maine nearshore waters, other than that this species does occur in the Gulf of Maine and that it is entangled in nearshore fishing gear in adjacent areas in Canada and Massachusetts. No entanglements in Maine lobster fishing gear were reported to the assessment team, nor were documented observations of the species in the Maine lobster fishery area, up to 2010. However, four entanglements were reported in 2011 (with a fifth in unspecified gear which could have been lobster gear). In areas in Canada where documented records were few, systematic searching for and recording of records via a fishermen's network led to compilation of 83 records of entanglements in fixed gear in continental shelf area over a 9-year period; this was considered a minimum estimate since it resulted from voluntary reporting (James et al 2005).

Based on recent information on fishery entanglements of this species, the NMFS (2010) opinion concluded that a take of 5 leatherback turtles could be anticipated as a result of the continued operation of the American lobster fishery (p 130). Nesting trends are stable or increasing for nearly all nesting sites, and recent nest counts have been among the highest observed (p 130). Impacts of recent measures to reduce mortalities in longline and shrimp fisheries have probably not yet shown up in population information (p. 131). Overall, continued operation of the American lobster fishery is not considered to appreciably reduce likelihood of recovery for this species (p 131).

For ***loggerhead sea turtle***, the NMFS (2010) opinion concluded that death or serious injury could result from gear entanglement for 1 individual per year (p 123). A previous PVA analysis of impacts of the sea scallop fishery indicated that extinction probabilities under current conditions, including mortalities from the sea scallop fishery, were low (p 127). Estimated take of 1 individual per year in the American lobster fishery is less than 10% that in the sea scallop fishery (p 127). In light of current loggerhead turtle population size and trends, the opinion concludes that the level of take will not cause an appreciable reduction in the population (p 128) and that continued operation of the American lobster fishery within the constraints of the FMP will have no appreciable reduction in the ability of the population to achieve recovery (p 129).

The NMFS (2010) opinion explicitly considered potential indirect effects of the fishery on these ETP species. Possible indirect effects identified were ship strikes by fishing vessels and impact on prey abundance (p 51). The opinion concluded that these indirect effects were very unlikely to be significant (p 51, 107). NMFS (2010) concludes that "no indirect effects to cetaceans or sea turtles are expected as a result of the proposed action" (p 107) (i.e., continued operation of the American lobster fishery).

Score: 90

The effects of the fishery are known, as a result of NMFS (2010a) and NMFS (2011b), and there is a high degree of certainty that for all of the listed ETP species they are within limits of national and international requirements for protection of ETP species, in that population trends of the relevant species have been increasing under the recent threat environment, which additionally is also expected to be ameliorated by recent ALWTRP measures. For minke whale no population trend information is available but recent and current mortality rates are considered to be insignificant. Thereby meeting the first scoring issue of the 100 scoring guidepost for this PI.

As such, direct effects are highly unlikely to create unacceptable impacts for all of the listed ETP species, thus meeting the second scoring issue of the 80 scoring guidepost. Indirect effects have been considered (NMFS 2010a) and are considered unlikely to create unacceptable impacts, thus meeting the second and third scoring issues of the 80 scoring guidepost.

Accordingly a score of 90 is assigned for all the listed ETP species.

Audit Trace References

Information provided by:
New England Aquarium;

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Ocean Conservancy;
Maine Lobstermen's Association, based on NMFS entanglement summaries, sightings surveys, opportunistic sightings, information in ALWTRP Federal Environmental Impact Statement 2007;
M. Brown, New England Aquarium pers. comm.;
Baumgartner and Mate 2005;
Keystone Center 1997;
Waring et al 2003;
James et al 2005;
Maine DIFW 2009;
Dwyer et al 2003.
NMFS 2010a
NMFS 2010b

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.3.2	***Management strategy*** The fishery has in place precautionary management strategies designed to: - meet national and international requirements; - ensure the fishery does not pose a risk of serious or irreversible harm to ETP species; - ensure the fishery does not hinder recovery of ETP species; and - minimise mortality of ETP species.	There are measures in place that minimise mortality, and are expected to be highly likely to achieve national and international requirements for the protection of ETP species. The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).	There is a strategy in place for managing the fishery's impact on ETP species, including measures to minimise mortality that is designed to be highly likely to achieve national and international requirements for the protection of ETP species. There is an objective basis for confidence that the strategy will work, based on some information directly about the fishery and/or the species involved. There is evidence that the strategy is being implemented successfully.	There is a comprehensive strategy in place for managing the fishery's impact on ETP species, including measures to minimise mortality, which is designed to achieve above national and international requirements for the protection of ETP species. The strategy is mainly based on information directly about the fishery and/or species involved, and a quantitative analysis supports high confidence that the strategy will work. There is clear evidence that the strategy is being implemented successfully, and intended changes are occurring. There is evidence that the strategy is achieving its objective.

Scoring Comments

An overall strategy is in place for managing fishery impacts on large whales, the Atlantic Large Whale Take Reduction Program (ALWTRP), led by NMFS The Maine DMR and the Maine Lobstermen's Association are active participants in the ALWTRP. Maine has put in place a Cooperative Management Program for large whales, sea turtles, shortnose sturgeon and Atlantic salmon (Summers 2009; Summers et al 2011) and reports regularly on progress of activities under this Program (e.g. Summers and Morris 2008; Summers et al 2011). Under the ALWTRP, a series of measures to reduce impacts of the lobster fishery on large whales was put in place over the past several years, including requirements for no floating lines at the surface, for breakaway links on vertical lines, for sinking groundlines and mandatory gear marking. Sinking groundlines and marked gear are not required inside an exemption zone near the coast of Maine. The Maine Cooperative Program includes projects to maintain a real-time database on whale sightings (throughout the Gulf of Maine), to maintain a disentanglement network of trained personnel along the coast of Maine (including training for fishermen and Marine Patrol officers), to conduct research on gear to reduce impacts on whales, to study foraging behaviour through a combination of sightings records, whale tagging, and research on plankton distribution and abundance. The program also includes projects to improve information (see 2.3.3). Three minke whales were disentangled by the disentanglement network in 2010 (no other whales were reported entangled), and two leatherback turtles were disentangled in 2011 (Summers et al 2011).

There is evidence that the strategy (ALWTRP measures) is being implemented successfully. The DMR Bureau of Marine Patrol enforces the ALWTRT whale regulations along with other regulations, using 50 officers and 9 offshore patrol vessels (plus 15-20 seasonal near-shore vessels). Generally there is a high level of compliance with all measures (Major J. Fetterman pers. comm.) and 98-100% compliance with breakaway endline regulations was observed in 2006 (Fetterman et al 2007). Compliance surveys after introduction of new regulations were conducted by Maine's Marine Patrol in October 2009 and March 2010. Over 1,000 pieces of gear were hauled. Compliance with the new sinking groundline regulation was 93%, with the requirement for weak links 86%, and with the requirement to mark endline ropes 58% (Summers et al 2011) DMR have said they will continue outreach activities to increase compliance rates on issues for which compliance was low on this survey.

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

There is an objective basis for confidence that the strategy (ALWTRP) will work, in that a large multi-stakeholder team has developed the measures recently put in place, based on the best information available. The strategy has been designed based on best knowledge and assumptions on whale behaviour and fishing gear operations.

The NMFS (2010) assessment indicated that threats from the fishery would not compromise survival or recovery of large whales, and was based on information collected prior to implementation of the new regulations, which should further reduce threats. Accordingly it appears that there is clear evidence that the strategy is attaining its objective.

Further measures may be taken on vertical lines following a study based on overlap of gear and whales, to identify high and low risk areas for whales (P. McCarron, pers. comm.; ALWTRT 2009). The intention is to have draft rules by 2013 and a final rule by 2014.

For leatherback and loggerhead turtles, measures taken under the ALWTRP and the Maine Cooperative Management Program should help to reduce risks and support disentanglement of any entangled individuals.

Score: 90

There is a comprehensive strategy in place to reduce impacts specifically on large whales but also, indirectly, on marine turtles; this is consistent with best practice internationally and is designed to be highly likely to achieve national and international requirements. Thus the first scoring issue of the 80 scoring guidepost is met. The strategy is being implemented successfully. There is an objective basis for confidence that it will work in that a large multi-stakeholder team has concluded, after several years of work, that this is the best approach and discussions on further improvements to measures continue. Thus the fishery meets the second and third scoring issues associated with the 80 scoring guidepost.

Although the strategy is wide-ranging, it cannot yet be characterised as “comprehensive” as continued improvements are under discussion, so the first scoring issue of the 100 scoring guidepost is not met. Given that the strategy is mainly based on information directly about the fishery and species involved (through multi-stakeholder contributions), and is supported by a quantitative analysis (NMFS 2010a), the second scoring issue of the 100 scoring guidepost is met. The third scoring issue of the 100 scoring guidepost is met as clear evidence exists that the strategy is achieving its objective, and the information from the Marine Patrol surveillance study indicates that intended changes are occurring. As a result a score of 90 is assigned for both whales and turtles.

Audit Trace References

Summers 2009;
Summers and Morris 2008;
Fetterman et al 2007;
P. McCarron pers. comm. Summers et al. 2011.

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.3.3	***Information / monitoring*** Relevant information is collected to support the management of fishery impacts on ETP species, including: - information for the development of the management strategy; - information to assess the effectiveness of the management strategy; and - information to determine the outcome status of ETP species.	Information is adequate to broadly understand the impact of the fishery on ETP species. Information is adequate to support measures to manage the impacts on ETP species Information is sufficient to qualitatively estimate the fishery related mortality of ETP species.	Information is sufficient to determine whether the fishery may be a threat to protection and recovery of the ETP species, and if so, to measure trends and support a full strategy to manage impacts. Sufficient data are available to allow fishery related mortality and the impact of fishing to be quantitatively estimated for ETP species.	Information is sufficient to quantitatively estimate outcome status with a high degree of certainty. Information is adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives. Accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species

Scoring Comments

Available information on interactions of whales and sea turtles with this fishery is summarized above (2.3.1, 2.3.2, Introductory section 6.3.2). This information, particularly on the recent analysis by NMFS (2010a) of impacts of the American lobster fishery on species listed under the Endangered Species Act and by NMFS (2010b) on minke whale, is considered sufficient to assess the impact of the lobster fishery on ETP species, to support development of a strategy to mitigate impacts, and to provide quantitative estimates of mortality. Where there is uncertainty (and the information is subject to uncertainties), NMFS (2010) takes a cautious approach to estimating mortality by rounding up or considering mortalities from all American fisheries to apply to the lobster fishery.

Cost of obtaining the necessary information (aerial and shipboard sighting surveys for marine mammals), the concentration of survey effort outside the fishery area (because much of the fishery area, in inshore and nearshore areas, is not a key or core habitat for these species), the difficulties of identifying fishing gear to source when this is found entangled on whales, and the long time scale for assessing trends in long-lived species, are factors contributing to uncertainties about impacts of the Maine lobster fishery on ETP species. Within these constraints, available information has been analysed and presented in considerable detail. Activities to obtain better information are under way, in particular development of a reporting network for entanglements in Maine waters, acoustic monitoring of large whales in near-shore fishing areas and the Jordan Basin wintering habitat, expanded efforts by DMR to document density, distribution and seasonality of fishing gear through logbooks and boat and aerial surveys (Summers et al 2011). A network of acoustic buoys was deployed throughout coastal fishing areas in 2010 to examine distribution of large whales in this habitat; data are currently being analyzed. Mail surveys for distribution of fishing effort were conducted in 2009 and 2010 with return rates of 19% and 10% respectively. Logbooks to report numbers of traps and vertical lines were distributed in 2009 with a return rate of 35%.

Progress has thus been made on improving information on distribution of vertical lines from lobster fishing gear following the initial analysis by Smith (2006). Maine has established a whale reporting hotline, which will serve to improve information on interactions with gear and on distribution of whales and sea turtles in the lobster fishery area (Summers 2009, Summers and Morris 2008). Under the ALWTRT, modelling of whale and fishing gear distribution will be undertaken in the coming years to help to focus fishery management efforts where these will have greatest positive impact (ALWTRT 2009; P. McCarron, Maine Lobstermen's Association, pers. comm.; Summers et al

2011).

No endangered species of large whales have been reported through the disentanglement network. Three minke whales were entangled in 2010 and were released by the disentanglement network. Two leatherback turtles were disentangled from lobster gear in 2011 (Summers at al 2011).

A second problem is identifying the source of gear entangled on whales (ALWTRT 2009). This has long been recognised as a problem (e.g. entanglement information compiled by NMFS for the ALWTRT indicates gear being unidentifiable in a high proportion of entanglement incidents). There is now a requirement to mark gear from the Maine lobster fishery with a red mark on all vertical endlines, although this requirement is not in force in the exclusion zone near shore.

Score: 85

It is recognised that the fishery may be a threat to the protection and recovery of the listed ETP species. Information is available to measure trends and support a full strategy to manage impacts, and to allow fishery related mortality and the impact of fishing to be quantitatively estimated for ETP species that are known to interact with the fishery. Thus the first and second scoring issues of the 80 scoring guidepost are met.

Information is sufficient to quantitatively estimate outcome status for all the listed ETP species with a high degree of certainty, as outlined in NMFS (2010), thus the first scoring issue of the 100 SG is met.

Accordingly a score of 85 is assigned.

Audit Trace References

See 2.3.1 and 2.3.2

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

2.4	Habitat

2.4.1	***Status*** The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function.	The fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.	The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.	There is evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.

Scoring Comments

The fishery operates mainly in rocky and muddy areas (information from fishermen), with greatest concentration of effort near shore (within 3 miles) and a declining concentration of effort to beyond 12 miles from shore. Approximately 80% of landings are taken within 3 miles of shore (C. Wilson, pers. comm.). Benthic habitat mapping has been carried out in nearshore areas (Barnhardt et al 1998; Maine Geological Survey n.d.), showing a complex mosaic of different substrate types. Information is also available from further offshore (NEFMC 2011a, Map 6, p. 165), confirming that mud, granule-pebble, and cobble bottoms are predominant in the fishery area.

State and nearshore benthic areas are dominated by kelp and horse mussel communities with low profile, with associated sessile or mobile species (Ojeda and Dearborn 1989, Witman 1987); the ability to recover rapidly from disturbance would characterise the communities of a high-disturbance area such as this. Superposed on this background disturbance regime has been a set of environmental changes, partly caused by human activities, including removal of major predators and green sea urchins (Steneck et al 2004) and decadal changes in the sea temperature regime and stratification (Mountain 2004; Friedland and Hare 2007).

Further offshore, benthic environments are expected to be lower energy, and there is some potential for development of erect attached fauna which might be particularly sensitive to trap damage.

Impact of the fishery on physical structure and on biota which make up part of the habitat need to be considered in relation to the background disturbance regime. The state and nearshore waters habitat in which much of the fishery is concentrated are subject to substantial background disturbances from wave and storm action and tidal currents (Witman 1998). Wave-related disturbances are particularly significant down to about 10 m depth, although they may be felt down to about 30 m (Witman 1998). Biota in this area can be expected to be adapted to the disturbance regime, thus this is not an area in which long-lived, erect sessile organisms that would be particularly subject to gear damage would be expected to occur.

Impacts of trap fisheries on benthic ecosystems is considered to be relatively low, compared to impacts of mobile gear fisheries (Eno et al 2001; NEFSC 2002; Stevenson et al 2004, NEFMC 2011a). Use of multiple traps connected by bottom lines increases the impact relative to that of single traps, as lines may drag and cut off sessile organisms (Eno et al 2001). Generally this fishery is characterised by use of single or double traps in nearshore areas where effort is concentrated, with longer trawls used in deeper areas (Smith 2006), so groundline impacts would be greater in deeper areas. Eno et al (2001) suggested that soft-bodied erect organisms (sea pens) might recover from trap damage relatively quickly (several months). Hard coral communities, with much longer recovery times, are found in the Gulf of Maine area in waters beyond the depths fished by the Maine lobster fishery being assessed (for example in the Northeast Channel and edge of Georges Bank, Mortensen et al 2005). The recent requirement to use sinking groundlines to reduce risk of entanglement of whales could have the effect of increasing impacts on bottom habitats but this requirement is not in effect in the areas nearest shore where effort is concentrated (the exemption zone).

NEFMC (2011a) conducted a detailed review of the impacts of types of gear used in fisheries in the northeast USA, based on susceptibility and recovery ability of habitats, and considering both biological and geological habitat features. Lobster traps were assessed to be relatively low in impact in the habitats in which they are used (NEFMC 2011, Table 29, pp 97-100).

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Lobsters are highly habitat dependent, particularly in the young stages, requiring crevices of appropriate sizes and appropriate supplies of animal food, many species of which would also depend on healthy bottom habitats. The substantial increase in lobster abundance over the past two decades, when fishing effort has also been increasing, suggests that there have not been major negative impacts of the fishery on bottom habitats important for lobster.

The key unknowns in assessing impacts of this fishery on habitats are (1) the cumulative effect of repeated hauls of the very substantial number of traps in the fishery on habitats in disturbed areas and (2) impact of traps in deeper, lower-energy areas where erect fauna may be found. Information on number and distribution of trap hauls is not available but information from at-sea observer trips indicates about 220 traps hauled per trip, while it is estimated that about 260,000 trips were made in 2008 (information from C. Wilson), for a total of about 57 million trap hauls per year. This should be considered a rough estimate, but at least provides an idea of magnitude of the total footprint. Given this footprint, despite the relatively low individual impact of trap hauls, it is possible that the fishery is having some impact on habitat structure. However, there is no evidence that it is having a serious and irreversible impact, particularly in relation to the background disturbance regime and other ecosystem changes which have occurred in recent decades.

Score: 80

Based on inference from a range of available information, the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm, thus meeting the single scoring issue under the 80 scoring guidepost. This conclusion is based on interpretation of “serious or irreversible harm” in the MSC FAM (7.5.3), i.e. loss (extinction) of habitat types, depletion of habitat forming species to the extent that they meet criteria for high risk of extinction, significant alteration of habitat that causes major change in structure or diversity of associated species assemblages.

Audit Trace References

C. Wilson, pers. comm.;
Witman 1998;
Ojeda and Dearborn 1989;
Mountain 2004;
Friedland and Hare 2007;
Eno et al 2001;
NEFSC 2002;
Stevenson et al 2004;
Smith 2006.
Barnhardt et al 1998
Mortensen et al 2005
Maine Geological Survey n.d.
NEFMC 2011a

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.4.2	***Management strategy*** There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types.	There are measures in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance. The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/habitats).	There is a partial strategy in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above. There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or habitats involved. There is some evidence that the partial strategy is being implemented successfully.	There is a strategy in place for managing the impact of the fishery on habitat types. The strategy is mainly based on information directly about the fishery and/or habitats involved, and testing supports high confidence that the strategy will work. There is clear evidence that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its objective.

Scoring Comments

The mode of operation of the fishery and the characteristics of the habitats in the area in which it operates suggest that the Habitat Outcome level of 80 will continue to be achieved (see 2.4.1). However, it cannot be stated that the fishery has no impact on habitat, and as such, measures or a partial strategy are considered to be required (FAM 7.1.25).

Traps are considered to be a gear which has low impacts relative to mobile gear types, and habitats in much of the fishery area are considered to be of low vulnerability to damage from trap gear. As such, measures can be considered to be in place to achieve the 80 scoring guidepost for the outcome performance indicator 2.4.1.

Under US fisheries legislation, essential fish habitat must be identified and protected by fisheries management plans. The New England Fishery Management Council (NEFMC) has identified essential fish habitat for a wide range of species, and protection measures for these portions of habitat are identified in fishery management plans and in the EFH Omnibus Amendment 1 published in 1999 (NEFMC 2011b). The Omnibus Amendment was further amended in 2007 and is currently undergoing further revision. Lobster fisheries have apparently not, to date, been subject to restrictions for protection of essential fish habitat. A review of impacts of different fishing gears on fish habitat conducted as part of the current revision of the Omnibus Amendment (NEFMC 2011) indicates that lobster traps have relatively low impacts on fish habitat, at least compared to mobile gear. The lobster fishery could be subjected to restrictions if it was found to be harming essential fish habitat, under the US legislation.

However, it cannot be stated that a “partial strategy” is in place as there has apparently been no explicit consideration of potential habitat impacts of the fishery, and of how fishing operations should be changed if the measures in place proved to be unsuitable for meeting the 80 scoring guidepost for outcome 2.4.1.

Score: 60

There are measures in place which are expected to achieve the 80 scoring guidepost for Habitat Outcome (see 2.4.1) and these are considered likely to work based on inference from available studies of gear impacts and benthic habitats in this area, thus meeting the 60 scoring guidepost.

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Audit Trace References
See 2.4.1 NEFMC 2011b.

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.4.3	***Information / monitoring*** Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types.	There is a basic understanding of the types and distribution of main habitats in the area of the fishery. Information is adequate to broadly understand the main impacts of gear use on the main habitats, including spatial extent of interaction	The nature, distribution and vulnerability of all main habitat types in the fishery area are known at a level of detail relevant to the scale and intensity of the fishery. Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent, timing and location of use of the fishing gear. Sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).	The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types. Changes in habitat distributions over time are measured. The physical impacts of the gear on the habitat types have been quantified fully

Scoring Comments

Detailed information is available on bottom types in the area within 10-12 nautical miles from the coast, where most (80% or more) of the fishery operates (Maine Geological Survey n.d.; Maine Lobstermen's Association, compilation of information from Maine Geological Survey), and in areas outside the 3-mile coastal zone (NEFMC 2011a). Distribution of bottom communities which contribute to habitat can generally be inferred from the bottom type information and point information on communities (e.g. Ojeda and Dearborn 1989; Witman 1987). There is some uncertainty about whether sensitive habitats exist in deeper, lower-energy areas where the fishery operates, but effort is relatively low in these areas.

Some information on trap fishery impacts on bottom habitats is available, but direct evidence is quite limited (Eno et al 2001, Adey 2007, Stone 2006, Troffe et al 2005, NEFMC 2011). New England Fishery Management Council (NEFMC 2011) recently completed a detailed examination of impacts of fishing gear on bottom habitats, using a vulnerability matrix (susceptibility x recovery), and based on a detailed literature review and professional judgement. This review concluded that trap gear has low impacts on bottom habitats (both geological and biological components), with "susceptibility" scoring below 1 on a scale of 4 (10% or less of habitat quality affected) and "recovery" times short (scoring below 1.5 on a scale of 4, or less than about 1.5 years). Although studies to date conclude that trap gear has relatively low impacts on bottom habitats, especially compared to mobile gear, the cumulative impact of the very large amounts of gear used in the Maine lobster fishery have not been considered in detail. However the gear is fished in a high-energy environment where habitats are already subject to substantial natural impacts.

Information on spatial extent, timing and location of gear is available (Smith 2006; Maine Lobstermen's Association compilation; C. Wilson information) and has been improving due to dealer and harvester surveys and aerial and boat surveys of gear distribution to support large whale protection programs. The 2008 dealer and harvester survey concluded that 80% of landings are taken within 3 miles of the shoreline, and a similar proportion of effort is likely to be expended here (C. Wilson, pers. comm.). Monitoring of trends in gear use, distribution (seasonal and spatial) and changes in operations (for example, use of sinking groundlines) is improving, such that trends in impacts on habitat may be assessed in future.

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Score: 80

There is an understanding of the types and distribution of habitats in the fishery area, and information is adequate to broadly understand the main impacts of the gear on the main habitats, including spatial extent of interaction, thus meeting the 60 scoring guidepost.

The nature, distribution and vulnerability of main habitat types are known at a level of detail relevant to the scale and intensity of the fishery, from the information cited above. There is reliable information on the spatial extent, timing and location of use of fishing gear, and information continues to be collected on this. Although there is some uncertainty about whether sensitive habitats exist in deeper, lower-energy areas where the fishery operates, effort is relatively low in these areas. Accordingly the three scoring issues at the 80 level are considered to have been met.

Audit Trace References

Maine Geological Survey n.d. and information on coastal substrates from Marine Geological Survey, provided by P. McCarron, Maine Lobstermen's Association;
Sources cited in 2.4.1;
Adey 2007;
Stone 2006;
Troffe et al 2005
Ojeda and Dearborn 1989
Witman 1987
NEFMC 2011.

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

2.5	Ecosystem

2.5.1	***Status*** The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function.	The fishery is unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	The fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	There is evidence that the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.

Scoring Comments

The Maine lobster fishery operates in coastal and shallow-shelf areas of the Gulf of Maine, part of the Northeast US Large Marine Ecosystem (Aquarone and Adams 2009). Productivity in this LME is considered high (Aquarone and Adams 2009). Ecosystem structure and function, including trophic relationships, for the Gulf of Maine are generally known (NMFS n.d.). The ecosystem in which the fishery operates is generally high-energy (wave and tide) (Witman 1998). Benthic substrates are mainly rock interspersed with mud, sand and gravel areas.

Any assessment of ecosystem impacts must be done in the context of the substantial changes in Gulf of Maine ecosystems from a variety of causes over the past several decades, including removal of top predators and green sea urchins (Steneck et al 2004), and changes in oceanography and water temperatures (Mountain 2004, Friedland and Hare 2007). The ecosystem can be considered highly modified as a result of these changes, over and above any changes due to the lobster fishery.

The fishery operates relatively cleanly, targeting the target species effectively, and impacts on key elements such as productivity, trophic relationships, and biodiversity are considered to be low. The key potential ecosystem issues (scoring elements) identified for this fishery are impacts of removal of the target species on trophic relationships, and impact of the "bait subsidy" on ecosystems in which the fishery operates. Other ecosystem impacts have been covered in sections 2.1-2.4.

With respect to impacts of removal of lobsters on trophic relationships, this is likely quite low, effectively negligible, because lobster does not appear to play a key or structuring role in food webs. Although lobster of the sizes removed by the fishery (within a window between minimum legal size and maximum size determined by the market and trap characteristics) may occur as prey of large predators, especially fishes, predation occurs when lobsters are soft-shelled, when they typically shelter from predation. Commercial groundfish (for example cod, pollock) have been reported to prey on lobsters but there is little support for this (Lawton and Lavalli 1995). Rates of predation decrease with growth of lobsters and it appears that adult lobsters are not a significant forage species for predators (Lawton and Lavalli 1995). Lobster are able to switch prey species as abundance of these varies (Lawton and Lavalli 1995), so changes in lobster abundance due to fishing are unlikely to have a structuring effect on marine food webs (as would be the case if they were highly dependent on one or a few prey items).

The substantial quantity of bait used could have ecosystem impacts by increasing food available to species which can easily enter and exit traps (for example, juvenile lobsters, Jonah and rock crabs, small fishes and invertebrates) (the "bait subsidy"). Analyses on the potential impact of bait use on ecosystems in which the fishery occurs are preliminary and somewhat contradictory, but there is no evidence that this is having serious or irreversible impacts. Saila et al (2002) conducted a preliminary assessment of the potential impact, concluding that the organic (carbon) subsidy of bait use within 3 miles was equivalent to an 80% increase in primary production in this area, and could have supported 25% to 33% of the increased lobster fishery production observed in the 1990s. Grabowski et al (2009) described two studies which examined growth of sublegal lobsters in areas with and without fisheries; in one such area, sublegal lobsters grew 15% faster in the fished area than in the unfished, suggesting that bait was having an effect on growth, while in the other area no difference was observed, suggesting no such effect. However such studies are complicated by the multiple factors influencing lobster growth differences in different areas. Many fishermen believe that the bait subsidy is important to maintaining high lobster productivity, and that lobster are being

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

"farmed" in this fishery. There is no evidence of eutrophication of coastal waters from bait use (C. Wilson, pers. comm.). Overall, while the bait subsidy appears substantial relative to natural production, there is no evidence that this is causing serious or irreversible harm to the fishery ecosystem.

Score: 90

The fishery meets the 100 scoring guidepost for 1 of the 2 identified scoring elements – impact of removal of the target species on trophic relationships - in that good information is available to indicate that the fishery is highly unlikely to be causing serious or irreversible harm.

For the second scoring element, impact of the "bait subsidy", information is incomplete but based on what is known the fishery is highly unlikely to be causing serious or irreversible harm, and thus this element meets the 80 scoring guidepost. An overall score of 90 is therefore given to this performance indicator.

Audit Trace References

C. Wilson pers. comm.;
Steneck et al 2004;
Mountain 2004;
Friedland and Hare 2007;
Lawton and Lavalli 1995;
Saila et al 2002;
Grabowski et al 2009.
Aquarone and Adams 2009

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.5.2	***Management strategy*** There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function.	There are measures in place, if necessary, that take into account potential impacts of the fishery on key elements of the ecosystem. The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ ecosystems).	There is a partial strategy in place, if necessary, that takes into account available information and is expected to restrain impacts of the fishery on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance. The partial strategy is considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ ecosystems). There is some evidence that the measures comprising the partial strategy are being implemented successfully.	There is a strategy that consists of a plan, containing measures to address all main impacts of the fishery on the ecosystem, and at least some of these measures are in place. The plan and measures are based on well-understood functional relationships between the fishery and the Components and elements of the ecosystem. This plan provides for development of a full strategy that restrains impacts on the ecosystem to ensure the fishery does not cause serious or irreversible harm. The measures are considered likely to work based on prior experience, plausible argument or information directly from the fishery/ecosystems involved. There is evidence that the measures are being implemented successfully.

Scoring Comments
With respect to the two scoring elements identified in 2.5.1 above: There appears to be no necessity for a management strategy with respect to the impacts of harvesting of lobsters on trophic relationships, as harvesting of the sizes in the fishery should not have negative impacts on food web structure. As such the 80 scoring guidepost is met. With respect to the potential impacts of the bait subsidy on coastal ecosystems, available information indicates that there appears to be no measurable impacts and as such there is no necessity for a partial strategy. As such the 80 scoring guidepost is met.
Score: 80
For the two identified scoring elements (trophic impacts of harvesting lobsters; bait subsidy impact on ecosystems) no strategy is necessary and accordingly the 80 scoring guidepost is met.
Audit Trace References
As for 2.5.1

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.5.3	***Information / monitoring*** There is adequate knowledge of the impacts of the fishery on the ecosystem.	Information is adequate to identify the key elements of the ecosystem (e.g. trophic structure and function, community composition, productivity pattern and biodiversity). Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but have not been investigated in detail.	Information is adequate to broadly understand the functions of the key elements of the ecosystem. Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but may not have been investigated in detail. The main functions of the Components (i.e. target, Bycatch, Retained and ETP species and Habitats) in the ecosystem are known. Sufficient information is available on the impacts of the fishery on these Components to allow some of the main consequences for the ecosystem to be inferred. Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).	Information is adequate to broadly understand the key elements of the ecosystem. Main interactions between the fishery and these ecosystem elements can be inferred from existing information, and have been investigated. The impacts of the fishery on target, Bycatch, Retained and ETP species and Habitats are identified and the main functions of these Components in the ecosystem are understood. Sufficient information is available on the impacts of the fishery on the Components and elements to allow the main consequences for the ecosystem to be inferred. Information is sufficient to support the development of strategies to manage ecosystem impacts.

Scoring Comments

Although there does not appear to be a comprehensive description of the Gulf of Maine ecosystem available, general descriptions of ecosystems in the area are available (e.g. NMFS n.d.) and the ecosystem would be generally similar to that in other nearby areas where more detailed ecosystem descriptions are available (e.g. for the Scotian Shelf, Bundy et al. 2005). A general description of oceanographic conditions and dermersal fish communities is available in the context of Large Marine Ecosystem Descriptions (Aquarone and Adams 2009). There is information on invertebrate and demersal fish community structure (Stevenson et al 2004) and on structure of inshore benthic communities (Ojeda and Dearborn 1989; Witman 1987, 1998). Changes in ecosystem structure over the past decades have been well described (Friedland and Hare 2007; Pershing et al 2005; Steneck et al 2004). The program for a recent symposium on ecosystems of the Gulf of Maine (http://www.rargom.org/Symposium2009/objective.htm) indicates that syntheses on ecosystems and biodiversity will be published as part of the Proceedings, and this would add to system-level knowledge of this area. Overall, the available information is adequate to understand general ecosystem structure and the role and function of components, and to identify key ecosystem elements which could potentially be impacted by the fishery.

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

With one exception, impacts of the fishery on key components of the ecosystem (target species including bait harvesting, bycatch, retained and ETP species) are identified and the functions of these components in the ecosystem are understood (see sections 2.1 through 2.4). The exception is the impact on habitats for which additional information is needed to clarify potential impacts. The function of this component is however understood.

With respect to the two key ecosystem-level scoring elements identified (trophic impacts of harvesting lobsters; impact of bait subsidy on coastal ecosystems), there is good evidence that no serious or irreversible ecosystem level impacts are occurring – lobsters of commercial sizes are not considered important prey for other species, and studies of the bait subsidy suggest that this will not cause serious or irreversible harm to the ecosystem. Accordingly, continued monitoring of impacts is not considered essential for these ecosystem scoring elements. Information sources on these scoring elements are provided in sections 2.5.1 and 2.5.2.

Score: 90

Information is adequate to broadly understand the key elements of the ecosystem and the two key scoring elements identified – potential changes to trophic relationships related to removal of commercial-size lobsters, and impact of the bait subsidy on coastal ecosystems. The 100 SG is met.

Main interactions between the fishery and these ecosystem elements can be inferred from existing information, and investigations have been conducted on lobster trophic relationships and on the bait subsidy issue. The 100 SG is met.

With one exception (habitats), the impacts of the fishery on the key Components are identified; the main functions of all Components in the ecosystem are understood; the 100 SG is mostly met.

Sufficient information is available on the fishery impacts on all Components and elements for the main consequences on the ecosystem to be inferred, meeting the 100 SG.

Information is sufficient to support the development of strategies to manage some ecosystem impacts (impacts on ETP species; retained bycatch; bait harvesting) but not others (habitats); the 100 SG is partially met.

Sufficient data continue to be collected to detect any increase in risk level to ecosystem impacts, meeting the 80 SG.

Given that most scoring issues of the 100 SG are met, and all scoring issues of the 80 are met, a score of 90 is assigned.

Audit Trace References

Section 6 of this report

References in scoring table Sections 2.1.1 to 2.5.2

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Principle 3	The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable

3.1	Governance and Policy

3.1.1	**Legal and/or customary framework** The management system exists within an appropriate and effective legal and/or customary framework which ensures that it: - Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; - Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and - Incorporates an appropriate dispute resolution framework.	The management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2. The management system incorporates or is subject by law to a mechanism for the resolution of legal disputes arising within the system. Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery. The management system has a mechanism to generally respect the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes which is considered to be effective in dealing with most issues and that is appropriate to the context of the fishery. The management system or fishery is attempting to comply in a timely fashion with binding judicial decisions arising from any legal challenges. The management system has a mechanism to observe the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes that is appropriate to the context of the fishery and has been tested and proven to be effective. The management system or fishery acts proactively to avoid legal disputes or rapidly implements binding judicial decisions arising from legal challenges. The management system has a mechanism to formally commit to the legal rights created explicitly or established by custom on people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.

Scoring Comments
Maine’s lobster management system is fully concordant with national laws and standards aimed at achieving sustainable fisheries because it is formally embedded in national and regional management structures through the Atlantic States Marine Fisheries Commission fishery management plan for American lobsters, ASMFC IFMP, Amendment 3. From the broader view of “the system,” the system is consistent with national laws and standards to protect marine mammals through the Atlantic Take Reduction Team process for Marine Mammals..

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Resolution of legal disputes occurs at local, state, and federal jurisdictional levels and provides transparent mechanisms for the resolution of legal disputes appropriate to the fisheries of the region and the objectives of sustainable fisheries. There are also formal dispute procedures for disputes between the U.S. and Canada, as revealed in a dispute between New England and Canadian lobster harvesters over the minimum size of lobsters. To this point U.S. courts have upheld the primary features of the regulatory system even though there have been many challenges, especially to the Magnuson-Act system. The management system has attempted to comply in a timely fashion with binding judicial decisions arising from legal challenges, as shown in the Atlantic Whale Take Reduction process. Within the State of Maine legal disputes are handled both formally and informally, and the role of local custom with regard to informal territoriality and rule compliance is well-documented, although with increased effort in the lobster fishery local customs have changed and weakened.

Even though the NMFS has won the majority of its fisheries management litigation, the threat of lawsuits is widely believed to influence proactive and precautionary decision-making within both federal and state management regimes, given how costly litigation can be and the uncertainties it creates. Lawsuits brought by environmental organizations have been particularly effective in forcing managers to take a more precautionary approach to management, using as their legal leverage their ability to demonstrate convincingly that there was a major gap between what the Magnuson-Stevens Act required and what the managers actually did (Layzer 2006). Because of the expenses, delays, and uncertainties created by frequent litigation, the management system at the level of the regional fishery management councils has begun to act proactively to avoid litigation. For example, at management council meetings, attorneys are present to help provide guidance to reduce the likelihood of legal disputes [personal observation]. Lawsuits are less important as drivers of policy within the State of Maine than within the federal fisheries system (LaPointe 4/24/09 interview).

The State of Maine's component of lobster management has mechanisms to formally commit to legal rights of people dependent on fishing for food and livelihood, particularly the native American tribe of Passamaquoddy. Native American fishing rights are recognized and protected through "tribal fishing rights" legislation passed in 1998; lobster fishing is bound by state laws and the number of licenses for commercial harvest is controlled but the tribe has jurisdiction and has developed its own management scheme.

Score: 100

Maine's lobster management system is fully concordant with national laws and standards aimed at achieving sustainable fisheries. Resolution of legal disputes occurs at local, state, and federal jurisdictional levels and provides transparent mechanisms for the resolution of legal disputes appropriate to the fisheries of the region and the objectives of sustainable fisheries. The management system has attempted to comply in a timely fashion with binding judicial decisions and arising from legal challenges and the has a mechanism to formally commit to the legal rights created explicitly or established by custom on people dependent on fishing for food and livelihood. Thus all of the scoring issues under the 100 scoring guidepost are met

Audit Trace References

Acheson 2003;
ASMFC Charter;
Barstow 1999;
Farside 2005;
Layzer 2006;
MacPherson and McCall 2003;
Molyneau 2008; Peabody 1991;
Pleasant Point - Passamaquoddy Tribal Government; Public Laws of Maine 1998, Second Regular Session of the 118th Legislature, CHAPTER 708, H.P. 1523 - L.D. 2145, "An Act Concerning the Taking of Marine Resources by Members of the Passamaquoddy Tribe"
LaPointe pers. Comm.

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.1.2	**Consultation, roles and responsibilities** The management system has effective consultation processes that are open to interested and affected parties. The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are generally understood. The management system includes consultation processes that obtain relevant information from the main affected parties, including local knowledge, to inform the management system.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction. The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information obtained. The consultation process provides opportunity for all interested and affected parties to be involved.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for all areas of responsibility and interaction. The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information and explains how it is used or not used. The consultation process provides opportunity and encouragement for all interested and affected parties to be involved, and facilitates their effective engagement.

Scoring Comments

The Maine lobster management system is highly consultative and open to all stakeholders (interested and affected parties). This applies all the way from the zone councils and other local or sub-regional levels of organization, to the state, interstate, and federal levels.

The Magnuson-Stevens Act and ASMFC systems have strong requirements for public consultation throughout the decision-making process, as does the State of Maine. Participation of stakeholders is particularly enhanced by the LCMT system of Amendment 3 of the ASMFC management plan for lobsters and by the State of Maine's zone council system, as well as the multi-stakeholder nature of the Whale Take Reduction Teams. In addition, information collected for management is available for consideration by stakeholders and scientists at all points of the system, and there is transparency about its use or lack of use through public forum and management websites, e.g. http://www.maine.gov/dmr/index.htm, meeting a key scoring issue for SG80 & 100. Such consideration and transparency are formally structured into the NMFS and the ASMFC systems. Moreover, lobstermen have become increasingly cooperative in the collection of fisheries information and scientific data. Most notable was the 1996-2001 research collaboration between lobstermen and scientists, coordinated by the Island Institute, that "redefined how cooperative research could work in Maine" (Conkling, p. 1) and led to new understandings of the robustness of lobster populations as well as concerns about the future. The scientific work of state biologists and scientists at the various research institutes has come to depend on a highly productive consultative relationship with members of the lobster industry (Corson 2005) which has facilitated the ability to obtain local knowledge and reliable information from the industry and has facilitated the development of cooperative research programs. Transparency is furthered by the NE Consortium's handling of data from cooperative research. Its on-line site provides a Project Information Database (Project titles, participant contact information, abstracts, downloadable reports, publication lists, photos, video, and more), and a Fisheries and Oceans Data Management System, where one can view raw data from completed cooperative research projects in tabular and map-based formats. Data can be browsed by specific project, general topic, or geographic area.(

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

http://www.northeastconsortium.org/docs/2008/nec_2008_participants.pdf)

Score: 95

Organisations and individuals involved in the management process at the state and federal level have been identified and their functions, roles and responsibilities are explicitly defined and well understood. The management system is highly consultative and regularly encourages and seeks input in a transparent way from interested and affected parties and demonstrates consideration of the information and provides explanations as to how it is or is not used. The second and third scoring issues under the 100 SG are therefore met. The assessment team consider that the third scoring issue of the SG80 is met but because of possible under-representation of environmentalist groups in formal state-level and ASMFC decision-making, the third scoring issue of the SG100 is not met. A score of 95 is therefore assigned.

Audit Trace References

Acheson 2003;
Conkling 2008;
Corson 2005;
Farmer et al. 2007;
Federal Register 2007;
Johnson and Van Densen 2007;
Hartley and Robertson 2006;
Hartley, Gagne and Robertson 2008;
Northeast Consortium 2008;
Palmer et al. 1992
Cotnoir pers. Comm.

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.1.3	**Long term objectives** The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Principles and Criteria, and incorporates the precautionary approach.	Long-term objectives to guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are implicit within management policy.	Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within management policy.	Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within and required by management policy.

Scoring Comments

At the broadest level, the ASMFC's strategic plan for 2009-2013 has one clear long-term mission or objective consistent with P1 and P2: "Healthy, self-sustaining populations for all Atlantic coast fish species or successful restoration well in progress by the year 2015" (ASMFC 2008b). Amendment 3, the ASMFC IFMP for American Lobster (1997), has clear long-term objectives: "The intent of Amendment 3 is to achieve a healthy American lobster resource and to develop a management regime that provides for sustained harvest, maintains opportunities for participation, and provides for the cooperative development of conservation measures by all stakeholders" (Fed Register 2007 supra).

There is no explicit mention of a precautionary approach, but the 2009-2013 strategic plan does outline the goal of a "proactive" strategy to be undertaken by the States (ASMFC 2008b: 7). Moreover, Amendment 3 takes an adaptive management approach: " In short, Amendment 3 was envisioned to provide much of the framework upon which future lobster management to be set forth in later addenda would be based.…[T]he Commission's American lobster management strategy is neither predicated upon a single measure nor is it contained within a single document. Rather, the structure is based on facilitating ongoing adaptive management with necessary elements implemented over time." (Federal Register 2007; see also NMFS Northeast Region 2009: 12). "Eleven addenda to Amendment 3 have been approved since 1999, including Addendum X to Amendment 3 …, approved in February 2007, and Addendum XI to Amendment 3 …, approved in May 2007" (Federal Register, 2007). The ASMFC strategic plan does not explicitly refer to ecosystem-related objectives pertinent to Principle 2, but the ASMFC does have a Habitat Program, the strategic plan for which recognizes the role of ecosystem-based management goals in the development of more specific habitat-related information and recommendations for ISFMPs (ASMFC 2009). It includes a long-standing (since 1998) submerged aquatic vegetation policy (http://www.safmc.net/Portals/0/EFH/HabPlan/Hab_planAppI.pdf) and has adopted Magnuson-Stevens Act criteria for identifying essential fish habitats and "Habitat Areas of Particular Concern" for species that are managed jointly with federal fishery management councils. .

The Magnuson Stevens Act, which applies to federal waters in Area 1 and complements the ASMFC for American lobster, has clear long-term objectives (NOAA 2007), which include the identification and protection of essential fish habitats and, by implication, an ecosystem-based approach to management. A precautionary approach is clear in its 2006-07 reauthorization, which requires explicit recognition of scientific and implementation uncertainties in the setting of allowable biological catches through the regional fishery management councils (NOAA 2007) however, it is unclear is the extent to which this would apply to lobster management in Area 1 since management is no longer through the New England Fishery Management Council, only through the States/ASMFC and the NMFS. The 2007 amendment also recognizes that fishery management councils are able to integrate ecosystem considerations in fisheries management using the existing authorities provided under this Act (2007 Amendment, 109-479; http://www.nero.noaa.gov/sfd/MSA_amended_20070112_FINAL.pdf). Again, the implication of this for lobster management is unclear as it takes place through the ASMFC rather than the regional fishery management councils.

Score: 70

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

The ASMFC's lobster management plan has clearly stated long-term objectives; they are not explicitly consistent with a precautionary or ecological approach, although it is clear that the plan has precautionary and ecological (specifically habitat) measures in it and the ASMFC's strategic plan includes a proactive strategy. Moreover, the ASMFC has a Habitat Program, with a strategic plan that refers to ecosystem-based fisheries management while focusing on habitat (ASMFC 2007b). Within the broader state-federal management structure, a precautionary approach is required through the reauthorized Magnuson-Stevens Act. However, it is unclear the extent to which this applies to LCMA 1, and there is no explicit statement about a precautionary approach in the ASMFC plan. These uncertainties about the formal commitment to a precautionary approach for lobster management and the somewhat restricted incorporation of ecosystem objectives keep the score from fully achieving the single scoring issue under the 80 scoring guidepost.

Audit Trace References

G. LaPointe pers. comm.
Carl Wilson interview;
Federal Register 2007;
ASMFC 1997, 2007b, 2008a;
NOAA 2007.

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.1.4	**Incentives for sustainable fishing** The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing.	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2.	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and seeks to ensure that negative incentives do not arise.	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and explicitly considers incentives in a regular review of management policy or procedures to ensure that they do not contribute to unsustainable fishing practices.

Scoring Comments

A strong sense of stewardship is achieved through a high level of harvester participation in informal and formal management of the resource, ranging from informal local arrangements that restrict entry (the so-called "harbor gangs"—Acheson 1988) to the democratic zonal councils and the effort management teams of the ASMFC. In addition, the state DMR and legislature are recognized by harvesters as generally supportive of the industry, given problems in groundfishing, sea urchin diving, and other alternatives. The overall competitive structure, continues to give incentives for maximizing the numbers of traps used and other dimensions of effort, but effort has been capped and the zone councils are working to further reduce trap numbers and to control licenses, expressing a strong sense of stewardship and helping to ensure that negative incentives do not arise. Incentives for reducing the potential for marine mammal entanglements derive mainly from the enforcement system, however, financial incentive was recently provided to lobstermen to help them re-gear to sinking ground ropes. Evidence for stewardship also comes from the history of lobster management in Maine, which reveals that at times of serious decline in lobsters, the industry, legislature, and state agency have been able to come up with new and tighter regulations (Acheson 2003); the newer system, whereby state management is embedded in the interstate and federal systems, may be even more conducive to the exercise of stewardship (Acheson n.d.).

Score: 80

An exceptionally strong sense of stewardship is reflected in industry demands and support for more stringent regulations than in other states and in federal waters, substantial industry participation at several levels of management, and a relatively high degree of compliance with lobster fishery regulations. In addition, both the ASMFC, through its effort management team system, and the State of Maine, through its zonal council system, have invested in an institutional structure that provides good incentives for stewardship even though the competitive nature of the fishery in the context of downturns in other fisheries has made effort control quite difficult. Financial incentives have been used to assist the transition to sinking gear to reduce the potential for entanglements of ETP species. The state management system contains no explicit subsidies that provide perverse incentives working against achieving outcomes consistent with MSC Principles 1 and 2. Accordingly a score of 80 is assigned.

Audit Trace References

Acheson, James M. 1988, 2003, n.d. Interviews
ASMFC 1997
ASMFC 2002
ASMFC 2007c

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

3.2	Fishery- specific management system

3.2.1	**Fishery- specific objectives** The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2.	Objectives, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are implicit within the fishery's management system.	Short and long term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.	Well defined and measurable short and long term objectives, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.

Scoring Comments

The Atlantic States Marine Fisheries Commission set forth its resource objectives for American Lobster in its Interstate Fisheries Management Plan (ISFMP), Amendment 3. These objectives are adopted by the State of Maine, as part of its adoption of the ISFMP Amendment 3. They are as follows:

(1) Protect, increase or maintain, as appropriate the brood stock abundance at levels that would minimize risk of stock depletion and recruitment failure;
(2) Develop flexible regional programs to control fishing effort and regulate fishing mortality rates;
(3) Implement uniform collection, analysis and dissemination of biological and economic information and improve understanding of the economics of harvest;
(4) Maintain existing social and cultural features of the industry wherever possible;
(5) Promote economic efficiency in harvesting and use of the resource;
(6) Minimize lobster injury and discard mortality associated with fishing;
(7) Increase understanding of biology of American lobster, improve data, improve stock assessment models; improve cooperation between fishermen and scientists;
(8) Evaluate contributions of current management measures in achieving objectives of the lobster plan;
(9) Ensure that changes in geographic exploitation patterns do not undermine success of Commission management program;
(10) Optimize yield from the fishery while maintaining harvest at a sustainable level; and
(11) Maintain stewardship relationship between fishermen and the resource. [EIS]

Most of the objectives are written to be readily operationalised in measurable terms. None of them refers explicitly to habitat, ecosystem, and bycatch considerations. It is unclear whether and to what degree Magnuson Stevens Act/Sustainable Fisheries Act provisions for habitat protection and minimizing bycatch influence management decisions for American lobsters in the state waters covered by the ASMFC ISFMP.

Score: 70

The explicit objectives for management under the ASMFC FMP are written to be readily measurable and are quite detailed and appropriate in relation to Principle 1. None refer explicitly to habitat, ecosystem, and by catch considerations and therefore does not fully meet the 80 scoring issue for Principle 2. However, the Magnuson Stevens Act/Sustainable Fisheries Act provisions for habitat protection and minimizing bycatch, which explicitly reflect Principle 2, can influence management decisions for American lobsters in the state waters covered by the ASMFC ISFMP, insofar as there must be consistency between federal and state waters' management. However, there is some uncertainty about the application of MSA/SFA principles to state management of American lobster, via the ASMFC, leading to a score of 70 to be assigned.

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Audit Trace References
ASMFC 1997 ASMFC 2002 ASMFC 2007c

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.2.2	**Decision-making processes** The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives.	There are informal decision-making processes that result in measures and strategies to achieve the fishery-specific objectives. Decision-making processes respond to serious issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions.	There are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives. Decision-making processes respond to serious and other important issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions. Decision-making processes use the precautionary approach and are based on best available information. Explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.	Decision-making processes respond to all issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions. Formal reporting to all interested stakeholders describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.

Scoring Comments

The decision-making processes are well-established, involving legally-established zone councils, a Lobster Advisory Council, the Department of Marine Resources and its Advisory Council, the state legislature, the Atlantic States Marine Fisheries Commission, and, by extension to federal waters, the New England Fishery Management Council and the National Marine Fisheries Service of NOAA. At the zone council level, the processes are not focused on technical measures so much as effort control and boundary issues, but the councils provide an advisory forum for higher levels. Above that level, the processes are science-based, transparent, and consultative, and they do produce measures and strategies intended to promote sustainability. These include numerous technical measures intended to protect the brood stock and lobster habitat. They also include strategies [so far not effective in Maine] for managing effort and other fishery-specific objectives. They respond to “serious and important issues” such as effort reduction—thus far, in Maine, with little success (Acheson forthcoming; various personal communication). They are struggling to respond to new ones, such as whale entanglement. They are all very transparent, imbued with U.S. political culture demands for openness and public review.

The decision-making processes are somewhat cumbersome, given requirements for broad participation and public review as well as complexity of the processes (e.g. State-interstate-federal) on the other hand, the highly consultative and democratic nature of decision-making is thought to result in more robust decisions.

The lobster management decision-making processes for Maine do take account of the wider implications of decisions: the decisions made in Maine and by Maine-based groups (Zone Council-LAC-DMR-Legislature) are keenly affected by awareness of the social implications of decisions, within a tradition that upholds owner-operator fishing and a

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

situation of exceptionally high local to state-wide dependence on the fisheries. Decision processes increasingly take into consideration ecological and protected species issues, highlighted in the whale entanglement deliberations within NOAA and the large, multi-stakeholder Atlantic Large Whale Take Reduction Team.

Decision-making processes are based on the best available information as a matter of policy and often in practice.

Measures undertaken to reduce the risk of whale entanglement in lobster gear are suitably precautionary in light of the uncertain knowledge on the rate and significance of right whale entanglements. However, it is more difficult to discern precautionary approaches in the lobster stock management processes both within Maine and within the ASMFC, although some argue that the Maine technical measures are implicitly precautionary in so far as they are thought to "protect the broodstock". The actual measures used in Maine lobster management are arguably more precautionary than elsewhere (V-notching, maximum as well as minimum sizes, etc.).

Reporting to all interested stakeholders of 'how and why' the management system responded is formalised in both the Maine DMR and the ASMFC, through letters, newsletters, web-site posting, and personal outreach to client groups such as the Zone Councils.

Score: 90

Although the established decision-making processes could, at times, be viewed as being cumbersome, they are effective in delivering measures and strategies to achieve fishery-specific objectives, thereby meeting the first scoring issue of the 80 scoring guidepost. Decision-making processes respond to serious and other important issues and take account of the wider implications of decisions, e.g. ETP entanglement, thereby meeting the second scoring issue of the SG80. The decision making processes use precautionary approaches, in effect if not through written policy, and the decisions are heavily based on best available information, thereby meeting the third scoring issue of the 80 scoring guidepost. There is formal reporting to all interested stakeholders on the findings, actions and recommendations resulting from research and management review thereby meeting the second scoring issue of the 100 scoring guidepost. Accordingly, a score of 90 is given.

Audit Trace References

Formal reporting:

Newsletters, DMR website; interview accounts of interactions with zone councils.

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.2.3	**Compliance and enforcement** Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with.	Monitoring, control and surveillance mechanisms exist, are implemented in the fishery under assessment and there is a reasonable expectation that they are effective. Sanctions to deal with non-compliance exist and there is some evidence that they are applied. Fishers are generally thought to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery.	A monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated an ability to enforce relevant management measures, strategies and/or rules. Sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence. Some evidence exists to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery. There is no evidence of systematic non-compliance.	A comprehensive monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules. Sanctions to deal with non-compliance exist, are consistently applied and demonstrably provide effective deterrence. There is a high degree of confidence that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.

Scoring Comments

The level of compliance with fishery regulations in Maine is exceptionally high. In 2008, there was 98% compliance from all boardings, for all harvesters (not just lobstermen). This reflects both the high level of stewardship in the industry and the strong commitment of the State and its Marine Patrol to effective enforcement, despite the extremely long and complex coastline and large number of harvesters. The patrol officers team up with the U.S. Coast Guard on occasion and are deputized to patrol federal waters, due to the application of Maine's regulations to federally permitted vessels that are also registered in the State of Maine. There is considerable cooperation with the U.S. Coast Guard and NMFS Enforcement in monitoring the fisheries, particularly in LCMA 1's federal waters.

The state Marine Patrol has developed a high level of insightful and effective monitoring. This has happened over the years, through the development of personal connections with industry and a strong sense of trust, which has contributed to the development of reliable sources of information, particularly in inshore and nearshore waters. Marine Patrol officers are taught that seeking compliance is the main goal, and this has helped craft relatively good relationships with industry in that those who are in compliance are less likely to be hassled (Fessenden interview 4/24/09). The Marine Patrol also tries to be present on the water, a challenge for such a large coastline and large number of fishers and others on the water. Furthermore, considerable effort is made to ensure that the laws or rules that are passed are enforceable at the outset.

Score: 95

The Maine lobster fishery has a high level of compliance with regulations, partly because the industry itself has had a major role in crafting and amending those regulations but also due to the development of a highly professional marine enforcement unit which has worked toward high levels of trust and respect from the industry. A comprehensive

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules and there is a high degree of confidence that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery

The score falls short of the 100 scoring guidepost due to the lack of evidence that sanctions provide demonstrably effective deterrent.

Audit Trace References

Acheson 1988;
Fessenden, Joe, Director of Marine Patrol and Enforcement, DMR, Hallowell, ME. Interview April 24, 2009; 2008 Report on Joint Enforcement agreement.

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.2.4	**Research plan** The fishery has a research plan that addresses the information needs of management.	Research is undertaken, as required, to achieve the objectives consistent with MSC's Principles 1 and 2. Research results are available to interested parties.	A research plan provides the management system with a strategic approach to research and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2. Research results are disseminated to all interested parties in a timely fashion.	A comprehensive research plan provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2. Research plan and results are disseminated to all interested parties in a timely fashion and are widely and publicly available.

Scoring Comments

In the fall of 2010, DMR brought together fishermen, scientists and managers to develop a new research plan for lobster. In January 2011, this research plan was released. Principle 1 issues are addressed through the prioritization of research on stock assessment such as: evaluating the appropriate time period to use as a baseline for the lobster stock recruitment relationship; examining what factors might correlate to lobster abundance and how to measure these factors and determine if they should be integrated into stock assessment models, and; establishing the key factors that industry can assist with in stock assessments. The plan addresses principle 2 issues by highlighting the need for: additional research on marine mammal interactions; more accurate accounting of lobster fishing effort (including latent effort), including density, location and seasonality, and; the aggregate potential impact of lobster traps and fishing practices on habitat. These research priorities will be used to guide upcoming DMR research programs.

The ASMFC's 2009 Review of their lobster management plan identified seven areas of program research needs. They included the Principle 2 matter: "Ecosystem-based Management", in which research needs identified included predator/prey interactions and community structure. Numerous Principle 1 research needs were identified, including: development of the University of Maine Model for stock assessment; collection of fishery-dependent and fishery-independent information; research on growth and the apparent mismatch of biological reference points and current stock status; research on age and the potential application of aging techniques developed in England and Australia, and; investigation of historical levels of stock production.

Score: 90

The DMR and other organizations engaged in lobster research in Maine do exceptionally well given the scarcity and uncertainty of research funding. Research has been undertaken to achieve the objectives consistent with MSC Principles 1 and 2 and this has been strengthened with the adoption of the relatively recent new research plan which provides a strategic approach to research, thereby meeting the first scoring issue for the 80SG. Dissemination of research plans and results is timely, utilizing the various advisory groups, the zone councils, and the lobster associations and DMR website, thereby meeting the final scoring issue of the SG100. Accordingly a score of 90 is given.

Audit Trace References

C.Wilson pers. comm.
Erin Summers pers. comm.
Research plan documentation.

1 SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.2.5	**Monitoring and management performance evaluation** There is a system for monitoring and evaluating the performance of the fishery-specific management system against its objectives. There is effective and timely review of the fishery-specific management system.	The fishery has in place mechanisms to evaluate some parts of the management system and is subject to occasional internal review.	The fishery has in place mechanisms to evaluate key parts of the management system and is subject to regular internal and occasional external review.	The fishery has in place mechanisms to evaluate all parts of the management system and is subject to regular internal and external review.

Scoring Comments

U.S. fishery management systems are not regularly subject to external review per se, but much effort goes into high quality peer reviews of the scientific bases for management. Ad hoc reviews of the system by the state task forces, national research bodies (i.e., the National Research Council), the Congressional Research Office, and other groups are possible, and fisheries management systems are always subject to review due to law suits. Moreover, there are annual reviews of the entire ASMFC plan by the ASMFC's Plan Review Teams (PRTs), which include staff of the Commission, representatives of some state fisheries agencies and the NMFS as well as one or more members of the industry. The issues identified and recommendations of the PRTs go to the Lobster Board of the ASMFC. For example, the 2007 review of the lobster FMP raised concerns about the models used, the need for control rules and biological triggers, data reporting and socio-economic assessments, implementation of effort control plans. It also noted the need for "methodologies to measure the success or failure of management measures to the objectives of the plan" (ASMFC Plan Review Team 2007: 11).

The State of Maine's component of the management system must be in compliance with the ASMFC IFMP which, in part constitutes an external review, i.e. if it is judged to not be compliant—mainly by not having implemented regulations agreed upon through the ASMFC—its fishery can be shut down by the Secretary of Commerce.

An external peer review of the lobster monitoring programs of the Maine DMR as well as other programs led by the Gulf of Maine Lobster Foundation and Bigelow Laboratories, took place in February 2009 (DMR 2009). The programs reviewed included port sampling, sea sampling, dealer reporting, harvester reporting, inshore bottom trawl survey, juvenile lobster monitoring, settlement index, regional ventless trap, and volunteer ventless trap programs.

According to the Commissioner of Marine Resources, internal reviews are ad hoc, although also worthy of being seen as adaptive management (LaPointe, 4/24/09 interview) as may be appropriate for a small organization with limited resources. Through a Joint Enforcement Agreement, the enforcement system is jointly reported with NMFS.

Score: 90

The fishery has in place mechanisms to evaluate key parts of the management system and is subject to regular internal and occasional external review at the levels of both the ASMFC and the State of Maine DMR. It is not subject to "regular" external review of all elements of management and thus does not meet the 100 scoring guidepost. However, there is regular external peer review of very high quality of the fisheries science.

1 SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Audit Trace References

ASMFC Plan Review Team. 2007. 2007 Review of the Atlantic States Marine Fisheries Commission Fishery Management Plan for American Lobster (Homarus Americanus). Prepared by the Plan Review Team, Toni Kerns, ASMFC, Chair; Clare D. McBane, New Hampshire Fish & Game; Bob Ross, National Marine Fisheries Service; Carl Wilson, Maine Department of Marine Resources; Dick Allen, Lobsterman; Dan McKiernan, Massachusetts Division of Marine Fisheries. http://www.asmfc.org/speciesDocuments/lobster/annualreports/fmpreviews/lobsterfmpreview07.pdf. Accessed June 9, 2009.

Department of Marine Resources. 2009. Report of the Lobster Program Review, Maine Department of Marine Resources Laboratory, Boothbay Harbor, Maine, February 5-6, 2009.

LaPointe, George. Interview. Commissioner of the Department of Marine Resources, State of Maine. Hallowell, Maine, April 24, 2009.

Peer reviews of lobster stock assessments, examples:
(http://www.asmfc.org/speciesDocuments/lobster/minutesandmeetingsummaries/ap/sept05APmtgsummary.pdf) and 2009 (http://www.asmfc.org/americanLobster.htm).

APPENDIX B

Peer Review Reports

Peer Review Biographies

Dr. Simon Northridge is a senior lecturer at the UK's Sea Mammal Research Unit at the University of St Andrews. He has worked in the field of marine mammal bycatch and interaction with fisheries for over 25 years and has written well over a hundred reports and publications on this subject. His work has mainly been in Europe where he has been involved with several multi-partner EU projects addressing aspects of this issue, but also won a National Research Council Post-Doctoral Fellowship to work with the Protected Species Branch at the NMFS laboratory in Woods Hole in the early 1990s.

Dr. Julian Addison has over 25 years experience of scientific research on crustacean biology and population dynamics, and stock assessment and provision of management advice on shellfish fisheries. He is Head of the Coastal and Freshwater Fisheries Group and Senior Shellfish Advisor for the UK's Centre for Environment, Fisheries and Aquaculture Science. Julian has also worked as a visiting scientist at the Department of Fisheries and Oceans and National Marine Fisheries Service where he carried out collaborative research and experienced shellfish management approaches in North America. For four years he was a member of the Scientific Committee of the International Whaling Commission (IWC) providing scientific advice to the UK Commissioner to the IWC.

It should be noted that as a result of these reviews some scores relating to Principle 2 Performance Indicators were reduced. None of the scores dropped below the minimum requirement but, the overall Principle 2 average score dropped below 80. The client was subsequently able to collate and provide further information which enabled the assessment team to revise the report and re-score some Performance Indicators. This resulted in the overall Principle 2 score achieving >80.

The following responses to the peer review comments by the assessment team relate to the Draft Peer Review Report. Because the report was subsequently updated some of the assessment team comments no longer relate to the current sections of the Public Comment Draft Report.

It should also be noted that, in light of the additional information provided by the client, the option of undertaking a further peer review either separate to, or, as part of the public consultation phase was given careful consideration. It was concluded that the expertise and knowledge of stakeholders directly involved with the fishery and/or aspects of its interaction with the marine ecosystem is such that the benefit of a further peer review was negligible and not doing so did not compromise the assessment process, i.e. there is no requirement to undertake a further peer review step in the MSC process.

Peer reviewer 1

Marine Stewardship Council Assessment Report for Maine Lobster Trap Fishery: Peer Review of Draft Certification Report

The assessors' report provides a thorough review of the extensive literature on the biology and population dynamics of the American lobster, and its role in the ecosystem. The report evaluates the status of the Maine lobster trap fishery primarily from a comprehensive stock assessment undertaken in 2009 by the Atlantic States Marine Fisheries Commission (ASMFC). This assessment (ASMFC, 2009) was provided in draft to the assessors and is now available to download from the ASMFC website.

In general, the Maine lobster trap fishery appears to be in an excellent state with stock abundance levels at record highs and the fishery is well-managed. There is detailed and extensive knowledge of the biology of the species and its role in the ecosystem in this geographical area, data collection is extensive, catches have achieved sustained high levels for many years, stock abundance is high, recruitment has been excellent for a sustained period, a wide range of management tools are in place, and there is strong enforcement of, and compliance with, those management regulations, and the fishing operations do not appear to have any major impact on the ecosystem. There are however a number of issues that complicate the evaluation of the status of the stock and the management of the fishery. Fishing effort has continued to increase in recent years, with consequent estimates of exploitation rates remaining high for many years, and it appears that the very high recruitment levels are driven primarily by a regime shift rather than as a result of management actions. I think therefore that there is scope for the fishery to be managed more effectively, and have particular concerns about the underlying management process which does not have sufficiently explicit harvest control rules which will kick into action if recruitment starts to decline significantly as has been seen in the neighbouring Southern New England lobster stock. I should emphasise that the concerns expressed above have been identified and highlighted in the recent ASMFC stock assessment, and I believe that the assessors have produced a thoughtful and balanced review of the rather complex body of information available, and that the uncertainties are reflected appropriately in the scores, particularly in relation to Principle 1.

<u>Principle 1</u>

The assessors have allocated a wide range of scores to the various performance indicators under Principle 1 which I believe reflects appropriately the current stock status and management regime for this fishery. The stock is currently at a high level with both abundance and recruitment significantly above target reference levels, and despite the high exploitation rate, there seems to be no sign of any imminent recruitment failure. The fishery therefore achieves relatively high scores under PI 1.1.1, stock status, PI 1.2.3, information and monitoring, and PI 1.2.4, assessment of stocks, as there is a high level of monitoring and a wealth of information available which contribute to a comprehensive stock assessment. There are one or two areas where better information could be collected to inform the assessment (e.g. more extensive collection of CPUE data, collections of accurate data on catches from gear other than traps and from recreational fishing, is the Gulf of Maine fishery a separate stock from the Georges Bank and Southern New England stock?) and whilst the UMLBM model is a significant improvement on previous assessment models, it will evolve and improve, but neither of these issues are sufficiently serious to warrant a specific condition of the certification because they are being improved continually.

Reference points have been introduced for the lobster fishery, but there are understandable concerns about their applicability simply because the recent trajectory of the stock is one of very high recruitment and stock abundance which is driven by an environmental factor, and hence it is not straightforward to identify targets for fishing mortality and abundance which are equivalent to sustainable harvesting. Using a median value of the time series from 1982-2003 essentially uses only information from the period when there was a major surge in abundance and landings, in comparison with the period of stable landings from 1950 to 1980. This approach does mean that different models predict different stock status estimates, but does have the advantage of setting any abundance reference points at a relatively high level in relation to long term historic trends. The reference points are therefore based on trends in abundance and exploitation rate (F or E) over a recent 20-year period and not on analytically calculated reference points. Notwithstanding that these analytically calculated points contain many uncertainties and caveats, the ASMFC stock assessment report does conclude that the current exploitation rate and abundance levels suggest that the stock is overfished and depleted based on these analytical reference points. In relation to the reference points based on median values, the stock does not appear to be overfished or depleted. The fishery managers have taken a pragmatic approach to defining reference points in difficult circumstances, and I agree with the assessors that the fishery does not achieve a score of 80 for PI 1.1.2. Condition 1 which relates to this PI is therefore appropriate so that future reference points relate

more closely to the risk of recruitment failure. This will undoubtedly be a challenging condition, and therefore the time scale suggested is realistic.

The score for PI 1.2.1, harvest strategy, of 80 reflects the conflicting aspects of the management of this fishery discussed above, but there should be concerns about uncontrolled fishing effort. Fishing effort appears to have increased over recent times and calculated exploitation rates are high and probably not consistent with long term sustainable harvesting. Licences are limited and individual trap numbers are limited, but there does appear to be significant latent effort in the fishery due to trap limits not fully taken up. In addition, currently only 6 of the 7 inshore zones have limited entry, and the NMFS still has open access to the offshore federal zone. Eradicating latent effort in trap fisheries is not straightforward, and whilst it is perhaps not necessary to have a separate condition for certification relating to effort control, it certainly needs to be part of any specific fishery management objectives.

IMM Assessment Team Response: Latent effort is a problem. Text to this effect has been included in the scoring table for PI 1.2.2, and in Condition 2 dealing with harvest control rules.

I agree that PI 1.2.2 on harvest control rules and tools should score only 60. There is a range of management tools in place which are reviewed regularly and there is a commitment in the IFMP to take appropriate action if reference points are exceeded or there are obvious signs of a recruitment failure. However these are not the same as explicit harvest control rules and therefore a score of only 60 is appropriate, as is condition 2 which I believe is absolutely essential. Indeed I question whether the requirement to meet this condition by the third year of certification is sufficiently demanding. Despite the exceptionally long period of continuing increased abundance and recruitment, a significant decline in recruitment due to a regime shift could occur at any time and therefore I think that it is an absolute priority to meet condition 2 as soon as possible.

IMM Assessment Team Response: We agree that Condition 2 is a priority item, but feel that in practice it will be very difficult to achieve to a tighter time scale.

Principle 2

For all by-catch species, at-sea observer programmes show that the discard rates are generally an order of magnitude below what are considered to be significant by-catches, and there is a high probability that the trap fishery has low or negligible impacts on both commercial and non-commercial fish species. The only significant species retained by the lobster traps are Jonah and rock crabs, and although there is no evidence that the lobster fishery is having any detrimental impact on stocks of these species, there is very little quantitative information available. Thus the PI scores relating to the bycatch are appropriately scored above 80, whereas those for the retained species component are appropriately assessed at less than 80. Condition 3 which requires the collection of data on landings and maturity for these two crab species and a formal assessment of likely impact is therefore appropriate. The time line is within three years of certification, which should be achievable, but is not necessarily the highest priority condition to meet.

I agree with the assessors' report that the impact of the lobster trap fishery is highly unlikely to create unacceptable impacts on Endangered, Threatened or Protected (ETP) species. In general, the risk of entanglements is highly unlikely but has a high impact, so all mitigating measures should be put in place. The only potential problem would occur if a PBR of 0% is accepted for right whales. Whilst such a rate may be justified in theory based on population numbers of right whales, in practice this would be impossible to achieve without prohibiting all fishing and severely restricting all shipping. Although this is not my area of expertise, a score of 80 on PI 2.3.1 may be harsh. There is a strong overall set of measures in place to manage the fishery's impact on large whales, but there undoubtedly could be more information collected to quantify the likelihood of, and mitigate against, any entanglements. Condition 4 is therefore highly relevant, but it is not imperative to meet this condition immediately, so the longer time scale for this condition is appropriate, as this may require much more intensive whale monitoring and potentially detailed information on distribution of gear through, for example, the implementation of satellite monitoring devices on all lobster vessels. Such information on the distribution of fishing effort would also be beneficial to assessing the impact of fishing on habitat features where information on both habitat types and fishing activity is limited. The PI's of 80, 75 and 70 are appropriate for this component of the assessment, and condition 5 is appropriate, but challenging and some initial answers should be relatively easy to compile. Lobsters do not appear to play a key role in Gulf of Maine ecosystems and therefore I agree that the scores for the Trophic Function PI's should be relatively high.

Principle 3

In relation to governance and policy and the fishery specific management system, I agree with the assessors that there are formal management systems within which there is excellent stakeholder involvement both through the ASMFC LCMT's and through the zone councils and consequent advisory councils of the Maine DMR, which appear to provide effective consultation and communication, and there are effective, robust decision-making processes in place. It is clear that there is an excellent relationship between enforcement officers and licence holders which ensures very high levels of compliance. The main concern is that the management plan is high level and strategic and lacks specific objectives and therefore some PIs are lower than others under Principle 3, and condition 6 is very important because there are no specific short or long term objectives. As with harvest control rules where there are a number of actions that management plans would implicitly carry out, it is important for these short and long term objectives to be stated explicitly, including those that relate to habitat condition and by-catch. Whilst there is a wealth of research ongoing on the Maine lobster fishery, this is inevitably rather patchwork and opportunistic because of the way in which it is funded, but the fishery would benefit from a comprehensive research plan, and as such, whilst this is not a major issue in relation to the overall assessment, a score of 80 is rather generous for PI 3.2.4. In terms of management performance evaluation, the scoring table in appendix A gives a score of 90 which seems too high given the information available and evaluated. However Table 7 in the main report gives a score of 80 for this PI, which I think is more appropriate.

IMM Assessment Team Response: The score for PI 3.2.4 in the scoring table has already been amended to 80, as in Table 7.

Traceability

For the MSC standard to be maintained there needs to be traceability from the sea to the consumer. There are potential traceability issues for lobsters because this species is distributed from Cape Hatteras to Labrador. Checks would therefore be needed to ensure that lobsters from adjacent inshore and offshore grounds were not able to enter the chain of custody.

IMM Assessment Team Response: This is an important consideration. This is why the Unit of Certification (UoC) is described as LCMA 1, thereby allowing as many of the Maine licensed vessels to be covered by the assessment. A small number (< 10) are permitted and, we understand, may fish in LCMA 3. If the fishery is certified, these vessels will need to implement a system that reduces the risk of lobster from being mixed with lobster from outside the UoC.

14.1 Certification Recommendation

My main concern with the overall recommendation to certify the Maine lobster trap fishery relates to uncertainties underlying the definition of reference points and the lack of explicit harvest control rules. There is no obvious sign of an imminent recruitment failure, but the case of the Southern New England stock shows that regime shifts could occur for which explicit agreed action would need to be taken. On that basis, acknowledging that a regime shift is outside the control of fisheries managers, that the recent history and potential future trends in stock abundance in the fishery make it difficult to remove all the uncertainty surrounding the definition of reference points, I accept that the fishery does meet the required score under Principle 1 to permit certification subject to conditions 1 and 2 being met in full and within a realistic time scale. Although the issues addressed by Principle 2 are not necessarily my area of expertise, I agree that the fishery meets the requirements for certification. The fishery scores higher under Principle 3 than the other two principles, although condition 6 is a key condition. Overall, I would therefore agree with the recommendation that the Maine lobster trap fishery be certified according to the MSC Principles and Criteria for sustainable fisheries.

Reference

ASMFC (2009). American Lobster Stock Assessment report for peer review. Stock Assessment Report No. 09-01 (Supplement). Washington, DC: Atlantic States Marine Fisheries Commission, 316pp.

Peer reviewer 2

In accordance with the guidance provided, I have attempted here to address:

- The accuracy of the information quoted in the report
- Whether this information has been applied appropriately to the scoring indicators used in the table
- Whether the interpretation of this information justifies the decision made on whether to certify the fishery
- The suitability of the conditions attached to the certification

Some general notes on the main text parts 1-6:

Introduction

1.4 Other information sources Information sources – reference list is incomplete: Anon, Drinkwater and US Anon are not given in full. Sheehy and Bannister 2002 referenced on p 18 is not cited; GMRI 2008 (p 24) not cited; Layzer 2006 not cited …

IMM Assessment Team Response: The reference list has been amended

The background to the fishery:

3.10 – History of the fishery. I note that the fishery being considered here is that portion of the Gulf of Maine lobster stock that is designated as Lobster Management Area 1 under the ASMFC. This extends along the shore from the Canadian border to Provincetown and includes most of NMFS statistical areas 511-514, including state waters of Maine, New Hampshire and Massachusetts, extending in places at least 50nm from the shore. Much or most of the discussion is focused on the state of Maine. A more detailed description of the boundaries (what area, which boats, what gears) of the fishery under consideration would have been useful at this point, as there possible room for confusion later.

IMM Assessment Team Response: This is an important point. Although formally the fishery area is ASMFC LCMA 1, and includes NMFS Statistical Areas 511-515, the fishery that is being assessed for certification are those vessels that are licensed by the State of Maine. These vessels operate almost exclusively in Maine state waters (i.e. within 3 miles), with effort extending offshore to beyond 12 miles. Vessels that are licensed to fish in Maine state waters are not allowed to fish in any other State waters. Fishers in New Hampshire and Massachusetts that are licensed to fish in the waters of those States, and that are responsible for most of the lobster landings from those waters, are not part of the unit of certification. We have clarified the area where the fishery operates in the certification report.

In response to several comments by this referee that the text in the assessment report refers predominantly to 'Maine' we should emphasise that the management of the lobster fishery is governed by the Interstate Fisheries Management Plan of the Atlantic States Marine Fisheries Commission. This plan prescribes the management objectives and measures to which the regulations in *each state* should conform, and although there are some differences of detail between states with regard to trap limits, the principal regulations such as limited entry, minimum and maximum landing sizes, number and size of trap vents, and the prohibition on landing ovigerous females, apply to all states. On the other hand, the scientific assessment is carried out for stocks, not states. The 2009 scientific assessment discussed in our report is therefore that for the entire stock in the Gulf of Maine (as distinct from the stocks at Georges Bank and Southern New England), based on scientific and fishery data compiled and aggregated from all of the relevant states in the Gulf of Maine. To cover these points additions have been made to the text in the scoring tables for PIs 1.2.1, and 1.2.4

Stock Assessment

4.2.1 Fishery Dependent Data. I note that three different data collection regimes exist within Management Area 1. Effort data are critical to understanding impacts on non-target species, but I found little information on how these are collected. In Maine "a minimum of 10% of harvesters must report catch and effort in logbooks". How this translates into an effort assessment is opaque. The system in New Hampshire is also unclear as "all harvesters must report monthly trip level data if they land >1000 lbs of lobster" – but do they report effort and if so what proportion of the total does this part

of the fleet constitute and do they report location of traps? Massachusetts requires “annual returns of monthly catch and effort” ... from whom to what level of detail is not stated.

IMM Assessment Team Response: See below the next item

4.4 Assessment Models. It is unclear how useful trawl surveys are for determining trends in lobster abundance: it would have been useful to have elaborated on this and whether or not the time limited ventless trap survey might not be a better way of obtaining fishery independent data? Also unclear how or what fleet effort data are used in the assessments.

IMM Assessment Team Response: To cover the point about effort, the following text has been added to the text in the scoring table for PI 1.2.3: “The total number of licences issued by each state is known (Table 3.2.1.1 in ASMFC 2009a), and the data collection programmes in each state operate independently to produce estimates of annual landings (Table 3.2.2.1 in ASMFC 2009a) and the total number of traps in operation (Table 3.2.2.2 in ASMFC 2009a) for The Gulf of Maine stock, the George Bank stock, and the Southern New England stocks. There is no overall statistic of effort or index of catch per effort for these stocks, however, but indices of abundance are derived from fishery independent data”.
To cover the points about trawl surveys and ventless trap surveys, the following texts has been added to the text in the scoring table for PI 1.2.3:

“Regular multi-use bottom trawl surveys have the advantage that they cover a significant portion of the coast at different depths in spring and/or fall (fall surveys are the most reliable for lobster) using a standard gear and a routine random stratified sampling protocol that is amenable to statistical treatment (stratified geometric mean catch per tow by sex and size class, with year effect). For lobster, the disadvantages are that rough ground and the most inshore parts of the lobster distribution tend to be poorly sampled, and that abundance estimates could be biased by catchability and gear selectivity issues that cannot be corrected. Conversely, attempting to estimate lobster abundance from the very large number of single traps in operation in this fishery is affected by major data gathering problems, and by the very real difficulty of interpreting trap catch per trap haul owing to poor knowledge of how behaviour and soak time influence trap catchability, selectivity, and retention/escape. Even if data could be mustered from traps at an appropriate scale and intensity, extensive research is still required to interpret such data, so survey data remain the only viable option at present.

The ventless trap survey aims to provide improved catch rate estimates, especially for the recruit size classes, but coverage is low intensity and sparse, and there are major manpower and funding issues. Ventless traps are a valuable research tool but their extension to estimate abundance for the stock as a whole cannot yet be envisaged.”

4.8 The Recruitment Regime Shift. “...the fishery will not be sustainable if the recruitment regime reverses. This is noted repeatedly throughout the Stock Assessment Report (ASMFC 2009a) and the advisory report to the Peer Review (ASMFC 2009a) although there is no information in the IFMP or the Stock Assessment Report to indicate what management actions will be taken in this event, nor is there any basis for predicting what management actions are most likely to be successful.” This seems an important point.

5.2 – Management Objectives. I note that the 11 Management Objectives of the ASMFC do not include any that relate to non-target species or the wider environment.

IMM Assessment Team Response: The text has been revised and the PI re-scored.

5.3.3 State of Maine: all very good, bit equivalent information about New Hampshire and Massachusetts would have been expected. They appear to have been airbrushed out of this fishery!

IMM Assessment Team Response: As indicated above and also now provided in amended text, this assessment focuses on the fishery operated by vessels licensed by the State of Maine. The effect of the lobster fisheries in New Hampshire and Massachusetts are taken into account by the stock assessment of the Gulf of Maine stock unit.

5.4.2 Harvest Restrictions. No mention of Mass or NH again....I understand that trap limits in NH may be up to 1200, and 800 in MA, and that “Most fishermen purchase the maximum number of trap tags they are allowed each year regardless of whether they intend to use them all (Smith 2006)”. Another study suggested that the average maximum number of traps per licensed fisherman is 564 in Q3 in Maine and 501 in Q4 in NH/MA (GMRI 2008). Latent effort under the existing trap limits is therefore large, as stated on p24. If most people are licensed to have 800 traps but only use about 500, then limiting traps as a method of effort control would have to be quite dramatic in order to have any noticeable effect.

IMM Assessment Team Response: To address the question of rules and management measures to restrict the harvest, including the problem of latent effort, additional text has been included in the scoring table for PI 1.2.2, including the sentence, "One notable problem to be overcome in this fishery is the residue of latent effort in the form of trap limits that are not fully taken up. This problem would have to be dealt with in the event of a stock crisis requiring a significant reduction in exploitation rate in order to increase stock biomass"

More focused comments on the ETP species section

6.3.2 Endangered, threatened or protected species.

Several aspects of this summary give me cause to comment:

The recent discovery of 44 right whales in the middle of the Gulf of Maine during winter raises the possibility that these animals may over winter in the region. This should increase the level of caution we might have about potential overlap with the lobster fishery, more than simply 'adding a new dimension of knowledge'.

IMM Assessment Team Response: We have added text in 6.3.2 to address this point.

The number of opportunistically obtained sightings from inside 3nm, 3-12 and outside 12 does not provide a good overview of right whale distribution. The figure (no 35) in Smith's 2006 report referenced in this review provides a much more telling representation of these data, but even this is of limited value because it cannot be related to search effort. Nevertheless it is clear that a substantial proportion of sightings of right whales recorded in the central Gulf of Maine were reported from within the fishery zone. The fact that few were recorded inside 3nm, or even within 12nm, of the coast of Maine may -as stated- be because survey effort there is low, but this does not mean that individuals from the small remnant population do not regularly swim into the rest of the fishery area, which extends beyond 12 miles and beyond the Maine state boundary.

IMM Assessment Team Response: We believe part of the issue here is that in the "peer review draft report (v1)", the extent of the Maine lobster fishery was not made obviously clear. LCMA 1, is described as the geographic area of the Unit of Certification (UoC). However, Maine licensed commercial lobster vessels that use traps (i.e. the fishery component of the UoC) do not fish in the state waters of New Hampshire and Massachusetts. Effort is concentrated predominantly within Maine territorial waters, i.e. within 3 miles of the shore (Smith 2006 and unpublished compilation from Maine Lobstermen's Association) but 21% of the Maine licensed vessels also have federal licences that allow them to fish beyond the 3 mile limit and as far as the LCMA 1 and 3 boundary which is co-incident with the 25600 Loran line (see figure 6) which is approximately 40 nautical miles offshore.

The reason that the whole of LCMA 1 is described as the geographic component of the UoC is to deal with issues related to chain of custody as set out more clearly in section 12.

We agree that opportunistically obtained sightings may not provide a complete overview of right whale distribution, but this is the information available to us. The information is consistent with what is known about right whale movements and behaviour in general - they are not a coastal species but an offshore species which may make excursions into coastal waters.

"Most of the individual tracked in this study visited areas outside the Maine lobster fishery area", yet it is not just the Maine lobster fishery area that is seeking certification.

IMM Assessment Team Response: Again, clarification on the extent of the fishery and re-affirmation that it is just the Maine lobster fishery that is being assessed should help to address this comment.

The information on the distribution of vertical lines does indeed show a concentration closer to shore, but with so many lines in the water, it is still the case that there are monthly totals of many tens of thousands of lines in the water between 3 and 12nm of the Maine coast, and thousands outside the 12 mile limit (Figures 7 to 12 in Smith 2006). There are over 1200 fishermen licensed to fish lobsters in federal waters (GMRI: Gulf of Maine Research Institute 2008. Taking the Pulse of the Lobster Industry: A Socioeconomic Survey of New England Lobster Fishermen). The scale of the fishery in Federal waters or between 3 and 12 nm should not be overlooked on the basis that it is small compared with the scale of the fishery in inshore waters.

IMM Assessment Team Response: The reviewer makes a good point that effort is significant beyond 12 miles, and we

have revised our text to ensure that the potential impact is not minimised.

Throughout this section there is reference to the number of recorded entanglements. It must be assumed that this means entanglement mortalties (and possibly serious injuries though this is not stated). Documented cases of entanglement in lobster gear are not a straightforward measure of their lethality. Documented records only constitute a small proportion of the total number of entanglements. "These mortality and serious injury numbers are minimum counts because of poor detection probabilities and inadequate documentation. Thus, the true level of human impact to these stocks is assumed to be greater than that reported here, however the amount greater is unknown." (Glass et al 2010).

Most entanglements appear to go unnoticed and evidence of scarring on whales suggests that it is much more frequent than might be supposed from opportunistically obtained records of entanglement. Among humpback whales this issue has been studied by Robbins and colleagues: "Entanglement-related scarring has been detected in all of the areas in which research has been conducted to date. For example, more than half of the Gulf of Maine population has experienced at least one entanglement and annual acquisition rates range from 8% to 25%. Yet, even where public awareness is high and a formal reporting network exists, fewer than 10% of new entanglement injuries correspond to successfully reported and adequately documented events. Serious injury determinations presently depend on evidence that an event has occurred and that it is likely to lead to death. Scar analysis indicates that the vast majority of entanglement events are not witnessed.

More than 60 percent of the North Atlantic right whales have scars from entanglement in fishing gear, such as lobster pots and sink gillnets. (Fujiwara and Caswell, 2001. Demography of the endangered North Atlantic right whale Nature 414, 537-541.)

Other sources suggest a much higher rate of encounter between whales and the lobster fishery: "Seventy five percent of appropriately photographed whales show evidence of entanglement, predominantly with lobster fishing gear" – (Myers, R.A, S A. Boudreau, R. D. Kenney, M.l J. Moore, A.A. Rosenberg, S. A. Sherrill- Mix and B. Worm, 2007 Saving endangered whales at no cost. Current Biology Vol 17 no1) – though these authors leave it unclear as to what "predominantly" in this context means.

So it should be made clear that the known entanglements represent only a fraction of the total mortalities. Quite how many of these entanglements might be associated with the Gulf of Maine lobster fishery is of course still a moot point.

IMM Assessment Team Response: The entanglements reported in the MLA compilation based on NMFS data, were the total of all entanglements – we were not advised whether these were lethal or not. Certainly these could have led to mortalities. We agree that documented entanglements are probably less numerous than the total of entanglements. As with all parts of the assessment related to ETP species, the information is not as complete as one would like, and we have to try to interpret what is available, in a manner that is fair to the fishermen and not prejudicial to survival and recovery of the species. We have revised our text to try to clarify that documented entanglements are not the whole story.

We have cited the publications referenced by the reviewer in the certification report as indications that entanglements are more numerous than reported.

Under section 5 – 5.3.3 deals with administration and advice within the State of Maine. No mention is made of Mass or NH. It is not clear how the "whale plan regulations" are enacted through the Joint Enforcement Agreements made with the States. P.45 says gear restrictions have emerged from the Atlantic Large Whale Take Reduction Plan ("NOAA Fisheries Service Issues a final rule October 5th 2007") and that the State of Maine adopted such restrictions to comply with Federal requirements. What about New Hampshire and Massachusetts? How are these regulations enforced? How frequently are offshore trap-lines inspected?

IMM Assessment Team Response: We have clarified that the fishery being certified does not operate in New Hampshire or Massachusetts waters. With respect to enforcement in Maine waters, we have added further wording to the Scoring Comments on PI 2.3.2 to describe the level of enforcement of ALWTRT measures. Regulations are enforced by the DMR Bureau of Marine Patrol, which has 50 officers and 9 offshore patrol boats (plus 15-20 seasonal inshore patrol boats). The BMP found 98-100% compliance with breakaway endline requirements in 2007 (Fetterman et al 2007) and is monitoring compliance with the new ALWTRT regulations along with other regulations in the fishery.

The PBR for right whales has clearly been set at zero by the NMFS, and I know of no "algorithm for setting PBRs in use internationally" (P.53), because the PBR is a product of US legislation and to my knowledge is not formally mandated

anywhere else. It is disingenuous to try to imply that the PBR established for right whales by the US federal authority is in some way subverting an international norm: the PBR is a US measure of acceptable take limits established under the MMPA according to US management objectives.

IMM Assessment Team Response: Potential biological Removal is defined as follows on the NMFS web site (http://www.nmfs.noaa.gov/pr/glossary.htm#p)

Potential Biological Removal (PBR) Level: *defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. The PBR level is the product of the following factors--*

- *the minimum population estimate of the stock;*
- *one-half the maximum theoretical or estimated net productivity rate of the stock at a small population size; and*
- *a recovery factor of between 0.1 and 1.0.*

This was what we referred to in the "peer review draft (v1)" as the "algorithm for setting PBRs in use internationally".

Irrespective of the actual value of PBR for right whales, which is not referred to in documents on conservation and management of this species, it is acknowledged that North Atlantic right whales are critically endangered and everything should be done to ensure their survival and recovery. Consistent with other management documentation, we have therefore not referenced the PBR for right whales in this report, although we have referenced it as a useful reference level for other species of large whales.

It cannot be ignored that the North Atlantic right whale is one of the most critically endangered marine species and that it can and does interact with the lobster fishery and that mortalities result from this interaction. I think the text needs to state this more robustly. At present the wording appears to try to evade this problem by focusing on the likelihood that interactions are minimal inside Maine's 3nm.

IMM Assessment Team Response: We have used this wording to open the right whale section under 6.3.2.

Thus the paragraph on page 57: "Fishery impacts on marine mammals do not appear to be substantial relative to other sources of mortality, despite the tremendous number of vertical lines in the fishery area and the depleted state of populations of large whales (particularly right whale), which might interact with the fishery. Whales have been rarely observed in areas where the fishery is most intensive, and there are few documented entanglements" seems misguided.

IMM Assessment Team Response: We agree, this paragraph was out of place and not very helpful, anticipating the assessment in the scoring guidelines. We have deleted this paragraph.

6.3.3: Impacts of fishery on habitat. While I agree with the overall tone of this section, that trap fisheries are not rated highly in terms of their destructive capacity on habitat, I don't think it is true that only one study of this issue has been made. An hour using Google revealed the following:

Adey, Jonathan Max (2007) Aspects of the sustainability of creel fishing for Norway lobster, Nephrops norvegicus (L.), on the west coast of Scotland. PhD thesis, University of Glasgow.

Adey, J.M., Atkinson, R.J.A., Smith, I.P., Tuck, I.D. & Taylor, A.C. (2006) The environmental impact of the Nephrops creel fishery. Commissioned Report, April 2006. Scottish Natural Heritage, Battleby, Perth. 167 pp.

Eno, N.C., MacDonald, D.S. & Amos S.C. 1996. A study on the effects of fish (crustacea/mollusc) traps on benthic habitats and species. *A study on the effects of fish (crustacea/mollusc) traps on benthic habitats and species.* Report to the European Commission.

Eno, N.C., MacDonald, D.S., Kinnear, J.A.M., Amos, S.C., Chapman, C.J., Clark, R.A., Bunker, F. St P. & Munro, C., 2001. Effects of crustacean traps on benthic fauna. *ICES Journal of Marine Science*, **58**, 11-20.

Kinnear, J., Barkel, P., Mojsiewicz, W., Chapman, C., Holbrow, A., Barnes, C. and Greathead, C. 1996. Effects of nephrops creels on the environment. Fisheries research Services Report No 2/96. FRS Aberdeen,

Freiwald, A., Fossa, J.H., Grehan, A., Koslow, T. & Roberts, J.M., 2004. *Cold-water coral reefs.* pp. 37 - 39. UNEP -WCMC, Cambridge, UK.

Peter M. Troffe, Colin D. Levings, G. (Beth) E. Piercey, Victor Keong 2005. Fishing gear effects and ecology of the sea whip (Halipteris willemoesi (Cnidaria: Octocorallia: Pennatulacea)) in British Columbia, Canada: preliminary observations Aquatic Conservation: Marine and Freshwater Ecosystems Volume 15, Issue 5, pages 523–533, September/October 2005

Stone RP (2006) Coral habitat in the Aleutian Islands of Alaska: depth distribution, fine-scale species associations, and fisheries interactions. Coral Reefs 25:229–238

Mortensen Mortensen and Gordon 2005 effects of fisheries on deepwater gorgonian corals in the Northeast Channel; Mortensen PB, Buhl-Mortensen L, Gordon DC, Fader GBJ, McKeown DL, Fenton DG (in press). Effects of fisheries on deep-water gorgonian corals in the Northeast Channel, Nova Scotia (Canada). In: Thomas J, Barnes P (eds) Effects of Fishing Activities on Benthic Habitats: Linking Geology, Biology, Socioeconomics, and Management. Amer Fish Soc Symp, November 12–14, 2002 Tampa, Florida

I cannot say all of these studies are strictly relevant- but they point out the obvious fact that traps can do some damage and my brief reading suggests that the species most at risk are Gorgonians, Sea Whips, Sea Pens, Hydrocorals and sponges. It would have been good to see whether the distribution of these organisms has been examined in the Gulf of Maine and whether there are any particularly sensitive areas.

IMM Assessment Team Response: Erect benthic fauna are indeed the sensitive species, with their vertical development which can be damaged by fishing gear. They are characteristic of low-energy habitats. Our assessment takes into account the concentration of the fishery in relatively coastal, high-energy habitats, where any gear damage to benthic habitats would come in addition to disturbance from waves, storms and strong tidal currents. Despite the concentration near shore the fishery does operate in deeper areas where erectile fauna may be found, and we have revised text to try to ensure that we do not underestimate the potential impacts on erect and other sensitive species.

The suggestions on publications are much appreciated, several of these are directly relevant (Troffe et al; Stone; Adey 2007) in providing observations that traps can indeed damage erect fauna (sea whips, corals et al), and that traps on lines cause more damage than single traps. In our estimation, Eno et al (2001) remains the best analytical study of trap impacts, but it is not the only study as pointed out by the reviewer, and we have cited the additional publications in the revised report.

Comments on the Scoring Table:

1.1.1 *Stock status*: seems sensible – but lacks and assessment or comment on the reliability of the methods used and data available (fishing effort data and trawl survey data).

IMM Assessment Team Response: The quality and reliability of the monitoring information and the stock assessment are dealt with under PI 1.2.3 and PI 1.2.4, where additional text has been included as already described earlier.

1.1.2 *Reference points*: well argued and coherent

1.2.1 *Harvest strategy*: unclear to me if this refers solely to Maine – have NH and MA been included in this assessment – there is no mention of inter-state control/enforcement issues.

IMM Assessment Team Response: As noted earlier, we have added text to the scoring table to show that the management objectives and measures for this fishery are those prescribed in the ASMFC Interstate Fisheries Management Plan and its Amendments and Addenda, which are the framework for all the relevant states in the lobster fishery.

1.2.2 no specific comment

1.2.3 *Information monitoring*: "sufficient fishery-dependent and independent information is collected …" not clear there was good measure of fishing effort. Ventless traps form the basis of a potential time series for recruitment – but they are time limited and apparently no longer ongoing? I fully agree with the finally comment that given the huge value of this fishery and the fact that the amount of money spent on monitoring is trivial that perhaps the privilege of participating in a limited entry fishery should place an obligation on ALL fishers to submit full records of catch and effort.

1.2.4 *Assessment of stock status* – no specific comment.

2.1 *Retained non target species* – no specific comment.

2.1.2 *Management strategy* - no specific comment

2.1.3 *Information monitoring* - no specific comment

2.2.1 *Status of discarded species* - no specific comment

2.2.2 *Management strategy* - no specific comment

2.2.3 *Information / monitoring*: - it is unclear to me that we can be sure sufficient monitoring of bycatch has been done, nor that a monitoring and assessment strategy is in place. Though it seems unlikely there is any problem.

IMM Assessment Team Response: We are not clear on the concern here, since bycatch monitoring is ongoing from year to year as outlined in this section. The concern may be the low level of coverage. We agree that this could be improved but we feel that the monitoring is adequate to justify the score.

2.3.1 *ETP Species – status*: I disagree with the statement "…there may be undocumented entanglements due to this fishery. In addition, survey effort for whales in the fishery area is low relative to areas further offshore, and the rate of occurrence of whales in coastal waters may be higher than has been documented". I would say that it is **certain** that there are undocumented entanglements (scar patterns show this) and that the occurrence of whale in coastal waters (though why only coastal waters are deemed important?) is **certainly** higher than that documented.

IMM Assessment Team Response: We have revised the text to take account of these comments. The scarring rates show a high proportion of whales have been entangled, but we cannot know in what fishery. Fishermen in the Maine lobster fishery have not reported entanglements in their gear and although this may not be reliable, we have to consider all available information. An entanglement reporting network has been set up, which should help improve information in this area. With respect to the emphasis on coastal areas, our approach is to try to assess the level of risk for the various areas in which the fishery operates: state waters (3 miles) (high concentration of fishing gear, apparently relatively low concentration of right whales although higher than documented), nearshore (3-12 miles) (lower concentration of gear, more whales) and offshore (outside 12 miles (relatively low concentration of gear, still more whales). We have tried to be clearer about this approach to risk assessment in our revised text.

Scoring comments on right whales also state that "Lobster fishing gear is concentrated in nearshore coastal areas although gear is also set outside 12 miles where right whale observations are more common". The former fact is irrelevant – what matters is how much gear there is in areas where right whales occur. Three documented entanglements do not mean that only three animals have been entangled.

IMM Assessment Team Response: See comments above.

While it is clear that for the majority of the lobster trap fishery, probability of right whale entanglement is limited due to the distribution of the whales, it is also true that some parts of the fishery overlap with areas that are relatively frequently used by whales (including critical habitat areas). If it is true, as stated, that "Assessing the acceptability of impacts of this fishery on right whales depends on interpreting the PBR. If a PBR of 0 is accepted, no impacts can be acceptable, and this fishery fails on this criterion", then the fishery will fail on this criterion. The PBR for this species has been set at zero. One cannot try to rewrite this: "If a non-zero PBR is accepted …" does not make sense. The PBR is established based on management objectives established under the MMPA. Furthermore, the subsequent justification given under 2.3.1 that ..."the apparently low observed and potential impacts of this fishery on right whales, in relation to other sources of mortality, would suggest that impacts are within the range of acceptability" is difficult to support. The 'low' *observed* rate does not take account of the likely *actual* mortality rate, and it is not clear how the relative role of entanglements in other gear types has been determined in order to make this statement.

IMM Assessment Team Response: With our revised text on the limits of the fishery area, it should be clear that the fishery is not operating in critical habitat areas.

With respect to the PBR discussion in our initial draft seen by the reviewer, we agree with the reviewer that focusing on the details of this is not productive. North Atlantic right whales are critically endangered and all efforts must be made to ensure their protection. Accordingly, consistent with most other management documentation on this species, we do not need to mention the PBR for this species but focus on the need to protect the species.

Given this, I cannot agree with the final statement that the "Impacts of this fishery are highly unlikely to create

unacceptable impacts on ETP whale species"; this is at best entirely unknown and at worst completely wrong.

IMM Assessment Team Response: We reviewed this comment and our analysis, and made changes to text and score. However, subsequent to receipt of the peer review, NMFS published its opinion on impacts of the lobster fishery on ETP species (NMFS 2010a) based on which we made further revisions to text and score.

2.3.2 *Management strategy*: the management strategy for trying to minimise whale mortalities is exemplary, though the task is very difficult.

2.3.3 *Information / monitoring.* "Availability of information to determine threat level and to monitor trends in support of a full strategy is complicated by the cost of obtaining the necessary information …[and].. the need to concentrate survey effort outside the fishery area …" – this seems to me to be the key issue. The 'need' here is driven by other considerations (for example trying to minimize ship strikes), not by the 'need' for this fishery to take proactive action or to demonstrate the level of whale entanglement.

"Not enough information has been collected" – is certainly true while the statement that "activities to obtain better information are under way" is not substantiated as far as I can tell. *Given the enormity of this issue it would seem to me that this valuable fishery should be doing much more to obtain better information on the distribution of vertical lines, and also on the distribution of whales in the whole fishing area, as is being done in Cape Cod Bay.*

IMM Assessment Team Response: We reviewed this and amended the text and score. However, NMFS (2010) was published subsequent to the peer review and provides the basis for the current proposed score.

2.4.1 *Habitat status*: bearing in mind comments on this topic above, the statement that, "this is not an area in which long-lived sessile organisms that would be particularly subject to gear damage are common", seems to overlook the main point. It is exactly *uncommon* sessile organisms that might be at risk. I am unclear from reading the preceding pages how much benthic mapping has been done and what assessment of the conservation status or conservation value of sessile organisms in the fishery area has been made.

IMM Assessment Team Response: We have tried to clarify the information on benthic mapping and indicated that sessile benthic organisms which are subject to damage by traps may be found in areas where the fishery operates, particularly in deeper, lower-energy areas further from shore. As noted in the report (and we have tried to provide further clarification in our revised draft), effort is concentrated in state and nearshore waters considered to be high-energy, high-disturbance environments where we would not expect to find the emergent and erect types of fauna (sea pens, corals, sea whips etc) that would be most impacted by the gear. However development of emergent fauna is possible in deeper areas in which the fishery operates.

2.4.2 *Management strategy*: I agree with the overall conclusion here.

2.4.3 *Information/ monitoring* – I agree with this assessment.

2.5.1, 2.5.2, 2.5.3 – no specific comments

3.1.1 *Governance and policy* – legal and customary framework - - no specific comment

3.1.2 *Consultation, roles and responsibilities*: almost too much of a good thing here!

3.1.3 *Long term objectives*. I noted previously that the 11 Management Objectives of the ASMFC do not include any that relate to non-target species or the wider environment. MSA objectives do.

IMM Assessment Team Response: We agree with the peer reviewer and we have amended and the score to reflect this point

3.1.4 *Incentives for sustainable fishing*: the review is very light on this with regard to the ALWTRT plans. It is stated here that: "financial incentive was recently provided to lobstermen to help them re-gear to sinking ground ropes"… though this is not elaborated on in the preceding sections. Which lobstermen and how many of them?

Has it been effective? Furthermore it remains unclear how these specific regulations, now enacted in Maine at least, are being enforced. The cap on effort seems to be of limited use at present given the latent effort among licensed lobstermen, so it is not clear how a real reduction in effort might ever be achieved.

3.2.1 *Fishery specific management objectives* – no specific comments

3.2.2 *Decision making process*: "Measures proposed by the ALWTRT"… need to be precautionary because right whales are a critically endangered species. This sentence implies they are overly cautious.

IMM Assessment Team Response: The text has been amended to clarify this point.

3.2.3 *Compliance and enforcement*. Much praise is heaped upon the State of Maine's enforcement officers, but no mention is made of equivalent patrols in NH or MA.

IMM Assessment Team Response: The NH and MA fisheries are not being assessed in this assessment. See previous points about clarification of the fishery under assessment.

3.2.4 *Research plans*: the assessment states that "Research is undertaken, as required, to achieve the objectives consistent with MSC's Principles 1 and 2": the nature and extent of work undertaken within this fishery to minimize large whale entanglements is unclear to me. The fact that : "DMR is also addressing research needs for whale entanglement and environmental questions, but money is scarce and key elements such as monitoring and acoustics are underdeveloped. This research has been mainly ad hoc" suggests that such research may be limited and uncoordinated. I cannot judge this on the basis of available information.

IMM Assessment Team Response:

3.2.5 *Monitoring and management performance evaluation*: no specific comment other than the observation that this seems to refer exclusively to the State of Maine again.

IMM Assessment Team Response: See previous points about the unit of certification.

Comment on Conditions:

Condition 4: ETP species: this condition is sound but should be fast tracked in my opinion; ideally these actions should be undertaken prior to any certification.

IMM Assessment Team Response: In light of the overall Principle 2 score now being below the required average score of 80 the timeline for this and the other conditions has been removed.

Comment on Certification

In my opinion no fishery should be certified when it may pose a threat to the survival of an endangered species. "The North Atlantic right whale is considered one of the most critically endangered populations of large whales in the world (Clapham et al. 1999). Three critical habitats, Cape Cod Bay/Massachusetts Bay, Great South Channel, and the Southeastern U.S. were designated by NMFS (59 FR 28793, June 3, 1994)" (NMFS SAR for North Atlantic Right Whale 2009 http://www.nmfs.noaa.gov/pr/sars/species.htm#largewhales)

While I appreciate that much of the lobster fishery may operate in areas where right whales are very rarely encountered, this is not true throughout the range of the fishery as described here. Specifically, the fishery area includes both Massachusetts Bay and Cape Cod Bay – designated critical habitats.

Furthermore, *implementation of the ALWTRT plans need to be demonstrated more clearly* than it has been in this assessment and *the likely overlap between whales and fishing effort also needs to be explored and documented* before it is possible to make the assertion that the "impacts of this fishery are highly unlikely to create unacceptable impacts on ETP whale species."

IMM Assessment Team Response: Clarification of the extent and limits of the fishery area has hopefully addressed the

concern about possible impacts in critical habitat areas – the fishery does not operate in these areas.

With respect to Implementation of the ALWTRT plans, there is debate within the Take Reduction Team about whether the Maine lobster fishery is taking sufficient action, on an appropriate timeline, to mitigate threats to large whales adequately. The results in this certification report, based on information from all sources we could identify, represent our best judgment on this question. We doubt that our best judgment will be agreed to by all.

With respect to likely overlap between whale distributions and fishery distributions, the ALWTRT has identified studies of gear and whale overlap as a priority and NMFS has committed to working on this (ALWTRT 2009). However the NMFS studies and ALWTRT consideration of these may not be completed prior to completion of this certification report.

Publication of NMFS (2010) has provided a detailed analysis of probable impacts of the lobster fishery on ETP species, which has contributed to our assessments of PIs in this area.

APPENDIX C

NOTES FROM STAKEHOLDER MEETINGS

MSC Site Visit – April 20, 2009
9:00 – Rick Wahle, Bigelow Lab
Background: Recruitment index as a forecasting tool for settlement is an ongoing project. Also studies shell disease episodes, natural mortality factors, and the role of groundfish (GF) in mortality process and why GOM GF fishery expanded incrementally in the late 1980s…

Collin: Where is the GOM fitting in with connectivity, circulation, and current trends and recruitment to the three main stock areas?

Rick: The settlement index has been the centerpiece for trying to understand processes before and after settlement and correlations. In terms of pre-settlement processes, the program has been expanded from RI north to Atlantic Canada; they have a good sense of the geography of settlement. Now that it is the 20th anniversary of the program, we're starting to get an idea of oceanographic and atmospheric correlations. There is an effort to establish patterns of oceanographic and atmospheric models of larval transport. Working with Andy Pershing to use regional climate indicators – Geopotential Height Anomaly (GHA - weather forecasting tool – wind and pressure systems). How positioning of regional pressure systems affect coastal larval transport. Found a strong correlation between GHA and settlement index at nodes with time series (mid-coast ME, RI, and New Brunswick). Direction and velocity of mean prevailing winds and settlement index. Post-settlement processes: we've been monitoring settlement to look at relationships between recruitment and the fishery…tracking fluctuations in settlement between young of the year (YOY), 1-year old, and later. Tend not to be strictly linear, and are somewhat non-linear, so it suggests some density dependence setting in the first year (mortality, immigration, natural mortality, e.g. disease?). The long time-series allows us to look at link between settlement and time-trends in fishery. MEPS paper – published in March Fogarty and Gibson. We haven't accounted for natural mortality due to predation by GF, which has significantly dropped off because of the effort/catch of GF. Shell disease isn't really a factor yet in GOM, but we need a better understanding of predators. Two key time series – federal GF trawl survey and inshore state trawl surveys, but Maine only started its GF trawl survey in 2000, whereas other NE states started in late 1970s, so we're missing inshore component for Maine waters. Jury is still out between what happens between settlement and pre-recruitment, with respect to natural mortality.

Collin: Do we know enough now to say that the current surveys of settlement, YOY, and models for recruitment would tell the managers that something is going on? E.g., if there was a decline or to forecast a decline. Will your material help managers with a real-time warning signal of a regime shift or early warning system?

Rick: Inshore ME has been underrepresented in the stock assessment, although the ventless trap survey helps. Fisheries independent data…why haven't we been able to develop a clear forecasting system? It's more complicated, unlike Western Australian (WA) Rock Lobster. Steep longitudinal SST, environmental signals are reflected in settlement, which makes it a more complex stock to manage. We're starting to recognize that any EWS would need to be tailored to finer spatial scales than WA. We have the tools in place to be able to do this. The 2006 SA model for fishing mortality (FM) and natural mortality (NM) does not account for connectivity. If you have losses from emigration, etc., then these will be considered FM.

Howard: Are there still two assessments, a state and federal?
Rick: There's a single assessment – ASMFC, but the states provide the Feds with inshore data.

Collin: As a scientist, do you see any reason for FM to increase from the 1980s to 2006?

Rick: Tough question….it is a function of the change in area definitions, three stocks. Only SNE in the 2006 assessment that F was above threshold. Other indicators were used as well – biomass, settlement.

Collin: Groundfish, and natural mortality is one element.

Rick: There are incredibly strong correlations between decrease in GF landings and increase in lobster landings in GOM. If you look at biomass indices, there is a weak correlation between GF biomass and upturn in lobster biomass. But mean body size of GF, there is a strong correlation, so it suggests to me, that overall biomass of GF has stayed constant, but a decline in the individual body size (not only harvested GF, but non-commercial species too). Ken Frank at DIO? (DFO) in top down forcing and trophic coupling between GF and prey assemblages. In southern waters, there is a higher diversity of predators, so if you deplete one or two predators, then it's okay because other predators will fill in – non commercial species. Video/tethering studies = much higher chance of predation. Important to look at biogeography, so we can't rule out GF in GOM.

10:00 – Vicki Cornish and John Williamson, Ocean Conservancy

Vicki: P2 – ME lobster fishery, do we have a management system in place that is set up to address bycatch and comply with the laws, MMPA and ESA? I will try to stick to the process and inadequacies within the process. Maine has actively worked to increase state waters that are exempt, and there are inadequate data about where whales are and inaccurate reporting with respect to fishing effort, entanglement, etc. in Maine. (*Vicki also sent Paul a written letter*.)

Status
Vicki: Three species of whales, North Atlantic Right Whale (NARW), Humpback and Minke that are entangled in GOM. Specifically, NARW – highest sources of mortality is ship strikes and entanglement. NMFS: from 2001-2005, 1.4 whales were known to be injured or killed/year for entanglements and 1.8 for ship strikes. Humpback (847 best estimate of the population) population is steadily increasing, but 1.8 whales were known to be injured or killed/year in fisheries, 1.4 in ship strikes. Finback whales are of concern for entanglement, but no records of entanglement in fishing gear. Minke whales – protected MMPA (3,000 best estimate), 2.2 of Canadian and US East Coast injured or killed by entanglement and 0.4 ship strike. Also, leatherback entanglements are an issue, but are not well recorded.

ALWTRP started in 1997 – trap pot and gill net fisheries. First set of regs in 1998, seasonal area management (SAMs), gear modifications, and most recent regs – April 5 – requires sinking groundline. Whales have continued to be entangled at the same rate as when the plan was put into place, so the ALWTRP has not been effective.
John: The problem with the ALWTRP is that you can't test for the adequacy of the gear change.
Vicki: NMFS sets potential biological removal (PBR) for NARW = 0, no allowable level of 'anthropogenic' take, so no room to test gear and no room for error. For Humpbacks PBR= 1. MMPA requires < PBR in 6 months. In January, five whales were entangled in fishing gear.
John: were they able to trace entanglements to gear of origin?
Vicki: efforts are made to disentangle whales. Of the five, three had gear removed, which takes immediate source of injury removed, but they also get the gear and can sometimes identify the origin of the gear and find out where it is set. One case, gear was lobster gear with a buoy/fishermen's ID, Canadian fishermen – off Nova Scotia. Ten days later, whale was found in Florida. NMFS, 1997-2007: 322 whales (all species) were documented as entangled, 91 had gear removed and evaluated, lobster gear was implicated in the entanglement of 31 whales. Of 31 (or 38?) whales entangled in Lobster gear, 13 were entangled within Maine inshore waters (not necessarily 3-nm, but within ? fathoms). ALWTRP website has a data summary of 11 years.

Whales get entangled in groudlines and end lines. In CCB, NARW feed on copepods on the ocean bottom. So the NMFS restriction on groundlines was just implemented and now the ALWTRT is starting to address end lines. The proposed rule for modifications to the ALWTRP proposed 50% of ME state waters to be exempt from the sinking groundline requirement, and after 15-month delay, the final rule exempted 71% of ME state waters because of pressure from Maine congressional delegation and fisheries managers. Then, they were given a 1-year implementation period, which was lengthened for an additional 6 months (October 2008 to April 2009).

Howard: Require weak links and sinking line in end line, but in exempted waters, there is nothing federal, only state requirements for weak links. Vicki – yes.

Vicki: NMFS says there are not a lot of whales in Maine state waters, but survey data is very limited in this area, and the density of traps in very high 3.2 million trap tags and 7,000 permit holders. But this is biased information. Bruce Mate satellite tagged whales, and several showed that right whales occur right next to the coast in Maine. We don't know how many, but even if just a few, the likelihood that they will encounter gear is high because of the density, especially in summer months where fishing effort is high and whales are feeding.

There have been efforts in Maine and Canada to look at imposing trap limits on individual fishermen.

Collin: What are you looking for as a solution?
Vicki: We believe that current restrictions on groundline only address half of the issue. Let's say its 50:50, and there is a solution for groundline, but Maine is largely exempt from this. OC would like to see groundline regs in place wherever there is risk, including ME state waters.
Collin: What % of density reduction would you suggest?
Vicki: ALWTRT says any line poses a threat, but we propose in the next phase of regulations, is to reduce the density of end lines in the GOM by 50%. This reduction would have a measurable effect on the entanglement rate of all three

whales.
John: There is also a temporal aspect to this, reducing lines and effort annually, and a better database by the state (survey and/or passive acoustic monitoring - PAM)…eventually leading towards an informed seasonal management strategies – lobster fishery. Right now, we don't have enough information on trap density, spatially or temporally. E.g., in MA waters, all fishermen have a log book – how many traps, traps per trawl, etc. In Maine, they started collecting harvester reports in 2007, and only 10% of fishermen report landings data, but they are not collecting data on effort. We need these key pieces of information that the state of Maine has been slow to implement and follow-up.

11:00 – University of Maine – Jim Acheson, Jim Wilson, Teresa Johnson, and Yong Chen.

Jim A – anthropologist – worked once at NMFS in fisheries management and has been interested in resource management since then.
Jim W – 1968 UME – economist, a lot of research in the lobster industry.
Teresa – new faculty at UME, grew up in a lobster family.

Jim A: P1 – Stock – good condition. P2 – management plan is working well. Industry is okay with the management plan – V-notch, and oversize regs have support, trap vents also, but not as much. About 45% say there are too many traps, but they don't want the zone councils to reduce effort. Some fishermen were fishing 2,500 to 3,000 traps before 600-800 limit. No real saving on fuel and bait with lesser traps, and much harder to make a living. 1995 – Zone A – it was standard to have 400 traps. Some older guys are okay with lesser amounts of traps, but 80% of fishermen don't want lobster zones to reduce trap limits, and if it was brought for a vote, they probably wouldn't get 2/3 vote.
Other problems are the whales and economic problems (gas, bait, lobster price). They don't think the state can help. Ghost trap issue – fishermen say can be resolved by going back to wooden traps. Two big success stories are initial trap reductions and limit on effort (licensing). Sustainable Fishing Act, 475 traps, Maine was afraid that ASMFC and NMFS would push trap limits on them, and that's when the state implemented the 800-trap limit.

Zones can limit number of traps and make recommendations on # traps in a line, in-out ratios (limited entry) and seasonal limits. Vote at council level (if 2/3 vote), then goes to commissioner.

Jim W: The question before the industry is whether or not it's reasonable from an economic point of view, the economics of cutting back on traps are pretty good. Ex., Monhegan is a special case – two years ago a group of 13 fishermen conducted an experiment where they set aside a test area during a closed time in September and October (June-December). In each of these areas, they had regular trap density, 1/3 less traps, and 2/3 less – from 800 to 500 traps – at 500 traps catch was within 15% of what it is with 800 traps, and at 300 traps...? There have been discussions about doing this in Stonington and Tenants Harbor.

Howard: What are the effects of ME fishermen fishing in the summer when catching shedders? Jim – There was a study on the effects of Canadian lobster fishery on the economics …?
Collin: (*missed question)*
Jim: early season traps are ready and as soon as they are trapable, the gear goes in the water.
WRT management, the give and take between zones, state and feds is working well.
Collin: When looking at US-Canadian fishery, what happens if the regime shifts (abundance)? Stewardship among lobstermen…North American has the lead on V-notch and size limits. What would lobstermen do?
Jim: Two diametric positions from fishermen: 1- group that had new trucks and large boat mortgages, started fishing harder 2 – slowed down fishing. Fishermen are by and large aware of the issue, but the question of whether the council can work out some collective action that responds in a reasonable way.

Bonnie: Is log book data collection going to improve?
Yong: Eventually the accuracy of land reporting will improve. 2009 Stock Assessment utilized a new model.

Collin: Why is it not overfished given the level of effort?
Chen: New model is one of the most complex in the world. It depends how the biological reference points (BRPs) are set up, in the past F=10%. Personally, the BRP and current FM are estimated from two different models, so you're comparing apples with oranges. Now BRPs have changed, and we are using a median value of FM over the last 10 years, same for biomass, which is compared with current FM to determine states. So there is a shift, both in reference points and models. There was no abundance estimates until recently…Wants to point out the biology of lobster and recruitment.
Collin: 7-8 years between recruitment and settlement. How many years would you recommend looking at management measures if recruitment is reduced?

Chen: 3-4 years, and they are working on simulations, and v-notching impacts WRT recruitment – thesis of his PhD student.
Collin: How wide-scale is v-notching now?
Jim: Estimates I have heard from MLA survey (5-10 years ago), 70-80% lobsters were already v-notched when landed. DMR sea sampling program has a higher percentage, but maybe because of observers. The enforcement on landings is 100%.
Collin: Using v-notching as a tag-recapture and FM?
Chen: V-notching data are incorporated into new assessment model for selectivity. A Canadian researching is looking at v-notching and abundance.

Bonnie: One principal pertains to incentives and disincentives, does management system for GOM lobster provides incentive to achieve goals of MSC and take action to discourage negatives?
Jim: When I compare it to other fisheries, incentives are strong in that direction, but what happens when the population starts to decrease? That would be a public discussion.
Bonnie: The process or infrastructure is in place to deal with these issues. Also, there is the commons problem.
Jim: Since the zone councils have been in place, there have been discussions about relaxing the restrictions, which hasn't happened.

Bonnie: How effective are they at in-out restrictions?
Jim A: In 2007, 2.7 M traps, now 3.2 M traps. One thing that the zones are criticized for is not reducing the number of traps. 1 – GF fishermen are entering the fishery. 2 – older fishermen are leaving, who had 200 traps and the new guy that replaces him builds up to 800 traps quickly. In-out laws are decided by the commissioner and changed by the legislature. 1998 in-out ratios were set – individuals, and then new laws deal with trap tags. This was not one of the original laws given to the councils, but they went to legislature to ask for this 'right' – 6 out of 7 councils have this and the last one, Zone C will be voting on this soon. If you're going to have a trap limit, you have to have limited entry.

Bonnie: What about cooperative research, stewardship, etc. Has there been an increase in co-op research in the industry, and if so, what benefits are coming out of it for management.
Teresa: A lot of cooperative research. Bob Steneck's work with the industry to study the distribution and abundance of lobster. It really helps justify and supplement the work that Jim and Jim did with the lobster zones and local management. It helps DMR staff to get on boats to help the sea sampling program – good success. ME-NH inshore survey is co-op research with NEC and Co-op research program, survey waters that aren't covered by the state or NMFS. These data are used in the new model.
Jim: After the councils came into place, there was a large change in the relationship between the industry and managers, especially DMR. A lot better than it was 15 years ago; much healthier. Although note that this relationship is a product of good times, and may change when the stock is in trouble.

Bonnie: Trap tag fees go to research, etc. – do you think that this will continue in bad times?
Jim: Bad, but there would still be a discussion, it wouldn't be 'brick throwing'.

Collin: Do lobstermen have any solutions with the whale issue?
Jim W: Problem I have with it is that there have been so few entanglements along the Maine coast. The relationship between the industry and the feds is callous. State folks and industry have spent a lot of volunteer time learning how to disentangle whales.

Howard: What's the impact, economic?
Jim: New exemption line lessens economic impact. The problem is that the further east, the sinking lines get hung up on the rough bottom – both the cost of replacing line and lost gear, and safety issue of line snagging on a bolder. Top-down approach, based on observations in Mass Bay. Regs have not been adapted well to Down East, and scientists would like to move in that direction. Lobstermen see them offshore – Mt. Desert Rock, Schoodic Ridge, and Jeffrey's.

Collin: Huge driver in the UK – all grocery stores are going to require some sort of certification, and this is not necessarily the same in the US, but may come to be.
Jim: The industry is aware of this, but they haven't had the chance to discuss it, and are wondering what the costs are going to be.

Collin: What's the relationship between licensing and family. UK there is latent effort so fishermen can save their license for family members.

2:00 – Sharon Young, HSUS

Original background is a field researcher. She has publications on feeding in baleen whales and differences between right whale and humpback feeding. ALWTRP – 2005 proposed regulations to implement sinking groundline, Maine opposed regulations. Is working to minimize risk. It's a 50:50 chance that it's groundline verses vertical line. Arcs average from 15-20 feet in the water column with ground lines. ME DMR has done plankton tows to see if they are feeding in Maine. We know that they probably aren't feeding on the rocky bottom, but it's likely that they are transiting from critical habitat/feeding grounds. They feed on sandy or rocky bottom types. Increase in offshore surveys in the GOM and PAM, and essentially they are in the area year-long. No systematic aerial surveys in inshore waters of Maine. Recent publication about individuals in Jordan Basin during winter. State of Maine has resisted regulations more so than any other affected state. Massachusetts required all trap pot fishermen to use sinking line between their traps before the federal government required it. Ocean Conservancy and HSUS – marketing campaign – green band on lobsters – 'whale friendlier lobster'.

Maine's argument is that there aren't right whales in Maine waters. Even with surveys, they only sight 30%, because they are sub-surface. You're less likely to see a transiting animal than a feeding animal. Baumgartner and Mate satellite tagged whales in the BOF and tracked 16 animals, 3 of which were in the GOM. Peter Tyack (2007) has a research permit to tag animals in NH and ME (Humpback whales primarily) – field report conclusion that mothers, including mom-calf pairs are coming into near shore waters. NMFS: 1997-2005, origin of gear could not be determined for many of them, 37% of whales entangled in lobster gear, where it could be identified to the source (for RW) were Maine (23% for all whales), followed by Massachusetts and Long Island (9% each). In 2008/2009, 39 calves born. This may be related to NAO index. Reproduction is cyclical.

We know there are whales in Maine inshore waters, but it would be helpful to put PAM buoys in inshore waters to study the temporal aspect of their occurrence. If there were areas in Maine where sinking groundline couldn't be used, we could think of alternatives, but right now the fishermen are just saying we won't use it. Sharon suggests using PAM in inshore areas of Down East Maine.

Collin: You're saying that serious information gathering is necessary, including a much more aggressive gear research program.
Sharon: There's been a debate about fishing singles, which do not weigh as much and have less line or because there are so many, whales may get entangled by more than one single. Break-away links are required on buoys, but we can't tell when it does work. However #3107 was killed in gear that had an unbroken weak link.

Collin: What are they doing about gear research/academically?
Sharon: We need academic research, but we also need incentive for fishermen to conduct research on their own. One suggestion…closed areas – draggers can't fish there, and if fishermen can fish w/o lines, then they could open it up to lobstering. The focus of academic research has not been productive (e.g. Time-tension line cutters).
Collin: If you could propose mitigation measures as a condition, it would have to be real mitigation. Supposing certification was held up because of this issue. So what would be more productive - is that it's going to be a step-wise process.
Sharon:
-missed last 5-minutes of conversation.

3:00 – John Ready, Client Member, Catch a Piece of Maine
Started as harvesters (uncle was a fishermen). Both graduated with business degrees, and started their first company, Ready Seafood (domestic and international). Utilize Maine values instead of just the product, and provide good service and knowledge of the fishery. Two-million pounds of lobster/year. Catch a Piece of Maine, community supported fishery, much smaller product movement, with higher price per lobster/trap. This is like the sales and marketing arm to Ready Seafood. Differentiate product, adding value, creating a sustainable sales method. Ready seafood tries to make clients aware of what is going on in the fishery, so if they are .05 cents off 'market price', they can understand. Sends video messaging, promotional spending/marketing, bringing people closer to the product and knowing who caught your lobster. People used to buy strictly on price, and now that they have a personal relationship with buyers, so if their price is a little higher they stick with their company. Catch a Piece of Maine – event marketing – introduce Maine lobsters to people who haven't eaten it.

MSC can do what we've done on a much larger scale. Especially with the EU requirements.

Collin: How do you see the Maine lobster fishery?
John: You have 5-7,000 harvesters who want to do everything their own way. They are interested in what they are doing that day and how it affects them. What are the red flags? Get people involved after assessment, when we know the red flags. Then it will be a mess.

Collin: Do you think the Maine lobster fishery is sustainable from a fishermen's point of view? If there was a trap reduction would you support it?
John: Yes, personally, I see the problem now, and it's a lack of sales/marketing to get the product out there. More needs to be done from the state's point of view. Biologically, yes, it is sustainable. Change is difficult for the fishermen, so it's hard to tell an 800-trap fishermen to go down to 400 traps when someone new can come in and replace those 400 traps. Overhead would be lower with sternmen, bait, fuel; however you need more strict entry limits.

Collin: Do you have specific fishermen who you buy from?
John: I buy on quality, then price. He knows where the good quality lobsters are, so he goes after the wharves where fishermen fish good bottom/quality.

Collin: Why not have a seasonal adjustment to catch better lobsters?
John: Soft-shells are better for processing, even though they get more product with hard shells. In June, July, and August, there is a market for soft shells, because they are easier to eat – retail: tourism, restaurants, etc. Certain areas that are fished, where you'll get more lobsters, but they are paper thin. Smart lobstermen would not fish in that area, and wait until they're harder, but then one renegade fishermen puts his traps in and ruins it.

Collin: Question about sustainability, do you feel that lobster populations may decline again?
John: Lobstering is like farming, we're feeding them – if you didn't have vents in traps, there would be too many lobsters to haul out. "They're like ants on the ground." So why don't we put more traps in the water? Is herring best used as bait (rhetorical question).

Bonnie: Where do these conversations take place?
John: I talk to wharf owners, one contact up and down the coast. It could start with discussions at the zone council levels. A lot of these meetings – same people with similar opinions, and it's negative 'doom and gloom'. Lobstermen ask how can this help me today? They hear you, but don't consider it. Social dynamic of younger generation doing something different and older generation keeping to themselves. Live lobster business – 5 or 6 big players in the state, and a lot of smaller businesses.

Collin: American lobsters can co-habituate in much higher densities than European lobsters, even though they are more round. Do you have a marketing size beyond which you can't sell? (no more than 1-lb, 1.5-lb) We've got to go from 3.5 inches to more, but we don't want to increase minimum size of lobsters.
John: I don't know.

Bonnie: Is sustainability something you use in your marketing?
John: If they ask, I'll tell them, but it's not a huge part of it.

4:00 – John Grabowski, GMRI

John: I'm involved in lobster predator interactions and lobster – herring bait studies. The industry was involved via collaborative research from Maine to NB, Canada – what the effects of fishing are on growth rates. Mid-coast ME fishing densities were high enough that lobsters in fished areas out-grew closed areas by 16%. Didn't find an effect in Canada, but there were a number of differences between sites. There was a tremendous presence of mussels in the BOF, which lobsters prey on.

Howard: Are we farming lobsters?
John: In the mid-coast we are, otherwise they may be prey limited.

Howard: Is this an ecosystem alteration?

Collin: ?
John: Carl Wilson and Dan Holland, trying to tease out impacts of effort reduction?

Missed 20-minutes of conversation.

John: Canadian industry was good to work with, tagging lobsters, and they were rewarded. One way I was convinced there was a correlation with growth rates is that in 2004 it was really cold, but fishing effort remained constant. Molt increment. Molt frequency data were difficult to interpret because of reporting rates, would have had to look at a longer period.

Paul: Is the GOM well mapped with respect to habitat?
John: It is well mapped in Canadian waters, but not in US, except for closed areas. Massachusetts is also pushing for better coverage. www.gommi.org – GOM mapping initiative.

Collin: Papers on recruitment are around, are there any plans for a synthesis workshop?
John: Not that I know of, but Rick has a workshop this summer about larval recruitment.
John: Habitat is not limiting.

Paul: How does the work that you are doing feed into management?
John: Yong Chen's student wrote a paper on ecosystem modeling. They keep the lobster zone councils aware of their research.
Paul: Are you satisfied with how your information feeds into the process?
John: Yes, although sometimes it's clearer how to do so on other projects. At the federal level, yes, but the state disbanded a committee he was on.
Paul: How much of your work is industry funded?
John: Only from zone councils, which is money from taxes that goes through the state and gets appropriated.

April 21, 2009

9:00 – Moe Brown, NEAQ

Moe has sent a written statement to Paul, and is paraphrasing from the letter for the first part of the call. There is a harbor porpoise assessment survey along the coast of Maine, and the scientists and observers record other species. These data should be available through the NARW Consortium database. Jeffreys ledge, Cashes ledge, and Jordan basin are new seasonal aggregation areas, which haven't been identified as critical habitat yet. In Maine waters, survey data are somewhat sparse – whales are there regularly (every year) but we don't know how many, in March – December, but concentrated in early and late summer. Current unpublished analysis from Hal Caswell shows a slight increase in population growth (1-2%). 1999 study showed extinction by 2200. Annual reproduction is extremely variable, but has been at or over 21/year since 2001. Other whales have been entangled, in addition to leatherback turtles. Johnson et al. 2005 (1993-2002), reviewed right whale and ? whale entanglements. Fixed gear entanglement…Knowlton et al. scarring analysis, 72.6% have scarring from entanglement in fishing gear. Frustrating that we don't know where the gear comes from, we have broad brush regulations that could be regionalized if we knew more. www.listenforwhales.org – PAM hydrophones and surface buoys along the Boston TSS.

Power Point Presentation
From systematic survey data, where track data exists, corrected for effort:
March – sightings Jeffreys ledge
April – sightings – Jeffreys ledge and Cashes ledge
May – sightings – Mt. Desert Rock,
June – no RW sightings
July – Offshore Down East ME, Grand Manan Island
Aug – ?
September - ?
Oct – ?
November – Cashes ledge (50-90 mi) offshore, due south of Bar Harbor, east of Portland
December – Jeffreys ledge, off Gloucester.

Opportunistic sightings data 1972-2006, includes whale watch vessel sightings – Gloucester and Bar Harbor, including several 'red dot' NARW sightings within 3-nm of the coast.

Baumgartner and Mate 2005 – Argos satellite tagged whales, movement in summer and fall.

Collin: What would your view be about how representative this data set is?
Moe: All known data, including harbor porpoise survey data (gillnets/pingers), which were conducted fairly close to shore. Data/Maps were prepared for April 2009 ALWTRT meeting. Would query the dataset to know the number of whales this represents.

Howard: How would you characterize your cooperation with the Maine Lobster Association and Maine fishermen?
Moe: All owner/operators, but they has been a good improvement in attitude.
Howard: What do fishermen say about whales in inshore waters?
Moe: They don't see them because they're not looking for them. With vessel surveys, there are two observers the whole time looking for whales.

Collin mentioned Sharon's view of the fishermen. Moe replied that Sharon has been along for longer, and mentioned Massachusetts fishermen. Sinking groundline is an issue in Down East Maine, and fishermen are concerned about shorter life-span of rope, abrasion, and possibly higher rates of ghost gear.

Collin: How long do you think it will take to implement some of the strategies you proposed?
Moe: Reducing vertical lines could happen almost immediately…(*but this would be if this measure was accepted voluntarily and not through rulemaking).* See Boston Globe Article April 21. Mentioned Carl Wilson's study in Monhegan – fished less traps and caught the same amount of lobster, but did not decrease fuel or bait costs. At the April ALWTRT meeting, NMFS said they could do something about vertical lines right now…but they want to do a more narrowly tailored approach. So anything that comes out with regard to mitigation, it would be very important to get across that it is step-wise, an iterative process because they can't be experimented on ahead of time (and so you disenfranchise your constituents).

Moe: One thing about the model (Hal Caswell), the survival curve is flat, even though population growth rate is increasing, so there is still an issue.
There are right whales within the exemption line. Modify ropes so there is no serious injury or mortality.

10:00 – Peter McAleney, Maine Import Export Dealers Association

Owns the wharf, works 7-days a week.
Short lobster, v-notching, etc. – we've done a lot to help the fishery be sustainable.
Missed 15-minutes of the discussion – traps, end lines, etc.

Paul: As a dealer, you're required to record everything, and have a particular form?
Peter: Yes, I spend two hours a day filling out forms. The fishermen do not report. DMR wants to know what bait you're using, where it's coming from. Bait should come from GOM because you have to be careful about introducing new bait species as it weakens the species. He also provides bait.

Bonnie: Is the management process coherent and is it easy to get involved? What if there was a discussion about a decrease in minimum size (from 3.25)?
Peter: Fishermen are not in favor of decreasing minimum size. When lobster prices were so low, around Thanksgiving weekend, we sold a lot of lobsters. On a DMR advisory committee, but he listens because he is not a lobstermen, he's a dealer. There's plenty of v-notched lobsters that are 1-inch, so at 3.25, they have plenty of time to breed. When there is a problem with introduction of predators, then you may have to change the minimum size. I sell all herring and some redfish because it lasts longer. Groundfish decreases, lobster population increases.
How much herring?
About 3 bushels, one barrel (~40-gallon oil barrel).

The stock seems to be very healthy. Sometimes you'll get mortality in the traps, but that would be if another lobster attacks and it bleeds out and then becomes food.

Collin: Do you ever get mass mortality in the lobster pound?
Peter: Yes it does happen, and we're trying to get away from it because people don't like pounded lobsters.
Collin: Transmission of bacteria from red tide, etc. with high densities in pounds? Also ammonia production.
Peter: 10% pound mortality is good.

Collin: What do you think will happen with a regime change (e.g. GF increase and lobster decrease), would you be happy if the prices when up – supply and demand.
Peter: It doesn't matter if prices go up for a dealer.

Paul: Have you seen a higher occurrence of shell disease?
Peter: No, except for old timers.

Bonnie: What about processors?
Peter: Processors aren't processing, and I don't get involved with that. They can't get credit and have overstock, around 28 million pounds of frozen product from last year. Canadian processors are not processing.
Bonnie: So what happens to real soft shell?
Peter: 40% of live lobster goes to Canada from processing and then it comes back. Some of them are used in the live market (Canada May-December).

Bonnie: Does MSC make sense for any of your customers?
Peter: No one has demanded it, but the fishermen are asking if it will cost more or if they will get paid more. There are a certain niche of people who want sustainable product. We think we have done everything to sustain the population.

Collin: What about recruitment, and that more than half of the lobsters are in the lower portion of the size range, but harvest rates are high. Our concern is what happens if you have high harvest rates and low recruitment/egg production.
Peter: He thinks the industry would react to that immediately. We don't hate each other, it's a game. For example, there was dredging in the harbor (November), and they said there weren't any juveniles, but they put in ventless traps and caught 50,000 pounds.
There is a Dealer network and a harvesters network, and they get on the radio in the morning, and people know the issues right away. E.g. tamale scare.
They fish 7-days a year in fall, but maybe next year, there will be no fishing on Sundays. If the fishermen are all okay with this and go to the state, then it could happen quickly.

Collin: If there is a problem that you would like to set right, what would it be?
Peter: If you start fishing later in the summer and get hard shells, it would hurt the economy. The soft lobsters go to the summer tourism industry. Transportation is the problem – wide bodied planes. United doesn't want them anymore because they drip. We stop about December 1 and that's when Canada starts, so if they overlap, then the price goes down.

Paul: Do Maine licensed boats land lobster in Massachusetts? Peter– No, only federally licensed lobster boats can land in other states. Draggers can do this, and can land lobsters and go by count, not pounds. Striped bass are really coming back, and hang out around his building.

Collin: Do you use electronic recording?
Peter: No, the problem is working around salt water (computer) and he doesn't want the fishermen inside. What about a tracking code? Are they looking at doing this for every lobster, putting a tag on each lobster…may snap the claw off ($). This would take time and money. They could print bar codes/numbers on bands.

Peter: Are the fishermen going to make more money? Are the restaurants going to make any money?
Answer: More to maintain your market share.

Peter: We don't have a problem selling the good quality lobsters, the problem is selling the soft stuff.

12:00 – Erin Summers, Carl Wilson, Sarah Cotnoir, ME DMR

Howard (P2): Do you ever get reports of sea turtles being entangled?
Erin: Anecdotal reports, but they are scarce.
Howard: What about seals?
Erin: Harbor seals, sometime ice seals in the winter, but they are not a big issue and are not threatened or endangered.
Howard: What about whales in state waters?
Erin: Bob Kenney at the ALWTRP talked about changing PBR for right whales to 0.6

Howard: What are Maine fishermen doing to reduce risk?
Sarah: Fishermen would say they are doing a lot with the sinking groundline, and they are worried about losing gear and abrasion. April 2008, 4-inch mark on the end line, prohibited singles in federal waters, 5 traps or less, they can't have more than one buoy in sliver area (30% of state waters – between 3 miles and exemption line). See Chapter 75 of State regs – all Federal regs are incorporated in state regulations.
Erin: Lobster trap tag (.30 to .40-cent increase) money goes towards habitat research, etc. End line survey – understand fishing behavior, and realize where the highest risk is to prevent blanket regulations.

Howard: What about the exemption area, what regulations apply?
Erin: Only state rules apply, weak links, sinking line on groundline or end line. There are requirements even though they are not federally mandated. Fishermen participate in plankton tows.

Bonnie: What about acoustic monitoring?
Erin: There is an array of buoys off Mt. Desert Rock, and a proposal to study acoustics in a potential area – Jordan Basin (Portland Shipping lanes).

Howard: Vertical lines
Erin: Next step for the ALWTRP – spring 2014. There is habitat monitoring within the exemption line, but not plans for acoustic monitoring in areas aside from Mt. Desert Rock, which is offshore, but within state waters because it's an island.
Howard: Is there a plan to move the exemption line?
Erin, Sarah: No, there are no plans. But if you ask a fishermen where it should be, they would say the 50-fathom line.
Carl: 80% of permits cannot leave 3-nm from shore, and it's a rare occurrence that whales occur in state waters.

Collin: May be rare, but whales are still at risk, so what's the balance with certification? Ambiguity with availability of data and with the approval of the exemption line (e.g. state congressional delegation, OMB, etc.) and not necessarily based on the data.

Bonnie: Is there a discernable process for management priorities and /or research, because it seems ad hoc?
Erin: Yes, the TRT has a gear matrix that is updated, and the actual research is based on funding, etc.
Sarah: We have asked NMFS where they would like research, and that DMR would look for funding, but it hasn't been straightforward (aside from end line survey).
Erin: There is also a whale research matrix that is prioritized.
Paul: Asked about documentation?
Erin: Research matrices and the foraging workshop report.

Collin: Framework that x work needs to be performed to achieve y goal in z time period. Ensure that critical issues are being resolved.

Howard: Asked about bycatch, is it representative?
Carl: Yes, each zone is sampled three times a month from May – September. Largest sea sampling program that he is aware of for lobster. See program review of the sampling program. Crabs are the most encountered bycatch, whether it is retained or discarded. Each crab has several local names, and some are broken down by species, but it's difficult.
Howard: Offshore – big crash in Jonah crab.
Carl: Very cyclical -14-year cycle and rock crabs are down as well.
Howard: Bait, what about it and how much?
Carl: Dockside monitoring asks how much and what type of bait. Prior to 2008, 95% of bait was herring, after that some menhaden was used. Paying fishermen for 3-bushels of bait for every ?-trap hauls.
Mostly within 30-miles of the shore, single stock along the coast of Maine, although there is controversy around the stock boundaries.

Howard: What about the impact of fishing on bottom habitat – sediment and benthic species?
Carl: In some cases, lobster traps are a source of habitat, in other cases, they may cause damage, but in general, habitat impacts are fairly low. Also an impact of ghost gear – just submitted a stimulus grant to remove ghost gear in state waters. Issue 10% extra trap tags to account for gear loss every year. If they lose more, they have to file. It used to be if you purchased 800 trap tags, you got 10% up front, but 2009 is the first year that you have to file an affidavit to get additional 80 tags.

Howard: How long does it take the panels to rot out?

Carl: Variable with bottom habitats. An unfished trap retains lobsters, and about 25% will die. Other research indicates they come and go from traps.

Howard: Ecosystem impacts, 'farmed' lobster?
Carl: Crustaceans in general benefit from a change in the predator field. Lobsters have benefitted from decline in GF. Bait may contribute 15-20% of growth. Crabs are benefitting as well. Herring is the preferred bait today, 20 years ago it was redfish and GF. Joe Kelly at U Maine has studied geology/habitat maps.

Collin (P1): Stock Assessment process
Carl: Explained historical models (collie-sissenwine model for F and abundance), etc…and the 2006 Stock Assessment recommended trend-based reference points, which is median abundance and fishing mortality from 1982 on. Peer review report recommends 50% of your median abundance and 90% of F.
Collin: How would you take intervention on 50% of the reference points should the regime change?
Carl: More biologically sound than F 10%, and may not end up with trend-based BRPs. New length based model incorporates M. Exploitation has been steady, even with trap limit because of latent effort.

Did not record next 20-minutes of conversation. Trap reductions, size limit, etc.

3:00 – Jim Henderson, Chair Zone G (Cape Elizabeth to Elliot), board of MLA, and President of Southern Maine Lobstermen's Association, full time fishermen (500-600 traps).

About 500 lobstermen in Zone G – 800-trap limit. Summer 3-4 night set, and the rest of the year is weather dependent. 3-4 bushels of bait a day/36 bushels a week with a 6-day week. He fishes singles all the way up to a 10-trap trawl. Inside of 3-miles there is a 3-trap limit, in federal waters, you can fish more. He always sells to the same person, but he gets bait from different sources – herring, pogies (aka menhaden), or artificial, e.g. hairless cow hide, or a 'fish cake'-better bait that lasts a couple weeks, although it doesn't fish as well as herring.

Paul: What is the structure of the zone council?
Jim: One representative is voted on by the council (2/3 vote). Meet every 2-3 months. Always trying to reducing effort without removing traps, e.g., no fishing on Sunday or after 4:00. Referendum didn't pass initially.

Bonnie: Sinking groundlines are done for this area and now you're looking at end lines.
Jim: Yes

Bonnie: Is the decision making about lobster management open to all interested parties. How do you deal with the legislature?
Jim: Yes, the LAC is made up of all Zone Chairs, 2 dealers, etc. We'll go to marine resource council, and listen at the legislative level. Zone G just changed apprenticeship program and after 1,000 hours and 2-years they can enter the fishery (sponsored by an established fishermen), but instead of entering when someone leaves, it's now based on traps. 4,000 traps have to leave the zone before an apprentice can come in (before there were less people, but the same number of traps). Then one person can come in with 300 traps and build up to 800. Students can enter the fishery at age 8, and the number of traps increases the older they get. They can come in full-time with 300 traps, and build up 100 traps/year until they are up to the maximum. Student to commercial license transfer is now at age 17.

Bonnie: Comparing this to limited entry where you have to buy a license, this is not the case for state licenses, but you can buy a federal license.

Jim: If he gets a lobster with shell disease, he'll bring it to Carl Wilson
Collin: If lobster abundance were down, what would you do at the zone level?
Jim: He said they would look for the problem, find money for the study, and work on a resolution.
Sarah: Effort reduction survey – LAC supported this, but management measures were not being based on this.

Jim: Zones develop their own by-laws. Zone council terms are for three years.

Collin: Aside from banning whales, is there a wish list you have – are there any issues that have not been addressed?
No

License fees

Class 1 $145, class 2 (plus helper) $291, class 3 (2 helpers) $435 (Cheaper for over 70 years or under 18)

Paul: Is compliance good and how many wardens in a zone?
Jim: 6 in southern Maine, and there should be 7-8. Compliance is good. Mainly shore-based, 1 year-round boat. If you have a violation, you can't be on the zone council.
Sarah: There is a report for compliance with whale rules, over 90% in all zones. Working with Erin to determine what to look for with respect to enforcement.

Bonnie: Do community issues come up at the zone council meetings, like working waterfront, etc.
Jim: Yes, we talk about lawn pesticides, etc.

Trap reductions – favor current level. Some wouldn't want to go up. If there was an issue, trap reductions or gauge size.

4:00 – Toni Kerns, ASMFC

Background: Working at the commission for six years, and for lobster, she staffs the commission, which is all the Atlantic coastal states, 26 co-managed species. Her role is to provide the management board information to make policy decisions. She conducts meetings with industry members to gather information about proposed rules, and also meets with biologists, etc.

Paul: What is the cycle of meetings you have in a year?
Toni: Four meetings a year, in general. Management board for lobster ME – NC and NMFS. The majority of interested parties are ME-NY and a little NJ. Meeting subject matter, reviews of the FMP, stock assessments, state-specific issues. Portions are flexible and some areas are set. Management board meeting is planned for the first week in May – review stock assessment and peer review report. Genny Nesslage is going to give the board a presentation on the model and how it functions, what it tells you. Then they get the model and will give them the basics. Then they make recommendations and after revisions, it gets published. It's possible that management measures are passed at the board meeting, but not likely. ASMFC has primary authority in state waters, (ACFCM Act) and will make recommendations to NMFS, but they won't always be the same regulations that are implemented. When NMFS makes regulations it is difficult to ensure they are complying with Magnuson …When ASMFC makes regulations, states must promulgate them and if they don't, they can shut the fishery down. Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA) 1993 – Federal regulation that gives ASMFC regulatory authority to tell the secretary of commerce to shut down a fishery. The Act gave authority to put together Management Plans, states to promulgate rules, and the ability to shut state fisheries down.

Paul: What about ecosystem management?
Toni: The plan mentions habitat, bycatch, etc., but we don't have authority over coastal zone management or sewer/wastewater in states to regulate these resources. We don't have any bycatch measures in lobster per se because we don't have a lot of bycatch. Whales are managed through NOAA/NMFS as ASMFC does not deal with endangered species, it's just a section in the plan. They do have a staff member that attends TRT meetings and writes the sections in the plans.

Collin: How is the commission funded?
State dues and the Act.

Bonnie: Has ACCSP helped in the assessment process? Some states have state dealer reports that are not fed to ACCSP, so until that happens, ASMFC still goes to the states for landings data. There has been significant progress towards moving to this goal. States that do coordinate with ACCSP give them data, and they put it into their format and give it to ASMFC and then they also get NMFS landings data.

Toni: Talk to lori at the NEFMC regarding herring.

Bonnie: What about the consultation process?
Toni: All meetings are open to the general public. Also, we have advisory panels that comment on coast-wide issues, and if it is a specific area or region, then it goes to the LCMT, and the states can get involved to get a more specific industry perspective. Addendums go out for public comments and states request hearings, and she brings the comments back to the board. For every document that we develop, we ask the states if they want a meeting, and usually we have a 30-day comment period. Comments become public record.

Bonnie: Evaluation of the management process, is there an internal or external evaluation? What about SAW/SARC?
Toni: There is an informal process, but not a 'msc' type evaluation. We do not use stock assessment workshop (SAW)/stock assessment review committee (SARC), but we do use the CIE, external peer-review process for the assessment. Other species do go through SAW/SARC/southeast data and review (SEDAR) processes, but not lobster. There is also a FMP annual review, but it is not peer reviewed.

Discussion about lawsuits and they become the source of information for the lawyers.

Toni: We do have a fairly active Plan Development Team (PDT), Toni, economist/social scientists, NMFS, and ?

Paul: What is the process for states promulgating regulations?
Toni: Some states have to go through legislature to implement regs (e.g. George can't change size limits, it has to go to legislature), other states 'DMR' can. So they ensure that the regulations can be implemented in the state within a specific time period.

April 22, 2009

9:00 – Elliot Thomas, Client Member & LAC

Fishing for 23 years and before that he fished part-time during college. He's the western Maine representative of LAC, Board of the MLA, advisory committee for ACCSP. The fishery has changed dramatically over the last 20 years; when the catch went up everybody came into it. The limited entry program is working, we're below 1998 levels in tags (70%) – zone F. Casco Bay area is affected by more rivers than any other zone, then Penobscot Bay, but it is bigger and deeper, so outflow from rivers can make a big difference in catch.

Paul: What would you do about the whale issue?
Elliot: Engineering materials in the break aways, so they consistently break at the same tension. Also the TLLC, it needs to be made safer.

Trap reduction may provide an individual benefit to the fishermen, but not necessarily for the overall catch level, because they would haul the traps more frequently. The combination of licenses and tags will make a big difference. I'm not in disagreement about lowering traps. Tiered license system based on percentage of income. 19% of licenses did not land a lobster last year in state waters. Trying to get rid of latent effort, discussing a tag freeze. Dealer reporting – cannot get effort, but you can get effort from log books, which is 10% of harvesters. Rotational 10%, including recreational licenses. There is intention to increase that coverage, but state funding is not there. ACCSP is funding log book coverage in Maine right now. Tax money may go to research Carl is doing and marketing. Tags costs go to enforcement and management primarily, and the % increase for whale research was supported by the fishermen.

Collin: What would you do if population starts to decline?
Elliot: We're already looking at ways to reduce tags because the last decrease went from 1,200 to 800, but there was no stopping someone at 100 traps to build up to 800, it was more of a reallocation. With tiering system, it would be a cut. In Zone F, if you stopped fishing at 4:00 and on Saturdays, traps would go way down because of all the part-timers.

Relationships between fishermen and the state have gotten a lot better.

What do you worry about? Waterfront develop – trying to limit parking at the wharf in Yarmouth, so fishermen would have to walk. Water is getting warmer, he participates in eMOLT – environmental monitoring of lobster traps (NEC). Nova Scotia Fishermen's ?…Lobster Institute's Town Hall meeting between US and Canada.

Add an annual surcharge to tags, so if they are not being used, people will get rid of them. Canadians say don't let fishermen own their licenses because for example, with the scallop industry, licenses are owned by corporations. Bill – GF fishermen landing in Maine verses Massachusetts. Fishermen from NH will have one last drag for lobsters and land them in Maine. Concern about what draggers do to bottom habitat when they are targeting lobsters.

Zone F is the smallest in area, but they have the most dragged bottom outside of 3 nm of anywhere along the coast. Shrimp come down even south of Maine. Fishermen do v-notching (zero tolerance), and it seems to be working very well. The wardens come on board and are at the docks and go through the lobster tank. Overall sex-ratio for the year depends on the time of the year, but we catch more males than females (non v-notched). Gauge sizes – market would like

to see them smaller. We would hurt a little if gauge size went up (for one year)…Now, we're catching so many just under the gauge, it would have to go up ¼- inch to make a difference, and I don't want to do this because it is suicide in the market – because people want smaller 1 – 1.5 pound lobster.

What about bycatch? We catch crabs, but it's okay because lobster-crab license. Black sea bass, dogfish, occasional cod, striped bass, sculpin, etc. Do you land crabs? There is a market for Jonah crabs, but he is landing a lot less – bushel a season. Peeky toe crabs/sand crabs – crab meat in Maine. Decline in Jonah crab may have opened up the bottom for Peeky toe crabs.

Bonnie: How can it work better?
Elliot: Lobster industry is a large collection of small businesses that are competing for the same resources. The best thing would be to make it mandatory for all fishermen to belong to some association. Not enough people have the time to go to zone council meetings, so information is not disseminated widely enough. DMR only distributes a newsletter 1-2 times a year. There are a lot of people who don't know what's going on. If you're not involved in an association, you may not be aware. There are a lot of people who don't talk to each other.

10:00 – Patrice McCarron, Executive Director (10 years), Maine Lobstermen's Association

MLA has about 1,200 members. Primary advocacy group for the industry; monthly newsletter – meeting notices, summary of issues, comments; e-mail lists (wives print e-mails and hand them around); work at state, regional and federal levels. The organization is very well known. We don't work at local levels because of zone councils, this level is very well representative. Citizen legislature in Maine, a citizen can contact their local legislature and propose a bill. Hoping that zone councils would deal with management issues. Usually committee pools lobster bills together to vote at councils, but this year, they heard them as they were proposed, which took the councils out of the process a little. Involved in state rulemaking and ASMFC, we have fishermen on subcommittees, and they monitor herring management with NEFMC and NMFS. Federally, liaise with congressional delegation, e.g. whale rules and NMFS, ALWTRT. Currently, our focus has shifted with the recession, below-average prices all year, and then steep decline in fall 2008. We're also involved in the Governor's Task force on the economic sustainability of Maine lobster (whales, bait, prices).

Bonnie: How often does the board meet?
Patrice: It depends on what is going on, if they are going to DC, the president goes, and Patrice will supply the facts and information. A team approach works well, but you can't bring too many people because you may have 5-20 minutes, and we keep weekly monthly contact with staffers. MLA brings one message to the delegation – we eat our differences with DMR, so everyone is on the same page, and we get a lot of support. The groundfish fishery is more disjointed, and have interests in conflict.

Collin: What's the membership fee?
Patrice: $100 harvester, $125 for a business. Strategic planning – looking to diversify the board membership with fundraising and management pressures – would like to be more proactive.

Bonnie: Do you have any NGOs represented on the board?
Patrice: We like to be at the table talking about issues, "keep your friends close, and your enemies closer". Keep lines of communication open, and we will call commissioner to raise issues to his level.

Howard: From your point of view, how did it all play with the whale rules?
Patrice: It was tough. (*Patrice provided a hand out to the group.)* Gear loss, expenses, safety, line abrasion are all issues. Right whales are a coastal species, and although our guys don't see them [in state waters], there has been Maine lobster gear taken off of whales. Scientists will say they are rare in state waters, and 80% of fishermen can only fish within 3 nm. One size doesn't fit all – we would recommend seasonal or spatial measures. If we're going to spend a lot of money on gear, ensure it is going to save whales – we've been looking for a more strategic whale rule, and lost. We do have an exemption line in state waters - 75/25%, but people don't fish within one side of another, they cross the line, and would have to come into compliance. (People aren't going to change behavior, lobstermen would use different gear for specific areas.) Fishermen started fishing sinking line in the fall, and now that it's spring, people are losing gear and now have to get extra tags by trap, not up front. Some people say they may go to singles, but down east, the tide is too strong for singles. Then they don't have buoys for singles.

Regarding vertical lines, we reached out to Woods Hole and NEAQ, to conduct their own study with Hauke Kite-Powell (modeler) and Scott Kraus (biologist), to get good effort data into the model, and scientists will add whale data, in

addition to depth and bottom type. The study is funded by ME Sea Grant. We will use the model results as a tool to help harvesters, if you take x% of traps out the water, then you will reduce risk by y%, but if you take more out, then it's even better. NMFS is doing the same thing from ME to FL, and are taking effort and sightings together for a co-occurrence model.

Collin: Do you feel like you're making ground with NMFS and the ALWTRT, and that they understand that fishermen can be involved in the process?
Patrice: It's night and day now, there is much more respect. We talk about all the options and include the fishery. NMFS laid out a timeline and said they wanted to be more deliberative, find the hot spots and target certain areas, area-based management. Which is what they wanted them to do with sinking line, but at least this will inform the end line decision. If there was a density formula by area that you can't exceed, then that would be one possible management measure. At the TRT meeting, the goal is not to avoid all entanglements, because it happens all the time, but the goal is to not have serious injuries or mortalities, so we need to know why they are getting entangled – are they sick, lost, etc (video monitoring).

Howard: What about marking lines so you know the origin?
Patrice: Lobstermen are concerned with the labor of a gear marking strategy because they have so much line. Would like to see line distinguished between inshore, offshore, MA, etc. Right now all GOM trap pot fishery is all red markings, so they can't distinguish between MA, NH, crab pots, etc.

Collin: How do the lobstermen react to the data that is available that shows some evidence of whales within 3-nm, do they accept it or are they blind to the issue?
Patrice: They are still not very accepting. As an industry we need to get away from the dots on a map because there are whales everywhere. Usually entanglement of lines around the mouth occurs in Massachusetts where they are feeding. Step 1 – where's the co-occurrence, step 2 – are they feeding and what's the risk of entanglement in Maine waters. Otherwise there are broad measures that may or may not reduce the risk.

Howard: Where are you with the bait issue?
Patrice: There is one stock in the GOM, which is huge, but there are other spawning stocks and the debate over Area 1 – inshore GOM, herring committee required a lesser TAC than the scientists recommended. It started with a TAC of 60,000 metric tons for years, then it went down to 50,000, then 45,000 + research set aside. Good news is that the stock assessment is ahead of schedule, and will have new specifications in 2010 (TRAC stock assessment), I'm hoping it will be closer to 60,000. Trend is to land quota later, Area 1a. ASMFC manages landings on a week-week, month-month basis, and they will be trying to set monthly quotas with carry-over, so you don't catch it all before the fall. There are some food markets in other countries for herring.

From the harvester's perspective, there is a sincere and long held belief that we are a sustainable fishery, and they are part of this driving force, and have a pride for the level of stewardship that goes into sustaining the fishery. Core practices are sustainable.

Collin: Do the lobstermen who have been through the pre-1980 population decline and are still fishing now have a better sense of the dynamics of the fishery?
Patrice: There are different perspectives between the older guys (they get it and own their houses and boats) and the younger guys (intellectually they get it, but economically they are overcapitalized – boats, trucks, houses).

11:00 – Dane Somers, MLPC

MLPC Board represents Down East, mid-coast, southern/western regions, as well three harvester representatives, dealers and processors, and public members. Designed to represent all various interests and bring everyone to the table who might not necessarily agree. How they fair in the marketplace affects everyone. MLPC was the one to initiate conversations about MSC certification in 2000. A lot of people's perceptions are not based on the facts. We have been very active throughout this process, and it got to a point where we needed to move forward or park it and re-visit. John and others wanted to fast forward the discussion, so they formed a working group with the commissioner, and MLPC has been working with them. MLPC has had the MSC come down to talk to fishermen and others. Outreach aspect is important because of the entire industry, only about 500 people have enough background to have an informed opinion. The industry zone councils lend themselves to foster communication. Not unusual to give folks information about MSC and the website, but they won't take the time to go onto the website and read about the process.

Due to the efforts of Patrice and David, MLA, MLPC, and DMR, relationships are better now. We present the fishery as a sustainable fishery, and this is our message to our constituents. When he presents to chefs and culinary associations, he tells them that they are hand selected (sized, sexed, etc.) by licensed harvesters who are schooled in conservation (roughly 1 of 3 lobsters that are caught are landed and brought to the market place, which is an inefficient way to bring a product to the market). We practice this conscientiously and are proud of the effort. We invest quite a bit in this process. My perception, if the harvesters were in charge, they would be stricter than DMR.

MSC, does it make sense? What good is going to be, is it another layer of bureaucracy, is there value? There's been a shift because of everything that's going on, meetings up and down the coast.

Howard: What do you see as the major threats or issues to sustainability?
Dane: The resource seems healthy, recruitment is good, but there is an ecological balance that is disturbed by human activity. As predatory stocks rebound, lobster populations may decline again. Over the last 25 years, the levels of pollutants in the GOM watershed have been dramatically reduced. There is a dangerous perception that things are good now and that they will stay that way…

We have to be cognizant that we can't flood the market with product and hope it sells, we have to work on supply and demand and the quality of the product. This concept is starting to come around. Between 1996 and 2006, the landings essentially doubled, and the market reacted, so there is a tendency to think it is okay, but that was under certain market conditions.

Bonnie: If the fishery is certified, how well is the infrastructure set up to deal with this?
Dane: It wouldn't be DMR, but the industry (with zone councils) and everyone else can support it. After the assessment, determine how to meet conditions and add up all the costs and figure out where the money is going to come from. Cost-benefit analysis, and is it going to be seen as beneficial to the industry. If not, then it's an uphill battle. Can we massage programs we have in place to meet conditions or not? Industry is vitally important to the state economy, so there has to be an appreciation of the benefits –outreach.

Bonnie: Does your coalition include environmental groups?
Dane: No, but we try to keep an open dialogue about issues.

Missed 20-minutes of conversation.

1:00 – Larry Knapp, Zone Chair E

He started fishing as a kid in the 1950s, got his first skip with an outboard engine in 1960s, and has a 42-foot boat now, and has been involved in other fisheries. He is a7th generation fishermen. Lobster council chair for Zone E, LAC, LCMT. Around 300-400 lobstermen in Zone E. Every year for 3,000 tags that go out, we only allow 600 to come in, so we're slowly try to down size. Most of the industry would like to see the slate wiped clean and start over with respect to trap limits, v-notching, etc.

We have very bad attendance at the council meetings, maybe 5 or 10. They're angry about government regulations. For example, the original trap limit – 1,200 was determined by guys who lobster part-time, and then the full-time guys got their traps taken away. We meet after advisory council meetings or every couple of months.

He fished for GF in the spring and went lobstering in the fall, and then he ended up losing his GF license. Zone E has a 600-trap limit. Bait is not a problem for him – herring, pogies, red fish (small shad).

1960s started with wood traps and shorter sets. Lobster explosion – wire traps fish better, increased from 3-4 foot traps, large pogie kill (made bait available). Late 1970s, early 80s, there was a lot of floating small pelagic lobsters, and they would get pulled into the boat and the live water well. I fish out of Boothbay Harbor, out 20-25 miles to ? and Monhegan. Participated in larval recruitment study and other cooperative research projects.

Carl listens to what we say, and we may disagree, but I'll see what he is saying.

Headed toward corporate fishing, with Walmart, and we're losing our infrastructure – can't go gillnetting in Boothbay, would have to go to Portland. GF fishery went corporate and they are the problem with overfishing.

2:00 – Lew Incze, USM

Biological oceanographer, working primarily in the coupling of oceanographic and biological processes, including recruitment etc. 1980s, very little work going on with lobsters, so he tried to build up a program with larvae and worked with Bob Steneck and Rick Wahle. Works with climate change as well. He also works with fishermen, going back to 1988, and started with the Sea Grant director, Bob Wall This started the fishermen's forum, and a lot of NGOs have contributed (e.g., Island Institute, NASA grant, satellite technology for SST and chlorophyll). A lot of fishermen recognize us and we them, which helps discussion since we don't regulate them. ME Seacoast Mission Society – boat that travels up and down the coast, talking to fishermen about what they are doing and listening to them, developing community relations.

Long (1995-2000) sustained decline in settlement and then a big return in recruitment in 2001. Landings in the fishery didn't happen right away following the settlement decline. Data that we have suggests that the decline in recruitment into the fishery (not in landings) measured by state trawl surveys happened a year later than predicted 7-8 years verses 6). Fisheries landings kept going up, but CPUE was going down – fishermen were working considerably harder to get their catch. From the fishermen's perspective, they still see a lot of little lobsters, but their CPUE is down; however, they may feel that it is a natural cycle. If the lobsters followed the settlement index after 1995, then there would have been a 40% decline in recruitment, but other compensatory rates balance it out and natural mortality fluctuates. In the short-term, the fishery does not face the prospect of another recruitment hole. There are reasons to be concerned as with any fishery because there never seems to be a quick enough response. Eastern Maine has not had settlement issues because the BOF has filled up with mature lobsters.

We need to do a good post-analysis of the period we are looking at, but there is no funding. This will help the managers place some faith in the settlement index.

Paul: How do you feel about your work getting integrated into management?
Lew: NEFMC were interested in one paper they published, so they are getting positive feedback. There is more appreciate now for these things than their used to be.

<u>Rockland, Maine – Trade Winds Motor Inn</u>
6:00 – Linda Bean, Client and Port Clyde Lobster

Linda was one of the first members of the client group. She began as a wholesale dealer two years ago, lives on Port Clyde, which has four buying wharves, and she owns one on PC, one in Vinalhaven, and one in Tenants Harbor. This region produces between 25-30% of state supply, and she is producing 5% of the state supply. Her concern is the fishermen themselves because their pay doesn't increase with MSC certification and their costs go up, and she would like to be part of the solution by doing more. Why the processors left, I'm not sure, but those who have survived are marketing and adding value. She's also purchased a processing plant that is processing scallops. Importing and exporting scallops was too expensive with the transportation. She bought in December and she's buying equipment for a processing line and should begin processing soft shell product in July. Soft shell market was dealing with Canada, and with the Iceland banking situation, they shut down, except for one processor. This compromised their ability to keep fishing, but Linda kept open and kept buying through the four-day weekend. Now she has 4-5 Monhegan boats. Her policy is to not make money on bait or fuel, which has brought some controversy, but allows her to pass on savings to fishermen. She paid the highest bonus in her area - .33 cents/pound last year. She wants to do new things, and is surprised that more hasn't been done. There is a lot of opportunity out there…Fishermen need trap loans, and this is expected of the dealers, although it's tough because they don't know if they are going to stay next year. There are risks, but that is a challenge of the business.

Howard: Where do you see the benefit of the MSC?
Linda: I saw that in Belgian, and it's a great marketing tool, and then there is traceability. She'd like to be able to say this is certified Maine Lobster, and has begun this process at her three wharves, which says which wharf it comes from. The grocery stores like this – wild caught and Maine. The end goal is new markets and people to realize we have a great product. She's addressing the soft shell, and would like to get it processed in Maine (not Canada) and to go out in the US and a new form for like a sandwich – Linda Bean's perfect Maine lobster. The claw knuckle is a problem too, because you can't get it out (uses it in stew and lobster roll). We use claws and tails. We need a third party certifying body, otherwise it's their label, which is self-serving. Jay Kenny, a nutritionist talked about calorie density per pound, and lobster has 450 calories/pound. Some people think including the provinces in the GOM lobster fishery/certification process– but this is a problem, we should have our own fishery.

6:30 – Michael Dawson, Chair Zone D

He is a lobsterman and represents his fishermen (~100 in Zone D).

Bonnie: How do you manage to communicate with fishermen?
Michael: They know how to get in touch with me, it's a small community. He's also a member of the New Harbor co-op and is the board director. He was vice-chair and was selected as chairman for a couple of years. He's been fishing since he was 4-5 years old, his father has been in several fisheries. He also does shrimp dragging in the winter. Shrimping is usually more lucrative, although it's hard trying to find the right markets to sell the shrimp to.

Bonnie: From your perspective, in what ways has there been an improvement to the pre-council days?
Michael: We have a lot more input, the senators and representatives come to the meetings, and they can tell them in person rather than going to Augusta, where they may not feel comfortable.

Collin: Are your meetings well attended?
Michael: We have a very good turnout in the council, more in the winter than in-season.
Sarah: It's an active zone, they are innovative.
Michael: The trap tag ratio was 5:1, went to the state to change the law it so it's an equal balance. If you tell us to take our traps out, and then let new people come in and build up to 800 traps, then it's not fair. Our zone suggested it and met almost every two weeks to make it happen and then the state took over. At the same time, a lot of students were coming in, and they changed the age to 17. His son is 12 and has his 50 traps, but he hopes he will choose another career.

Howard: What about traps in this area?
Michael: Hard to say, and it changes because someone who retires is fishing less traps, and then someone younger comes in and starts with 300 traps, but then builds up.

Bonnie: What happens when you move from one zone to another, do you have to get on a waiting list? (Formal and customary law)
Michael: Yes, officially you can transfer by getting on a waiting list. There are boundary lines even though you have a state license. The 'old fashion' laws aren't as prevalent as they were even though there are unwritten boundary lines.

Paul: What was the feeling about MSC after the presentation by John.
M: If you get it, it's like an ace in the hole, it will help us sell more product and find new markets. Most people in the zone are okay with it, but some are uncertain, because they are not sure what happens down the line – 5 years later, are we going to have to do something else? They don't want to take traps out of the water.

7:00 – Gerry Cushman, Bob Baines, David Cousens

GC: 5th generation fishermen, lobstering since 1987, also gillnetting, tuna fishing, etc. Owns a 50-foot GF boat. MLA board, Zone D board, LAC.
DC: Lobstering for 40-years, full time in 1980 after college, and 1985 got involved in politics, when draggers were trying to land oversized lobsters in Portland. I've been active in management since then, and have worked diligently to get the resource to where it is today.
BB: First generation fishermen, has been lobstering for 30-years, MLA, advisory panel of ASMFC, chairs, MSC client group,…, president of Spruce Head Co-op.

Collin: What happens if the resource goes back to a decline, do you have any ideas why the recruitment is so good, and how would you deal with it if it goes backwards?

DC: There was a 25-30 million-pound average for a sustained period. Recruitment – we've done the right things to get the eggs and larvae in the water column - v-notching, size limits, etc – so you don't rely on a year class. (In case of an environmental catastrophe.) 1996, low recruitment because of environmental factors, not because of survival. From 1998 to 2001, the landings were way over, but we didn't have mandatory reporting. In the last couple of years, our landings have dropped 30-40%, even though the resource is healthy, the fishery is overcapitalized and it's expensive to get them. He thinks there will be an increase in recruitment in the next 5 years, primarily due to environmental factors. Dragger bill – offshore lobsters landed in Mass: once that stopped in the late 1990s (500-count limit on draggers, so they high-grade and lack of dragging for lobsters w/in 40-nm, Area 1/3 boundary line), recruitment improved. Bob Steneck – survey

oversized lobsters. Also found in gillnets.

Collin: In your role as MLA president, what contingency measures do you have if the resource started to decline?
DC: We have tools in the tool box. We would have to get to 250 traps until we affect catch. Seasons, gauge increases, decreases.
BB: But nothing happens quickly, the 2009 stock assessment is based on 2005-2006 data, and if they decide to revise the management plan, it would take longer and would be based on old data. The last management plan from ASMFC had a contingency where a change in gauge size, etc. would be triggered. ASMFC process is very cumbersome and not the best way to manage a fishery. By the time the federal plans goes to the state level and gets implemented, it is a long time. Maine can be more restrictive than ASMFC, but there's not the political will.

Collin: After talking with Rick and Lew, they said there is a 5-year indicator with bad recruitment and this can be acted on.
DC & BB: 8 years from larvae to legal lobster, but they said 6 or 7 years. They saw this in their catch; it went down up to 60%.

Howard: Is it widely accepted that landings are higher than what was reported…
BB: Carl has revised his numbers based on the underreporting factor.

Collin: Are you happy with the new stock assessment BRPs, etc?
BB: Yes, they are much better than F10, and it's hard because of comparing old with the new…

Bonnie: Are you involved in the stock assessment process?
BB: Not really, on the board, I go to the peer review, but leave it up to the scientists.

GC: Draggers are on the 40-mile dragging because lobsters migrate further out. We won the battle – limiting dragging for lobsters, but not the war = no dragging for lobsters.

Wire traps were catching 10 times more than guys fishing wooden traps, and is a better way of catching them. Landings data don't tell all; it's difficult to predict. Technology has helped to increase catch. Have the lobsters always been there and we just haven't been able to catch them at the current rate because of lesser technology? My father and grandfather only fished 300 traps. He fishes in the same areas, but further out, and more efficiently. Amazed that lobsters can take the pounding they do now, will it catch up? I don't know…

Collin: The transport system in the GOM facilitates larval transport.
DC: Urchins were cleaned out by fishing, and vegetation grew back, which is habitat for juveniles.

BB: As you go through this assessment process, there is a concern that this assessment might be different than 5-years down the line, where if another team comes in, looking at different standards that aren't considered in this assessment? For example, is your carbon footprint going to be considered down the line? Industry is concerned about goal posts moving.

Paul: The process is as follows: Assessment report – client group (technical review and action plan) – peer review (and back to the team) – public consultation (back to the team for revision) – 21 days back to the public. If the fishery gets certified, it should be a thorough assessment on that time; however 5-years down the line, with a different team it could be different, but it's not in MSC's best interest to change the standards.

BB: We want to make sure everything is on the table. I want to make sure all the major issues are known (e.g. latent effort, bait, PVC-coated traps, etc)
Paul: Every fishery has annual audits. All fisheries have had at least one condition, (unless you score about 80%). You can have changes within 5-years but it is based on the original standard. The client has the condition and develops an action plan. When you do a surveillance audit, they take about 4-5 days with stakeholders, competing fisheries sectors, scientists, etc. Thirty-days after audit to assess the condition, close it out, and see how the fishery is performing against the standard.

GC: First time we meet conditions, then 5-years down the line, what if there is a condition that we don't want to meet, and MSC drops us? (Carl said it's about 1/3 of us in Maine who are doing the fishing, what happens if 2/3 that have a license puts their traps in – 2/3 of the fishery is latent effort? People bought them thinking of licenses as an investment,

like Canada, and recently it doesn't make sense to start fishing those traps, but if it gets better in the future, then they may.)
BB: If the assessment doesn't identify latent effort as an issue, then there's a problem. We have potential to go to 5 million tags.
DC: We don't want to be blind-sided in five years. Groundline is going to produce more ghost gear. We should have been focusing on end lines; we don't have right whales feeding within 3-nm of shore.
DC: I think we need certification to keep our market share, and I know we have a very sustainable resource, but I worry about bait, whale issues, and effort. Let's get it on the table, and if it's going to be an issue, I want to know.
GC: We're going to tell you everything, but they are concerned about people who won't because they want this [certification] so bad.
BB: The way we are managed, it is going to take a significant amount of effort to meet conditions. For example, if we are overcapitalized, do we reduce effort, etc.
Paul: Client group does not have political clout to make changes (in general), but sometimes if the industry is supportive enough, that conditions are passed more quickly.
BB: I'm not against it, but I am still uncertain, and Dave thinks we need it more.

BB: % of new recruits/trap is getting higher.

<u>April 23, 2009 – Ellsworth, Maine</u>

9:30 – Sheila Dassat, Down East Lobstermen's Association Executive Director (since 2006)

Generational lobster fishing, boat building, Deer Isle, Stonington, etc. Her father is 85 and still fishes. She grew up on the island on Belfast, her father also was a tug boat captain. She worked for Hamilton marine, which is the largest marine retail store in coastal maine, in boat building and conducted seminars. Her family owns one of the last surviving boat shops, Holland's boat shop. She also owns a lobster boat with her husband.

Howard: What's the relationship between DELA and MLA, are they independent?
Sheila: I had to learn myself about this position, and they've helped me. Both were established in Jonesport. Then MLA went in a different directions and DELA started. We have different territorial concerns – MLA is based in Kennenbunk. DELA has members from Down East to NH, and are all fishermen. She doesn't make decisions, she contacts the board. Associate members are business owners and cooperatives. Membership is about 310.

Bonnie: What role do you play in communicating what is going on in management and science and markets?
Sheila: We have a newsletter that we put out once a month. Chair of the Maine RED Board, board of directors for the lobster institute, secretary – Maine Fishermen's Forum. She may also go to the state to voice the Association's opinion on a specific bill.

Collin: What's your view on the state of the resources and any views on issues with your members?
Sheila: Working with the lobster institute, I think Maine is in good shape. They're very cautious in our board meetings that Maine doesn't end up like Long Island with the pesticides, and the pollutions from all the cruise ships. Also participates in research with Normandeau Associates to test mercury. Lobster Institute asks people to bring a lobster with shell disease, etc. to the university. Abundance is healthy, so they are fishing and increasing supply, but demand does not necessarily follow. Our association is not advocating for trap reduction, but if they could fish according to the means, i.e., if they don't need to fish 800 traps, and can save bait, fuel - voluntarily. The ones that are doing the best are the ones who own their boats and have their operations figured out – can fish without technology. A lot of it is education, young fellows start with 14-foot skiff and outboard, a 32-foot is a good size to be able to make payments and own your boat. We've talked about going into the schools and having some of this information (business planning, etc) in their curriculum.

Collin: What proportion of license holders are actually fishing? What about new entrants.
Sheila: For DELA, just this past month, we have cut the fee from $80/month to $40/month for people over 70. They are people who work another job, and still have their license, but I couldn't tell you how many. There is an apprentice list, although on the islands, they automatically get in. In Zone E, Boothbay and down to Portland, the waiting list is not as long as in the Down East area, because there are less options. Blueberrying, trucking, or fishing are the only occupations the further Down East you go.

Collin: What happened with the trap limit?

Sheila: The majority of traps are in the Harpswell area, but Down East, they fished as many as they were allowed. As time went on, the realized it wasn't as bad as they throught it would be. Then there are some, Swan's Island, where only 400 traps are allowed. I believe they agreed on this.

Sheila: I don't go to all the zone council meetings because there are so many LAC meetings and other meetings.

Howard: What about the whales?
Sheila: She thinks the best friend of the whales are the fishermen, she has board members on the TRT, but there haven't been many sightings, and the sink rope issue is a very big concern. Rocks are very jagged, and we care about the whales, but we also care about the lives of our fishermen. There is an expense for switching lines, and loss of gear. Article in Bangor Daily about grant to clean up ghost gear: there is an estimated 30,000 traps out there. Haven't necessarily switched over beforehand because they didn't think it would be implemented and the rope isn't necessarily available. There are some fishermen who have never seen a whale. The 10-cent increase in trap tags – fishermen asked for proof, if they sighted a whale for a picture, latitude and longitude.

Howard: What about bait? Do you land crabs?
Sheila: Herring primarily, sometimes substitute menhaden, but it does not keep as well. Some Down East guys are going for their own bait. Yes, our dealer has a picking house, so they do land crabs and sell them – Jonah, rock, peeky toe crab.

Bonnie: Is ? important here too?
Sheila: Yes. Fishermen's forum brings everyone together.

Fishermen are concerned that they are the bottom of the chain, and they hope they won't have to go above and beyond what's expected and have to take a price cut.

10:00 – Mike Cote, Looks Gourmet Seafood

He bought his company because they had the name 'Bar Harbor' branded and is a trade name. We do a whole line of seafood soups, clam juice, sauces, cold-packed herring – factory in Whiting Maine. They support MSC certification and sustainability. Whether it adds value – West Coast states understand what it is, and East Coast is starting to catch on. We do shelf-stable canned lobster, knuckle, claw and tail – and use only certified Maine lobster. We use a number of other lobster parts in seafood chowder.

Paul: Do you have a feel for how the industry feels about it?
Mike: There's resistance, I went to all the meetings. He attended a meeting at GMRI about traceability and some fishermen think that makes more sense for them. They don't want to be restricted anymore and they are not very profitable. They worry about conditions and after 5 years, loosing certification and then going backwards. Our frustration is how did Maine lose their market/infrastructure. We use the 'certified Maine lobster' logo from the MLPC, which is free and she thinks they are the only ones who use the label. She's hoping that MSC will have enforcement added as a condition. For example a NYC restaurant that has a Canadian 4-pound lobster, on the menu as Maine lobster, which sets a bad example. She thinks the chain of custody will revamp the industry. The other thing that is gaining mistrust is that it is led by several individuals instead of a larger group. He saw a couple large processors at the GMRI meeting who feel better about traceability, so he wonders about how many processors would actually buy into the label. Down Easter's don't like change. They know something is necessary because the Canadian market.

At the fishermen's forum, I tended to believe that MSC would level the playing field. What if both Canada and Maine had MSC-certified lobster, would they have different conditions that would make it even?
Paul: WRT seasons, no, and both fisheries would be measured against the same MSC standard. We aren't in the game of changing management. What about size – we have to throw those back and Canada gets to keep them. Anything over a 3.5 pound is unsustainable, would that change Canadian regulations? No, it would be more like the numbers of eggs per recruit would have to be x. PEI has a small minimum size because growth characteristics vary depending on temperature, etc. The conditions are fairly open in laying out the problem and letting the client develop their own measures. There might need to be better marketing to the fishermen who it is going to affect, and it might be different for Canada, but why? Fishermen want to know what is it going to cost them, and what is the price I am going to get? Lobstermen don't see their product go down the line like we do. That has been my frustration with the state; we are not marketing a product that no one else has. There is no substance to 'certified Maine lobster', and the two major processors in Portland (Cozy Harbor, Portland Shellfish) co-mingle lobster, so they have no idea where they come from, thus they can't use the label.

The younger fishermen are getting it, because they left Maine, and went to school, and now are starting to pick up on this.

We have a third-party, MRAG Americans come out to…?

Collin: Do you have any concerns about the lobster fishery, setting aside economics.
Mike: There are dramatic differences between Portland and Cutler, in lobster cycles and quality…

11:00 – Bob Bayer, Lobster Institute

Lobster Institute is a clearing house for problems and ideas in the industry, Board of Advisors represents all aspects of the fishery, and geographically from New Brunswick to Long Island. We have a minimal budget, but it is okay because we have students, volunteer fishermen, and are set up through the university. Annual US-Canada Town meeting, has transcripts that he provided the team with. Quarterly lobster bulletin, spotlight pamphlet, economic impact summary of the fishery, float rope – decking, test used by law enforcement to determine chlorine scrubbing. We do work with socioeconomics. Lobster gram is the largest internet shipper of lobsters – from around the world. Primary funding is raised by individuals who want to preserve the way of life around lobstering, and a small amount from U Maine. He is a tenured faculty member, and is not paid as director, Cathy Billings is a paid associate director and we have money for a part-time secretary.

Collin: Has the university been involved with the sinking line and end line?
Bob: We were involved in it because the first question was what the breaking strength is, so we studied that, but other than that we just liaise.

Collin: Do you have any views about resource status?
Bob: You'd be surprised at the number of v-notched lobsters, berried females, and sub-legal lobsters. A graduate student looked at cod, haddock, and lobster catch – lag times, temperature, and it seemed like temperature was the one (honor thesis paper).

Lobster Institute is looking at hatchery technology as well, so we understand it and develop the infrastructure just in case. Released 1,500 tagged – fourth stage (first benthic) lobsters, and had about 20% survival rate, and fishermen marked them so they were only 're-captured' once.

We've been following shell disease for a while now, and decided to tag whales from southwest Nova Scotia and mixed them with other lobsters in a tidal pound, and they weren't able to transmit the disease to healthy lobsters. It's a systemic problem, and I think it's environmental, but we can't find that in Maine, maybe because the water is better up there. An unusual happening, red tail disease, is gone. We haven't seen it in three years of sampling. Another issue is a secondary infective organism that is related to stress, perhaps from high-speed haulers. Blood chemistry is different when lobsters are hauled up at high speed vs. regular. Sometimes from a depth of 100-meters.

Collin: Dave Cousens said lobsters are taking a longer time to harden up, and that using herring as bait may be affecting this.
Bob: Not sure that is accurate.

11:30 – Dan MacDonald, LAC representative for Zone C

Harvester on Isle a Haut, and used to run a co-op, but it closed. I have 800 tags, but I don't quite fish that many traps. Not much spring fishing, so I am alone now, and my daughters help me in the summer.

Collin: Any comments about the resource?
Dan: Right now, it's fairly strong, stock assessment didn't change much. I don't like the fact that other fishermen have been driven out of other fisheries and into lobstering. The way it used to be was about right – mussels, scallops, to shrimp throughout the year, and regulations pigeon-holed you and you can only target one species.

Bonnie: Do you participate in a way that makes a difference?
Dan: As much as I can at the state level, but not at the federal level. The state informs us, and we deal with it the best we can. At the state and local level, you have pretty good control, but when you're dealing with the Feds (ASMFC, NMFS), there is not much you can do. In general, I don't lose a lot of gear, but with the whale rules, it is going to go up. Traps are

$60-70/piece. It depends on how you lose it, if you part off the trap with float rope, you could get the grapple and take your trap, but you can't do that with sink rope and with a single, you have to actually get the trap.
Do lost traps go on fishing? For a little while. It takes vents about 10-11 months to pop out. You can still get 10% replacement tags, but you used to be able to get them up front, and now you can go to the warden and fill out a form.

Bait? Herring is only good for a couple of days, red fish lasts longer, but herring is easier to get. Do you land crabs? Only when I get enough to land them. Two types of vents – square (4-inch) for crabs and the round ones, crabs can't get out. So he has regular square vents.

Collin: What's the issue with the proportion of tags that are unused?
Dan: Even if you don't use them, you hold on to them in case you need to build up later on. Plus the talks of lowering the trap limits, which doesn't bother the small guys, but all the big guys are affected. Tiered effort reduction has been discussed, but it's not moving forward.

Bonnie: How well represented are the small guys?
Dan: In my zone, the majority of people fish 800, sit on the councils and the small guys are intimidated. Some full-time people are 12-months of the year, and then how are you going to tell someone who is 70 is fishes 5-6 months out of the year that he is part-time?

Collin: Any concerns about the ecosystem?
Dan: Don't care for cow hide, who knows what it might do?

Gauge size? I have a lot of faith in Maine fishermen, because they came up with gauge, v-notch rule, etc. Maximum 5-inch rule is good for the state, off shore is different.

Bonnie: You have a warden system, how well does it work?
Dan: Yeah, people follow the rules, but you'll have a percentage that follows the rule to the T, some who understand but may not agree, and a low percentage who don't care. Eventually they'll get caught. The biggest offense is keeping v-notched lobsters, hauling other guys gear, and catching oversized lobster.

Bonnie: What about the sliver area?
It's about 1.5-2 miles wide (exemption line to state waters) in Penobscot Bay.

Comment: Not sure he agrees with MSC, because he doesn't want to see the industry controlled by outside forces. We've been 'green' before it was tagged to be green – no draggers, ecologically friendly fishery.

1:15 – John Drouin, Chair Zone A

Fishing for 30 years, chair of Zone A for 9 years and DMR lobster advisory council. Took interest in management because he has children who are interested in fishing, and he wants to help secure the opportunity for them. Started fishing in federal waters about 8 years ago because of strong tides, prior to that he fished inshore. He has 54 trawls, 800 traps, x end lines, which are light, and before he had to weigh traps. Down East peak season inshore is August.

Collin: How was it when you started in 1979 and now?
JohnD: The fishery is much better now, he originally got into it because he liked being out on the water. Fishery has been very good to us over the last 10-15 years.

Collin: What are the key regulations that helped the resource?
John: Limits on females and oversized lobsters. Fishermen believed in it right from the start.
He has a federal and state license, and currently fishes 100% in federal waters. Zone A lobsters in colder waters don't have temperature issues, when water is warm they move around until they shed, and then they don't move, but will eventually start feeding and getting the protein to build their shells. With cold water, lobsters move faster.

1,200 lobster licenses in Zone A, and according the DMR, some of them are dormant. There's always been a level of latent effort; we've had as many as 10,000 license holders back in 1970s. It shouldn't be 'use it or lose it'. Washington County is the poorest county in Maine and the second poorest County in the US (~35,000 residents).

Did the trap limit have an impact on the individual fishermen?

Everyone did okay, but less than half license holders have the full 800 traps.

Any fears about the fishery except for price?
What we've learned over the last decade is that they don't use science to back up everything they say, they use their money to push their goals.

My best year was 2002. The mid-coast area had issues 2000-2005, but these have not reached Down East. Some point in the last 1980s we had a steady increase until 2002.

Howard: What about the whales?
In the early 80s, the amount of whales were incredible because the herring fishery was weirs and stop seiners. Now I don't see them. It costs upwards of $15,000 to change over to sinking line.
Bonnie: Is there a poor availability of sink rope?
Yes, I've heard that, and you can't get it, but they also don't know how it's going to work. Brand new gear, went out in May after a couple weeks and he had a sea sampler onboard and lost gear. Our issues Down East is that our bottom is extremely hard rocky bottom, so you either have to avoid fishing those bottom areas or force people to fish singles. Seems like they already made a tremendous amount of headway on the end line issue [from the TRT meeting]. Ocean Conservancy was talking about a 50% risk reduction. We know rope entanglements occurs, but is it all the lobster fishery? There is no way of knowing unless gear marking requirements are revised. Why do whales get entangled in the first place, are they sick or injured, ship struck?

Howard: What about ghost traps?
John: My biggest loss of traps is from Irving tankers. There is supposed to be a shipping lane. Last year I lost traps because of rope failure (3 traps) and other than that, I don't lose them – I go back and get them. Even when I fished inshore, I would lose 30 traps in a year and then I would eventually get it back. Traps all have biodegradable panels, they are not going to continue to fish. If something is big enough to get into vents, they can get through panels. Even with the sinking groundline, he doesn't expect to lose gear, he just uses a more efficient grapple.

Howard: What about bait? Any ecosystem-level effects?
It gets tight for us in the fall. I use 100% herring, but haven't lost a fishing day because of lack of bait. "If it doesn't come from the ocean, it shouldn't go into the ocean". We've tried to ban artificial bait (cow hide), but DMR is apprehensive to do this.
I don't think we're farming lobster, but we have created habitat for them, cleaned up the bottom.

Next week, the price may drop to $3.50. Last year was tough; this year will be the telling year. If it's bad again, I will cut way back, I won't go out and lose money. I built my current boat in 2005.

Bonnie: Is the precautionary approach built into the management system?
I don't think there is currently anything built in, but it's healthy so aside from existing conservation measures, we think that's enough. Zone A takes seed money and purchases and liberates females every year.

B: How transparent is the management system? What about timeliness, can you get decisions make fast enough?
J: It is now, although some are more active than others (for example Zone D). Regarding timing, things don't happen fast enough (regulatory process).

B: Are you involved in cooperative research?
J: Yes, GOMLF ventless trap survey for four years (funding from a NOAA grant, which is no longer available). Also, the dockside monitoring is in jeopardy after 2009 for funding, so they are looking for alternative sources of funding. I don't agree with the trawl survey, he thinks we'd get better information by the traps. So her participated from the Canadian border to Milbridge. Even with 100% dealer reporting the perception of what the fishery might have been is not what it really is.
Bonnie: Adaptive management.

Bonnie: What are your concerns about certification?
J: Who actually wants it? It wasn't actually the industry, there's part of us who think we won't benefit. There may be markets for MSC certified products, but we already have Maine lobster. Who is going to pay for it, what are the issues? If we become certified and lose certification, then that's worse. I don't see any benefit as a harvester. Perhaps someone else will make money, but not me. Will it open up markets and continue to move lobsters along, sure it's a possibility,

but will we do this at the cost of other markets (e.g., small processor around Cutler who is trying to get lobsters this winter and can't get them.)

3:00 – Dana Rice, LAC Eastern Dealer Member, chairman of DMR advisory council, NEFMC member of the herring subcommittee, ASMFC, board member of U Maine lobster council.

Sixth generation fishermen, almost all species in GOM, primarily lobsters. Homeport is on Schoodic peninsula, harbor master, town selectman.

Howard: involved with whales?
Dana: Yes, I am involved. He thinks the 'industry'(= non associated industry) will ignore the end line issue that is supposed to be resolved in 2014. Misconception that MLA speaks for a large number of industry, 90% of industry does not pay attention. MLA and DELA work against each other rather than with each other.

Bonnie: So if most fishermen are not in associations, how do they have a voice?
Dana: Industry responds as a reactionary process, when there is a threat, rank and file will stand up otherwise they keep quiet.

If the head office of an environmental office sat down with us to try and find common ground, we might be able to make progress, but that won't happen. It's difficult because the fishermen see the ship strike issue as the primary whale killer…

Howard: Bait
Dana: There hasn't been a real problem, but last year was a bit tricky. Area 1a – down to CCB, scientists say it's in good shape – Area 1a is okay, Area 3 (GB and Jordan Basin) is not so good. Historical TAC in Area 1a was 60,000, then mid-water and pair-trawlers came around because they were looking for their share of the quota. Georges was declared rebuilt (about ten years ago),so they came with $12-14 million boats and steamed around for 5 days and came back with no fish, so then they landed in area 1a. Mid-water trawling can be environmentally friendly, but there's no mid-water, it's bottom trawling. Took a while for herring Amendment 1, which implemented a June-October ban on mid-water trawling. They assumed next year, it would be based on historical allocation, so they fished hard early on, and flooded the market. Herring stock assessment indications are that next year, we'll go back to 50MT from 45 MT. There was no real reason to lower it at first, but there was a retrospective risk analysis, and the moved politically to a conservative approach. This year, they are just managing it and spreading out the catch during the season.

Missed 15 minutes of conversation about latent effort…

Scientific information put us in a comfortable place (with new model, etc.), we fish 12-months out of the year. Canada had limited entry and seasons and had the same issues with F10. Right now, we shouldn't do anything until the economic crises is over. Let's get beyond ' I have 800 traps and you have 400 traps', and start looking at the ecosystem approach.

Not concerned biologically speaking, but now we're at 70,000 and if it gets to below 45,000 say, then we might have a problem. Basic theme is to limit the amount of people, and then it makes it simpler.

MSC certification, in my opinion, which is shared by others, to this industry my answer is no, no, no. He's not against the concept, but he thinks it should be certified in house and in the state of Maine, and in partnership with the Canadians. Worst fear is that Maine will adopt MSC and that we will put ourselves against each other. We should be marketing it as North American lobster. One down side is if we do this, and the first 6-months the whale people are going to want to pull it. What goes across the press from Bangor to AP, and kills the market.

4:00 – Steve Robbins, Manager of Stonington Lobster Co-op (Deer Isle), sits on TRT, used to work for DMR (1.5 years – gear research specialist) after he stopped fishing commercially.
Fifth-generation fisherman, fished for 2 years, and participated in cooperative research – bottom temperature and salinity, tagging studies. Co-op established in 1948, he took over four years ago. It's probably one of the largest co-ops in the state – about 100 fishermen. We buy and market lobster fishermen's product. The vast majority of our business is wholesale, some is retail, we provide bait and fuel. We own our own dock, there are two buying stations in town, the co-op is a fishermen owned and operated business. Board of directors with 11 seats. There are about 20 co-ops in Maine.

Do you get involved in management?
Yes, when I was commercially fishing myself I took part in meetings because it always made sense. He goes now

because he is employed by the fishermen, and brings information back to the co-op.

Bonnie: How well does the fishery management system respond to resolving issues in the industry?
The vast majority of fishermen I come into contact with feel that their comments aren't incorporated into the process, but many of those same people have more power than they realize. Some don't do well attending public meetings, making a phone call, etc. – it's not what they do. Recently, there is a minority of fishermen who have stepped up to the plate to become involved, but you're always playing catch-up. GF gillnetting was a huge part of our community and it's just completely gone. Zone council is a good example of how people became more involved. It is awkward at best for Zone C because we encompass all the Island communities (Matinicus, Vinalhaven) in the same place at the same time.

How do your fishermen feel about the new measures? The sinking ground line issue is huge for us because we have a very distinct bottom type – rugged, rocky – and for most people, you have to travel a bit to get out to the islands. There are long, narrow channels, drastic changes in depth. Because of this, gear measures affect these people more drastically than other areas, and when you don't have significant interactions and documented sightings, then these should be considered. Stonington is distinctive, a lot is within exemption line.

Lobstering was a big part of people's income, but it was broken-up, fished in summer fall, winter- scalloping, spring – longlining. Don't see this diversification anymore. He sees first hand that it is a healthy resource, but realizes it is fragile. Min/max size, v-notch, observance – all regs have helped keep resource sustainable.

Future – resource. Geographically we are better off, environmentally there may be issues…

Some latent effort, but it's difficult to quantify. A number of guys buy tags that they may not use so they can keep 'access' to the fishery.

Any hot ticket items about what fishermen don't want? Yes, controversy around lowering the trap limit; people are adamantly against lowering the trap limit. Questions in DMR effort survey may not have been worded very well. Doesn't represent 'Down Home' or fishermen at the co-op.

5:00 – Nick and Norbert Lemieux

Nick: Zone A, Cutler, harvester, LAC – eastern representative member at large, MLPC eastern harvester member, VP of DELA. As far as the health side, I'd say it's healthier than ever because we made it that way along with mother nature. At least third generation fishermen. Has respect for the resource and conservation laws. This comes down from the apprenticeship program. Some problems I see overall – lobster prices, as far as Maine, we don't reach out to US cities. For example, in San Francisco lobsters are big, Boston, NY, we do well getting our product, but there's a gap getting it out to the market. MSC label there are some worries I have, but there is a lot of optimism and desire that it goes through. I don't know what would happen if you 'fell out of compliance' during re-evaluation, what are the chain of events – so do the benefits outweigh the negatives.
Norbert: Board of director – DELA, member LCMT committee, harvester, client member, went to Maine maritime, marine engineer – Gulf war. The best fishermen are the ones who grew up with it, and throw them back. When resource declines, it's mother nature, and it's the government's view to reduce traps, but that takes food away from the juveniles.

We had a meeting with Mr. Webster at Monterey Bay Aquarium because they put lobster on the 'avoid' list on their seafood guide. Next meeting, he moved it to middle rating.

Perhaps 60% fishermen aren't computer literate and I am, but I don't like electronic reporting because I don't want people to hack into it.

$3.50 boat price today in Stonington. $1,000 bait/day, $500 diesel, 20% stern man, and with low prices it's hard to break even, let alone make a profit. They fish in grey zone (EEZ, federal waters) with Canadians – they don't have to use sink rope, the keep v-notch and oversized, no mutilation law. Canadians keep lobsters and claws that US fishermen cannot. All costs have gone up – boots, traps, boat, engine, etc., but lobster prices have not gone up accordingly. We did okay last year even with low (as low as $2.00 boat price) only because the harvest was healthy. If it goes down in addition to a bad economy, that's when guys will go out of business.

Collin: State of the resource – will it continue at these levels of production and recruitment?
Maybe it will go back to 40-50 million pounds instead of the 70 million pounds we have now, then the 'green jumpers'

will get out and it will self-regulate. The big thing that changed the fishery is the wire traps, and another problem is the bank. You can walk into a bank and get a loan to get 800 wire traps – chasers and lobster catchers, not lobstermen (traditionally). When fishing is good, you don't have to 'know' how the catch them – the bottom, etc., but when it's bad they have overextended themselves and they won't catch enough to pay bills and will be pushed out.

Scientists thought they settled within 15 fathoms and they actually settle out to 45-50 fathoms (270 feet), stage four pelagics. Landings account for a very small percentage of abundance (traps are inefficient). Collin thinks Carl said there is a ~35% harvest rate. Trap density is confined to certain geographic areas. Traveled down as far as Harpswell from Cutler, and once you are below Jonesport, traps are close to inshore in the beginning of the summer, but then the traps get spread out.

They used to go get bait themselves, but now they have a great bait dealer. Usually gets tight at the end of August through the first part of September. Because the quota system on herring.

April 24, 2009 – Maine DMR, Hallowell

9:00 Col Fessenden, Maine DMR Marine Patrol
Fishermen always ask where you're from – grew up in Bangor, started I law enforcement in 1979, and was interested in conservation. I got to know a lot of fishermen and I try to look at it with their perspective. There are only about 50 of us patrolling the state. Working with the industry and has created a good working relationship, and because of it, have good compliance rates. Not a lot of other Federal or state enforcement offices follow this philosophy. Enforceability of laws in important, the Feds pass laws and regulations that cannot be enforced. For example, in 1995, the ME state legislature created the trap limit. Carl's predecessor predicted a collapse of the resource, but the state put conservation laws into place and protected the brood stock and oversized lobsters, biodegradable vents and escape panels. 1986-2006 the industry was prolific, new boats, wire traps, more efficient fishing and economically it was good for the state. Fishermen trust us, and don't condone their peers breaking any laws – 'community patrolling'- it's not acceptable to break the rules. Legislative session 124 – industry brought forth a bill to stiffen penalties.

Howard: How many times do you suspend licenses a year?
Joe: About 50 licenses, minimum 1-year, maximum 3 years. The law provides the penalty schedule, and any violation may result in a suspension. Officer weighs in, goes to Colonel's office, and then the commissioner makes the decision.

Bonnie: What threatens the high level of compliance?
Joe: The economy, also we have a significant drug abuse issue. The problem is because of the money – landings were up (even with the bad economy) – but with all their money, they got addicted to prescription drugs (pain killers). We've had situations with license suspensions, they broke the law to support their habit. In some parts of the state, it is a problem.

Bonnie: Have you done any violations of compliance?
Joe: Yes, we record it by boardings, it's probably about 5-10% that may not be in compliance. Even with the ALWTRP regulations, we have to enforce them, and we're finding high compliance rates. We're building 'lobster boats' for patrol vessels, and now we have a fleet that has 46-foot offshore lobster boats. We're out hauling traps, we have full-time boat captains, whereas USCG does not have authority to do this. Marking requirements, runners on the bottom of traps, escape vents, biodegradable doors. TBT – wooden traps and fishermen suggested getting rid of them. We have a joint enforcement agreement (JEA) ($750,000/year) with NOAA to enforce federal laws, the money mainly goes towards equipment, boats, etc. It has been a very successful program for us. We are very fortunate that this program came along, because the state budget is small. We file reports and show the government what we're doing. Fishermen call us 'coastal wardens', but we changed our names to Marine Patrol Officers a while ago. We have nine vessels – statewide, and another 15-20 seasonal boats. Team up with the USCG to share berthing. USCG does fisheries law enforcement, but they primarily deal with federally-licensed fishermen. If it's within state waters, they refer it to us. They can inspect gear on the vessels, but they don't have equipment on boats to haul gear. Owner/operator law – if you are going to fish lobster, you have to be on the boat, weeds out 'corporate fishing'. You have to use the boat that is licensed to you, and if you have a break down, you can get granted to use another boat.

Collin: Apprenticeship program helps people learn the regulations and gain respect…
Joe: Yes, it helps. The opposite happened with the sea urchin fishery.

Howard: You mentioned reports to NOAA.
Joe: We don't file annual reports on compliance, but we do generate reports for the JEA with NOAA. We can give you

the number of violations by number of boardings. It would be tough to separate the state waters since we claim authority on Maine state vessels out to 200-nm. We can't do that on non-state registered vessels. We do have access to VMS (federal government granted it about a year ago), and we do have someone who works for us and monitors the VMS, and if it looks like someone is dragging in an area with a lot of lobsters, we'll send a boat out. All GF vessels have VMS.

One-third of the 3M trap tags are being fished.

10:00 – George Lapointe, Commissioner ME DMR
I've been commissioner for a decade, since 1998; I'm in charge of the agency and a chair of the ASMFC, before that I was with ASMFC. My role in lobster management is to …one of the biggest discussions is the effort issue, it's been around for a long time. We keep forcing discussion, and under co-management, those discussions would percolate up from the fishermen, but there are repercussions. Last year, it was much more open, we talked about a 400-trap limit. Under statute, there are things the zones can vote on, but the best function of the zones is communication. There has been a lot of positive change in the fishery, but the pace of change is wearing fishermen out. People are suffering from issue fatigue; there are so many issues.

Collin: Is the management framework strategic? Is there a harvest strategy that is defined or is it implicit? Is the decision-making planned or ad-hoc, timeline? What happens if recruitment declines?
George: What to do if that happens, we don't have an answer. Some people say, go to a quota system – if we did that ten years ago, it would have been a 25M quota, and now we're landing twice that. The other area that is lacking is our data collection, so if we were to set a quota, it would be ad hoc. Can we handle our catch going down to half? – No. The democratic process responds slowly, and if they change trap limit, size limit, I have to go to the legislature, and if they don't want it, then it's tough.

Collin: What if reference points are established and approved, then what if you go above these points, so is there something that says " in the event that, then management action will be taken" and it doesn't have to be prescriptive.
George: Not quite like that, but through ASMFC, there is a process about how to resolve this issue.

Collin: What if a condition was made about harvest controls and decision rules, would it be futile?
George: The stock assessment may incorporate some of these measures. Broadly speaking, fishermen are not good at self-sacrifice. I'm sure we could put something together, but for many reasons, we would want to take measures before we got there. The difficulty with the hybrid client group is that they can't tell us what to do, it's the managers who have to do this.

Bonnie: One question that hasn't come up is dispute resolution.
George: The bill for the LAC includes dispute resolution in zones. One of the issues was the zone lines, between C and D, and we had a lot of meetings. Recognizing that the zones are advisory to the commissioner, he ultimately makes the executive decision. Zone E, F, and G, discussion about Casco Bay folks drifting into Zone G, line at 3 miles…All in all, it works pretty well. Zones F and G had a double-tagging effort. Marine Patrol also does dispute resolution.
Bonnie: Are there conflicts that come to the top, and what about law suits?
George: Law suits are less important, maybe one a week (maybe that's an exaggeration). The legal system is not the driver that it is in the Federal system. Law suits don't drive policy. Conflicts get percolated up in two ways, and that's the time you can use the 'bully pulpit' to make a decision. Sometimes they will still go to their legislature.

Bonnie: What about communication?
George: Not necessarily zone councils, oligarchic (represents the same people), we do have a quarterly newsletter, CFN, VHF radio, sometimes we'll write a letter to every license holder. For example, one letter will come out soon on the sink rope rule. I want to hear from people, so we know what's going on. Then when we have meetings with the TRT, we can provide data on how it's working. Also, questionnaire about traps (35% response rate) is very different than what we hear at the meetings.
One of the difficulties is that everyone wants to get involved in communication (Island Institute, GMRI, etc.). Sea Grant played a larger role 15 years ago, and now with our license plate funds, we are funding much more research than sea grant. Trap tag fees, .10-cent increase, research on whales.

Howard: What's your take on the whale issue?
George: Tough issue all around, when I try to balance the impact of the fishery on whales and the impact of whale rules on the fishery, I wish we could do more. What we've tried to do is engage fishermen, which didn't go over well (b/c they want it to go away). Our history is that we've gotten more out of dealing with NMFS directly than the ALWTRT (it

shows the limitation of public input).

Gathering baseline data for the fishery is what we have been doing and continue to do (TRT said end line data was bad, but it was all that is available). We are constrained by funding and staff resources. We were partially successful with the exemption line. We can focus on making incremental improvements with the data.

Howard: Any strategy to manage bycatch?
George: Part of the new bill (crab bycatch for GF vessels) would likely set biological limits for lobster traps and dragging. Crab fishery is interesting because it goes though episodic abundance periods. Fishery has a self-selected strategy for landing/harvesting crabs – males, etc.
Carl: Cusk and wolfish are issues, and if they were listed, it would be easy to prohibit them.

Bonnie: How are native American rights managed in this fishery?
George: Covered under state law – Passamaquoddy – limits on number of licenses (24 lobster, 12 urchins), they do the licensing and report to us. There are formal systems in place.

Bonnie: What about evaluation of the management process overall or specifically lobster (internal and external)?
George: We have an ongoing adaptive management system, but it is ad hoc. There are limits to public process. Not being done. All Zone movements go to the commissioner to approve or veto.

Bonnie: Has there been meaningful engagement of the environmental community in lobster management?
George: Well, not much because they have easier targets. However, Ocean Conservancy suggested cutting trap limits in half.

Bonnie: Is the precautionary approach implicit or explicit with ASMFC?
George: Explicit

APPENDIX D

STAKEHOLDER COMMENTS IN RESPONSE TO ASSESSMENT NOTIFICATIONS

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Ocean Conservancy
Start a Sea Change

202.429.5609 Telephone
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www.oceanconservancy.org

February 18, 2009

Paul Knapman
Moody International Certification
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Email: p.knapman@moodyint.com

RE: Comments on Nominees for the Marine Stewardship Council Assessment Team for the Maine Lobster Fishery

Dear Mr. Knapman,

Ocean Conservancy appreciates the opportunity to comment on the assessment for Marine Stewardship Council (MSC) certification of the Maine lobster fishery.

We have previously submitted comments on the nominees for the Canadian offshore lobster fishery assessment team, and in this letter raise many of the same concerns for the nominees to the Maine lobster fishery assessment team. While the management structure of the two lobster fisheries is different, the challenges to achieving sustainability are similar, especially with respect to threats to endangered whales posed by lobster pot gear. Therefore, our comments on the Canadian lobster fishery assessment process and the team nominated to evaluate it bear repeating. Additionally, we note that the MSC "harmonization" process benefits from having the assessment teams evaluate each of the MSC principles and criteria similarly across fisheries with similar operating characteristics and similar impacts on the environment. While we believe the nominees for the Maine lobster fishery represent a more diverse team of experts than was appointed for the Canadian lobster assessment team, and that some overlap between the two teams could aid in the harmonization process, the Maine lobster team would benefit from other members, in addition to Dr. Acheson, with specific expertise and knowledge of Gulf of Maine lobster fisheries as they relate to each of the three MSC principles and criteria.

We are especially concerned about the significant risk of entanglement that east coast lobster pot fishing gear is known to pose to large whales, and, in particular, the critically endangered North Atlantic right whale. Ocean Conservancy has been actively engaged in efforts with lobster fishermen and resource managers at both the state and federal level to identify and implement measures to reduce the impacts of fixed gear fisheries to marine mammals. Specifically, we have participated as an active member of the Atlantic Large Whale Take Reduction Team since it was first established in 1996 to develop solutions to prevent entanglements of right whales, humpback whales, and fin whales in east coast lobster pot fishing gear. Unfortunately, none of the measures implemented to date have been proven effective in reducing entanglement rates of large whales.

The impact on lobster gear on whales was identified as a significant concern in the MSC pre-assessment of the Maine lobster fishery. The risk to whales remains a critical consideration in determining whether the Maine lobster fishery is truly sustainable according to the MSC principles and criteria for sustainable fishing.

Data presented by the National Marine Fisheries Service to the Atlantic Large Whale Take Reduction Team in April 2008 indicate that between 1997-2005, for the 22 confirmed entanglements events involving whales listed as endangered under the Endangered Species Act for which the fishing gear involved could be identified as well as where the gear originated, 5 of the 22 events involved North Atlantic right whales and humpback whales entangled in fishing gear positively identified as Maine lobster gear (see Figure 1). Since 2005, the Provincetown Center for Coastal Studies has documented an additional 14 right whale entanglements. Information on the type and source of the entangling gear is still being evaluated, but at least one of these entanglements involved lobster gear, identified as originating from Canada (see Enclosure 1). These data show that lobster gear from Maine and elsewhere present a real, immediate, and ongoing threat to endangered large whales. The National Marine Fisheries Service has determined that the loss of even one North Atlantic right whale brings the species appreciably closer to extinction.

In addition, we are concerned that the potential for overlap between right whale habitat and lobster fishing areas is increasing, thereby increasing the risk of entanglement. Recent sightings data of persistent aggregations of right whales in the Gulf of Maine during the winter months are now leading researchers to believe that the Gulf of Maine is increasingly being used by right whales as a wintering ground and potentially a breeding ground. These new data could trigger additional management actions in these areas to avoid entanglements.

We believe, therefore, that it is essential that the MSC fishery assessment team include at least one scientist that is capable of evaluating the degree of risk to whales posed by the Maine lobster fishery. While the inclusion of Dr. Don Bowen does show some acknowledgement of the larger potential ecosystem impacts of the Maine lobster fishery, we recommend adding an expert with explicit expertise and knowledge of the Maine lobster fishery and the interactions of the fishery with the larger environment, including interactions with whales.

To fully consider the sustainability of the Maine offshore lobster fishery according to MSC's principles and criteria for certification, we recommend that the following individuals be considered for inclusion on the assessment team:

Scott Kraus, Senior Scientist and Vice President for Research, New England Aquarium – Dr. Kraus has pioneered long-term North Atlantic Right Whale research, creating a catalog of individual whales that is the cornerstone of many current studies. He is the author of "The Urban Whale" as well as several peer-reviewed scientific articles on North Atlantic right whales.

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New England Aquarium
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Work: 617-973-5457

Robert Kenney, Associate Marine Research Scientist/Professor in Residence, University of Rhode Island – Dr. Kenney's research interests include the ecology, behavior, and conservation of marine vertebrates, especially mammals and turtles; management of endangered species; and the effects of natural and anthropogenic environmental changes on marine food chains and apex predators. His main research is on the North Atlantic right whale, the world's most endangered whale species, as part of a long-term cooperative project involving a number of institutions in the eastern United States and Canada. He is also involved in several environmental impact assessment projects for the Navy and other agencies.

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Charles "Stormy" Mayo, Senior Scientist and Director of Right Whale Habitat Studies, Provincetown Center for Coastal Studies – As Director of the Center's Right Whale Habitat Studies, Dr. Mayo's research has focused on learning more about right whales, their use of Cape Cod Bay and their habitat requirements. His current research includes aerial surveillance, habitat and food resource monitoring, and investigation into the acoustic behavior of right whales.

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Hal Caswell, Senior Scientist, Woods Hole Oceanographic Institution – Dr. Caswell studies the mathematical ecology of populations and communities, using models that include life cycles, vital rates, dispersal patterns, and temporal and spatial variation in the environment. He uses these models to explore population growth, extinction, invasion, and spatial patterns, and applies the results to conservation biology. His research is defined by processes, not taxa; at the moment it considers marine mammals, seabirds, terrestrial plants, and benthic invertebrates.

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Carl Wilson, Maine Department of Marine Resources – Dr. Wilson is the chief lobster biologist for the Maine Department of Marine Resources and has conducted numerous studies on the American lobster. Recently, Dr. Wilson has been studying trap densities in various areas and how that relates to lobster catches. He is also conducting studies to improve the quality of data on lobster catches and to accurately characterize relative abundance and size-distribution of American lobster from Maine through New York.

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Robert Steneck, Professor, School of Marine Sciences, University of Maine – Dr. Steneck studies the structure and function of coastal marine ecosystems. His laboratories are in the Gulf of Maine and Caribbean. He and his students study organisms import to these ecosystems and the people who depend on them. Specifically, in Maine he's explored kelp forests ecosystems for over 20 years learning about lobsters, sea urchins and fish stocks in this region. He has also worked extensively throughout the Caribbean and tropical Pacific studying coral reef from both biological and geological perspectives.
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We are confident that these individuals would provide an objective and professional contribution to the MSC assessment process for the Maine lobster fishery. Again, we appreciate the opportunity to comment on the nominees for the MSC assessment team and look forward to additional opportunities to comment on the assessment process as it proceeds.

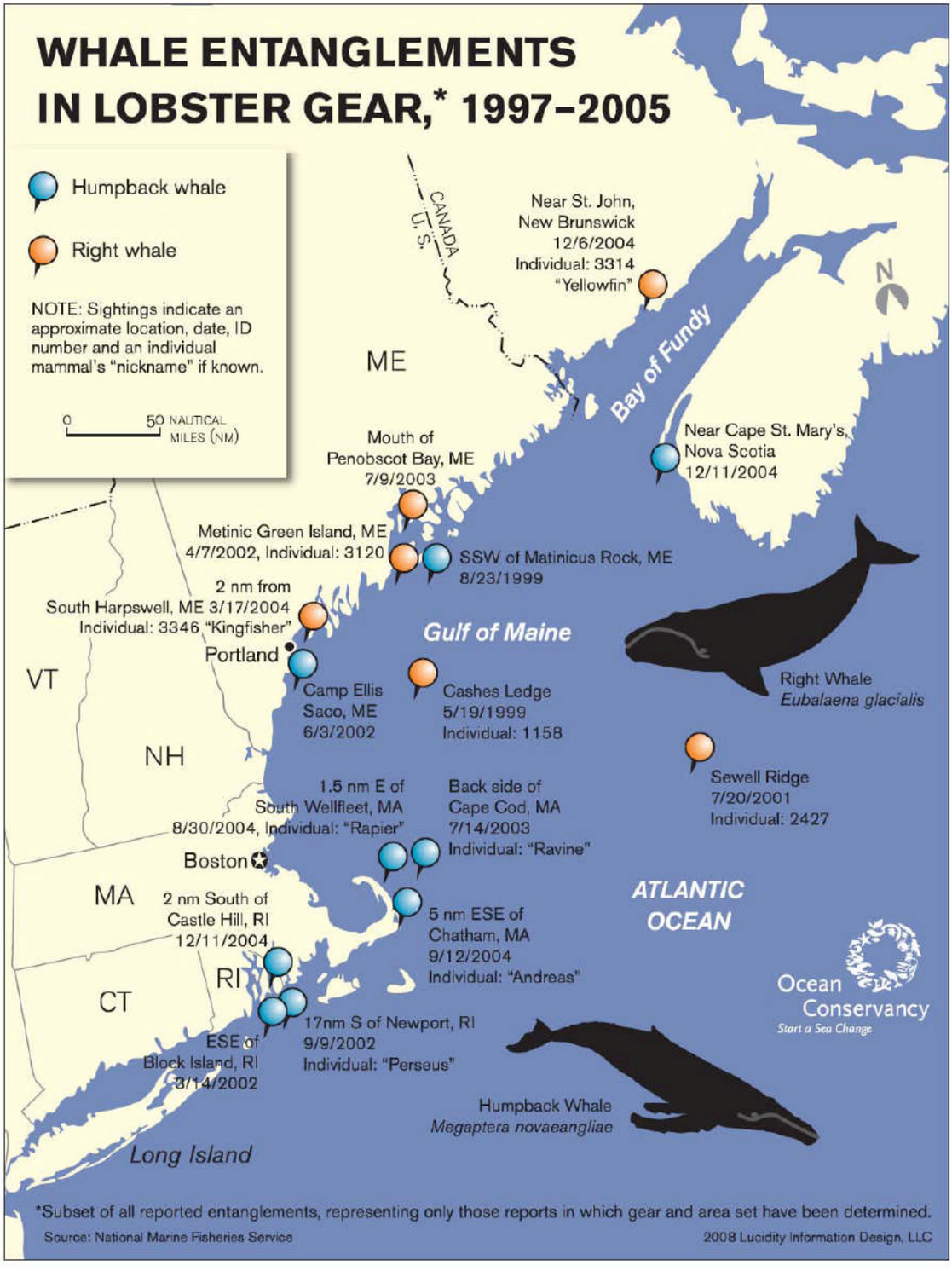
Sincerely,

Vicki Cornish

Vicki Cornish
Vice President for Marine Wildlife Conservation

Enclosure

Figure 1. Diagram showing locations of confirmed entanglement events involving interactions between U.S. lobster gear and humpback and right whales, from 1997-2005.



Enclosure 1. NOAA Press Release revealing source of entangling gear in recent entanglement events involving North Atlantic right whales.

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
UNITED STATES DEPARTMENT OF COMMERCE

Contact: Kim Amendola
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FOR IMMEDIATE RELEASE
Feb. 12, 2009

Crews Work to Free Another Right Whale From Entangling Ropes
Three Whales Are Rescued, But Two Still Entangled

NOAA and its partners cut entangling ropes on another endangered North Atlantic right whale off the southeast United States earlier today – this time off northern Georgia.

"We expect the ropes to pull free, making this the third right whale we've disentangled in just eight weeks," said NOAA's Fisheries Service biologist Laura Engleby. "It is alarming, and with each event we look for clues to help us understand more about why and where these entanglements actually occur."

Experts have seen an unprecedented number of entangled right whales off the coasts of Georgia and Florida this winter – a total of five since December. Scientists typically document one or two entangled right whale cases in the southeast each year.

However, where the animals pick up the entangling gear often remains a mystery. These whales spend their summers feeding in New England and Canadian waters, then travel to southeast waters to give birth to their calves from mid-November through mid-April.

"These five entanglements represent more than twice the number usually seen in the southeast during right whale calving season," said NOAA's Fisheries Service large whale disentanglement coordinator Jamison Smith. "In each case, significant amounts of rope—often more than 500 feet—were in or around the whale's mouth."

In December, disentanglement experts successfully removed fishing gear from two whales. Scientists confirmed via aerial surveys that both of these whales remain gear-free. Initial health assessments indicate the whales' overall conditions are improving since teams removed the entangling gear.

NOAA and partners have preliminarily identified the gear removed from one of these whales as Canadian lobster gear. The gear types removed from the second and third animals are still unknown; however, experts will continue to analyze the gear recovered from all of these whales.

NOAA and its Atlantic Large Whale Disentanglement Network partners are monitoring the two remaining right whales believed to have life-threatening entanglements. Crews responded to these whales earlier this year and removed some rope from each whale, but were unable to free them completely.

"Disentanglement efforts are extremely dangerous and complicated," Smith said. "These successful disentanglement efforts are a reflection of the experience and resolve of our partners, but at the same

time it is difficult for any of us to celebrate these successes, as other whales remain entangled."

The disentanglement team consists of land, sea, and air support from NOAA, Georgia Department of Natural Resources, Coastwise Consulting, Florida Fish and Wildlife Conservation Commission, Provincetown Center for Coastal Studies, New England Aquarium, and Wildlife Trust.

With only between 300 and 400 in existence, North Atlantic right whales are among the most endangered whales in the world. They are protected under the Endangered Species Act of 1973 and the Marine Mammal Protection Act of 1972. Vessel strikes and entanglement in fixed fishing gear are the two greatest threats to their recovery.

In the past few years, NOAA has implemented significant measures aimed at reducing impacts to Right whales from fishing gear and ship strikes.

NOAA's Fisheries Service encourages people to report sightings of dead, injured, or entangled whales to the Florida Fish and Wildlife Conservation Commission at 1-888-404-FWCC(3922). All live right whale sightings should be reported to 1-877-97-WHALE or 1-877-979-4253.

NOAA understands and predicts changes in the Earth's environment, from the depths of the ocean to the surface of the sun, and conserves and manages our coastal and marine resources. Visit http://www.noaa.gov.

Photos will be available Friday, Feb. 13, 2009.

On the Web:
NOAA Fisheries Right Whale Facts Page -
http://www.nmfs.noaa.gov/prot_res/species/Cetaceans/rightwhalefacts.html
NOAA Fisheries Northeast Region's Right Whale Web Page -
http://www.wh.whoi.edu/psb/NORTHATLANTICRIGHTWHALE.htm
NOAA Fisheries Right Whale Sighting Advisory System –
http://www.nefsc.nmfs.gov/cgi-bin/rwhale.pl
The Center for Coastal Studies Right Whale Research & Rescue Program –
http://www.coastalstudies.org/
Atlantic Large Whale Take Reduction Plan –
http://www.nero.noaa.gov/whaletrp/

From: Paul Knapman
To: Vicki Cornish
Cc: Susan Little Olcott
Subject: RE: Nominations for MSC assessment team

Hi Vicki

Thank you for your emailed letter regarding our team nominations for our assessment team for the Maine Lobster fishery.

In choosing a team we have to take into account a number of issues including, experience, qualification and availability. Also, to avoid possible conflict of interest we do not appoint team members that have been associated with the fishery under assessment within the last 2 years.

Finding people with appropriate qualifications and the time to commit to a relatively long term project is particularly difficult. Since November 2008 when we announced that the fishery was in assessment we have given opportunity to the client and stakeholders to provide us with nominations for the team. Also, in that period we have been contacting people to check on their availability and interest in being nominated as team members.

Unfortunately your suggestions came too late in the process for us to take them into account. But for your information at least one of your suggestions was contacted and another would not be able to be considered as he is an employee of one of the management authorities responsible for managing the fishery.

I appreciate your particular concerns with respect to the possible interaction of this fishery and right whales and this will be a key issue that will be addressed in an open and transparent way.

We look forward to continuing to work with you on this and the Offshore Canadian Lobster fishery assessment.

Best regards

Paul

From: Vicki Cornish [mailto:vcornish@oceanconservancy.org]
Sent: February-18-09 11:12 AM
To: Paul Knapman
Cc: Susan Little Olcott
Subject: RE: Nominations for MSC assessment team

Paul - Attached are Ocean Conservancy's comments on the assessment team nominees for the Maine lobster fishery. My apologies for not getting this to you earlier. Please let me know if you have any questions.

Vicki Cornish
Vice President, Marine Wildlife Conservation
Ocean Conservancy
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202-351-0452

-----Original Message-----
From: Paul Knapman [mailto:p.knapman@moodyint.com]
Sent: Wed 2/4/2009 9:08 AM
To: gino nadalini; Jooke Robbins; Moira Brown; Regina Asmutis-Silvia; Rob Johnson; Sharon Young; Susan Little Olcott; Tim Werner; Tonya Wimmer; Vicki Cornish; yarmouthwbc@yahoo.com
Subject: Nominations for MSC assessment team

Moody Marine Limited have announced their nominations for the assessment team that will evaluate the Maine Lobster Fishery.

To view the nominations please go to http://www.msc.org/track-a-fishery/in-assessment/north-west-atlantic/Maine_lobster_trap_fishery/assessment-downloads

Paul Knapman
North America Regional Manager

Submission made by the New England Aquarium for the assessment site visit

To: Paul Knapman
North America Regional Manager
Moody Marine LTD
28 Fleming Drive
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April 21st, 2009

Re: MSC Assessment Team for the Maine Lobster Fishery

Prepared by:
Scott D. Kraus, Ph.D.
Moira W. Brown, Ph.D.
Tim Werner
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Boston, MA 02110

The New England Aquarium has been working on right whale biology and conservation for nearly 30 years. Over the last 5 years, we have been working with the Maine Lobstermen's Association to better understand the problems with entanglements in the lobster fishery, and to work to mitigate those problems. As part of this work we have been compiling data on the occurrence of right whales within the lobster zones off of Maine, and the potential co-occurrence with fishing gear. The first set of data from that work is attached here.

The Nature of the Problem

- Fewer than 400 North Atlantic right whales remain; the species is listed as Endangered under the Endangered Species Act.
- Individual whales are tracked throughout their lives using photo-identification, allowing detailed population monitoring (Kraus et al., 1986).
- Recovery of the species is compromised by mortality from ship strikes and entanglement in fixed fishing gear (Knowlton and Brown, 2007; Knowlton and Kraus, 2001).
- North Atlantic right whales are highly migratory ranging seasonally from southeast U.S. coast to the waters of Atlantic Canada. On very rare occasions, NA right whales are also observed in the Eastern Atlantic such as the Azores. There are five reasonably well-studied habitat areas, three in the United States and two in Atlantic Canada (Kraus and Rolland, 2007).
    - In Maine waters, survey data is somewhat sparse, but the data that do exist show that right whales regularly (although infrequently) travel into inshore waters of the Maine, and more routinely can be found in the waters offshore of the Maine coast (see attached PowerPoint presentation) from March through December (sighting data available from the North Atlantic right whale consortium www.rightwhaleweb.org for a data access request form).
    - Since 2005, aerial surveys over the Gulf of Maine have found a consistent seasonal aggregation of right whales south of Jordan Basin in November, December and January.
- Population analyses of right whales showed a marginally increasing growth rate of 1.03 in 1980 that changed to a marginally decreasing rate of 0.98 by 1995 (Fujiwara and Caswell 2001). Caswell et al. (1999) estimate extinction probabilities centered on year 2200 based on contemporary population dynamics. Analyses currently underway suggest the growth rate has changed back to a small increase (ca. 1-2%) (Caswell, pers com.).
    - Reducing mortality by two females per year will shift the population trajectory from decline to stable (Caswell *et al*. 1999), thus the species growth rate is extremely sensitive to human sources of mortality.
- Mortality from fixed gear fishing and shipping could drive the species toward extinction (Kraus *et al.* 2005, Caswell *et al.* 1999).
- Annual reproduction is extremely variable; in some years mortalities have exceeded births (Kraus *et al.* 2007).
- There are well-documented entanglements of other endangered and protected species in fixed fishing gear deployed in the Northwest Atlantic, including leatherback sea turtles, humpback, fin, sei, blue, minke, and Bryde's whales.

- According to a review of 61 North Atlantic right (between 1993-2002) and humpback (between 1997-2002) whale entanglements, 89% of the gear that could be conclusively identified was either from pot or gillnet (i.e., fixed gear) fisheries (Johnson *et al*., 2005).

The role of fishing gear in right whale death and injuries

- Fixed fishing gear is known to kill right whales. There are nine known entanglement mortalities, including some from lobster gear.
- An additional 15 right whales that were last seen entangled that have never been seen again (Knowlton and Kraus 2001, New England Aquarium unpublished data).
- An analysis of all right whales that have been photographed for individual identification (Kraus *et* al. 1986) and archived in the Right Whale Identification Catalogue (www.neaq.org/rwcatalog) revealed that 72.6% bear scars from encounters with fishing gear (Knowlton *et al*. 2008).
- Wherever there is fixed fishing gear in the water, there is a risk that right whales will get entangled, i.e. throughout their range, from Florida to Newfoundland including the waters of the Bay of Fundy, Scotian Shelf and Gulf of St. Lawrence.

It is not always possible to determine the location of where the whale became entangled unless a surface buoy with a license number remains attached to the gear on the entangled or dead whale. Most fatal entanglements are caused by restrictive wraps of rope originating from a variety of fixed-gear fisheries in Canada and the U.S. The amount of fixed fishing gear and line in the water has increased, and right whale entanglements have increased in the last ten years. Mortalities are also increasing (Kraus *et al.* 2005).

14.1.1.1 Potential strategies to eliminate right whale entanglement

- Remove all fixed fishing gear from high-risk areas during times when right whales are known to be present. This requires a good definition of right whales distribution and movements (see last point in this list).
- Reduce the number and minimize the length of vertical lines in the water by improving the efficiency of lobster fishing (optimize catch per unit effort) and increasing the number of traps/trawl without increasing fishing effort.
- Identify and implement practical rope-less fishing techniques
    - Remote or acoustic trigger (vertical line and buoy triggered to release and float to the surface when the fishermen is ready to haul the gear).
- Mark all rope used in the fishery by zone and gear type, so that any entanglements provide better information on the high risk areas and gear types.
- Conduct aerial, shipboard or acoustic surveys for right whales in the areas off Maine where there is no information on right whale distribution, in order to define right whale habitats where there is a high risk of conflict (see grey areas without survey data in effort charts in the attachment).

Attachment

A *PowerPoint* slide show is attached with the analyses completed to data on right whales in Maine waters. Risk analyses have not been completed. The first 12 slides show an analysis of sightings per unit of effort (SPUE) for right whales in the lobster zones of Maine by month. SPUE analyses give a corrected view of whale distribution because it corrects for variable effort and anecdotal reporting – i.e. when whale-watching vessels report a lot of whales in a particular area, they are biased by the fact that they primarily only look there, instead of looking everywhere (see Brown *et al*., 2007 for a full discussion). Because such anecdotal data is dependent upon the distance from major tourist ports and the time it takes to get offshore, anecdotal data are not used in the SPUE analyses. In each slide, the upper right hand corner is the amount of cumulative systematic survey effort (measured as kilometers of survey trackline where professional observers were on watch – includes both shipboard and aerial survey data) by lobster zone by month, collected during the years 1978-1981 and 1986-2004. The lower left hand image of each slide shows the SPUE data (reported as the number of whales sighted per kilometer of systematic trackline surveyed by month by zone). The next slide shows all opportunistic sightings of right whales reported by observers without associated survey effort. These include whale-watching, coast guard, ferry, land-based, and other reports, and demonstrate a more widespread distribution of right whales than the SPUE analyses will reveal. Nevertheless, there is general consistency with the SPUE analyses. Finally, the last two slides show the satellite locations of satellite tagged right whales (1999-2001) and the tracks connecting those locations, indicating that a few whales travel along the Maine coast, although sightings of these tagged whales are almost never reported (Baumgartner and Mate, 2005).

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Kraus, S. D., M. W. Brown, H. Caswell, C. W. Clark, M. Fujiwara, P. K. Hamilton, R. D. Kenney, A. R. Knowlton, S. Landry, C. A. Mayo, W. A. McLellan, M. J. Moore, D. P. Nowacek, D. A. Pabst, A. J. Read, and R. M. Rolland. 2005. North Atlantic right whale in crisis. Science 309: 561-562.

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Kraus, S.D., R.M. Pace III, and T.R. Frasier 2007. High investment, Low Return: The Strange Case of Reproduction in *Eubalaena glacialis*. Pages 172-199 *in* Kraus S.D. and R.M. Rolland (eds). The Urban Whale: North Atlantic Right Whale at the Crossroads. Harvard University Press, Cambridge, MA.

Kraus S.D. and R.M. Rolland (eds). 2007. The Urban Whale: North Atlantic Right Whale at the Crossroads. Harvard University Press, Cambridge MA.

Submission made by the Whale and Dolphin Conservation Society in association with the site visit

April 29, 2009

To Whom It May Concern:

I am writing on behalf of the Whale and Dolphin Conservation Society (WDCS) to provide information to you and to express our concern with the Maine Lobster Fisheries' application for sustainable seafood certification from the Marine Stewardship Council.

As you are no doubt aware, bycatch in fixed gear fisheries is a significant problem for a number of species of protected and endangered large whales, particularly for the critically endangered North Atlantic right whale (*Eubalaena glacialis*). Fewer than 400 of these animals remain and the National Marine Fisheries Service (NMFS), the agency charged with protecting this species, has stated "*Today the right whale population is sufficiently fragile that the premature death of a single mature female could make recovery of the species untenable*." Proposed Rule 71 FedReg 36299, 36301 (June 26, 2006).

Entanglements in fishing gear and vessel strikes are the two most significant sources of anthropogenic mortality to this species. In the past six months, at least five new right whale entanglements have been reported to the Atlantic large Whale Disentanglement Team. The gear removed from these whales is still being analyzed. While the origin of gear is not known in all entanglement cases, what is known is that Maine inshore lobster gear has been involved in past entanglement cases and the gear type is not inconsistent with that of current cases.

Furthermore, on April 5th, 2009, when the NMFS mandated gear modification to reduce the risk of entanglement, 71% of inshore Maine waters were exempted from complying with risk reduction measures in this rule. We are gravely concerned that this exemption was based less on lack of risk than on pressure exerted on the NMFS by the Maine Congressional delegation responding to pleas from the industry. In fact gear removed from entangled right whales has been traced back to inshore Maine; and, in cases where origin of gear was documented by the NMFS, more than 20% was found to have been set in Maine waters.

This is further complicated by the fact that the State of Maine itself lacks adequate information as to the extent of the operations of its fishery. At a recent Take Reduction Team meeting attended by WDCS, employees of Maine Department of Marine Resources acknowledged that only 10% of fishermen are required to report effort. In a voluntary survey sent to licensed fishermen regarding the amount of gear deployed, less than 30% of their entire lobster fishery had

responded. They were unable to assure that this response painted an accurate picture of where, how and how much gear was set. Massachusetts, in contrast, requires 100% reporting.

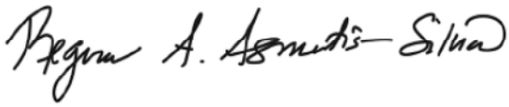
In addition to mandatory reporting, the Massachusetts Department of Marine Fisheries (MADMF) has an established MarineFisheries Conservation Program specifically developed for the conservation of the critically endangered North Atlantic right whale. As part of this program the State: works with the Massachusetts Environmental Police and Massachusetts lobster fishermen to remove "ghost gear" (gear that is not tended or is lost but continues to fish) from right whale Critical Habitat in Cape Cod Bay; funds aerial surveys and passive acoustic monitoring buoys to document right whales; and funds right whale habitat and plankton surveys. All Massachusetts lobstermen use sinking line, 600lb weak links on buoy lines, and specific gear marking to note gear is compliant with State and federal mandates. (See http://www.mass.gov/dfwele/dmf/programsandprojects/ritwhale.htm)

While we acknowledge that none of the aforementioned activities in Massachusetts can ensure the risk of entanglement is reduced to zero, we believe the efforts put forward significantly reduce the risk of entanglement and demonstrate a commitment toward conservation. As a result, WDCS has worked with the MADMF, the Massachusetts Lobstermen's Association and Ocean Conservancy to develop "Massachusetts Lobster Fishing: The Right Way" to support these efforts. (See Masslobster.org)

We believe that the entanglement rates of right whales in Maine rise above standard concerns with bycatch because this is a critically endangered species. Thus the unmitigated risk to the species posed by the manner in which Maine lobstermen are fishing should be weighed very heavily in considering the certification of this fishery as "sustainable." As I pointed out above, the bycatch of this particular endangered species is not sustainable and are one of the two risks posed that may contribute to the extinction of this species, without mitigation. The Maine lobster industry has not only failed to mitigate risk, as lobster fishermen in other states have attempted to do, but it has actively worked to exempt itself from having to mitigate risk. We believe that it would be premature to provide an economic advantage by giving it certification.

Thank you for your time and consideration to this issue.

Sincerely,



Regina Asmutis-Silvia
Senior Biologist

Whale and Dolphin Conservation Society (North America)
7 Nelson Street, Plymouth, MA 02360
Tel: 508.746.2522 Web: www.wdcs-na.org Email: contact@whales.org

Submission made by Ocean Conservancy in association with the site visit to the fishery

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Ocean Conservancy
Start a Sea Change

202.429.5609 Telephone
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April 30, 2009

Paul Knapman
Moody International Certification
28 Fleming Drive
Halifax, Nova Scotia B3P 1A9 Canada
Email: p.knapman@moodyint.com

RE: Comments on Marine Stewardship Council Assessment of the Maine Lobster Fishery

Dear Mr. Knapman,

Thank you for the opportunity last week to provide comments to the assessment team evaluating the Maine lobster fishery for certification by the Marine Stewardship Council (MSC). I am following up with these written comments that include and expand upon some of the comments that John Williamson and I made to the panel.

Ocean Conservancy is concerned that the Maine lobster fishery has an inadequate process in place to allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (as per MSC Principle 2). We are also concerned that the fishery is not subject to an effective management system that … incorporates institutional and operational frameworks that require the use of the resource to be responsible and sustainable, both with respect to management of the lobster resource and also management of interactions with endangered whales (as per MSC Principle 3). Background information which elaborates on these concerns is provided for your consideration.

The Maine Lobster Fishery and MSC Principle 2

MSC Principle 2, Criteria 2 states that the fishery should be "conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimizes mortality of, or injuries to endangered, threatened or protected species." The Maine lobster fishery does not have an adequate process in place to avoid or minimize mortalities and serious injuries of endangered and protected large whales, including critically endangered North Atlantic right whales,

humpback whales, finback whales, and minke whales[1]. NMFS has concluded that for North Atlantic right whales, the "loss of even a single individual may contribute to the extinction of the species" and "if current trends continue, the population could go extinct in less than 200 years." 69 Fed. Reg. 30,857-8 (June 1, 2004).

For the time period 1997-2007, the National Marine Fisheries Service (NMFS) documented 323 whales as entangled[2]. Of those, 91 whales either had gear removed and identified as to the type of gear, or other information (such as scar patterns) was available on the type of gear that was involved in the entanglement. Of these 91 entanglement events for which the type of entangling gear was positively identified, 44 could be traced back to the locations of origin where the entanglement originally occurred. Of these 44 entanglements, NMFS determined that 13 entanglement events originated with lobster gear set in Maine state or nearshore waters, including 3 right whales, 3 humpback whales, 6 minke whales, and 1 unidentified whale. Table 1 provides detailed information on these 13 entanglements. Figure 1 provides a graphic display of this information for the endangered whale species, for the time period 1997-2005 (the graphic has yet to be updated with the most recently released data for 2006-2007, there was one additional humpback whale entanglement SE of Bar Harbor in 2006). Gear type found on whales included both groundlines and endlines, as well as whole trawls.

Table 1. Confirmed entanglements of large whales in Maine lobster gear, 1997-2007[2]

NMFS #	Date observed	Species, Number and/or name	Disentanglement status	Location observed entangled/injured	Gear recovered	Location gear set
E21-99	8/23/1999	Humpback	Disentangled	5 nm E of Mt Desert Rock, ME	Traps (double set up)	SSW of Matinicus Rock, ME (inshore)
E21-00	8/4/2000	Minke	Partially disentangled	Frenchman's Bay, ME	2 sets pairs, buoy lines (lobster pot)	Frenchmans Bay, ME (inshore)
E7-02	4/7/2002	Right #3120	Partially disentangled	Frying Pan Shoals, NC	Endline, buoy (lobster pot)	Matinic Green Island, ME (state waters)
E10-02	6/3/2002	Humpback	Disentangled	Camp Ellis, Saco, ME	6 buoys with 6 single pots	Camp Ellis, Saco, ME (state waters)
E26-02	8/21/2002	Minke	Disentangled	NW of Little Duck, ME	No gear recovered	Local (state waters)

[1] Right whales, humpback whales, and fin whales are listed as endangered under the Endangered Species Act, and all four large whales are protected under the Marine Mammal Protection Act.
[2] NMFS. 2009. Preliminary Summary of NMFS Gear Analysis for Entangled Large Whales for the Years 1997 through 2007. Distributed to Atlantic Large Whale Take Reduction Team at their 2009 Meeting.

NMFS #	Date observed	Species, Number and/or name	Disentanglement status	Location observed entangled/injured	Gear recovered	Location gear set
E39-02	10/27/2002	Unid. whale	Disentangled	Off Cutler, ME	No gear recovered	Off Cutler, ME (state waters)
E15-03	7/9/2003	Right	Disentangled	Head Harbor, Campobello, New Brunswick, Canada	Buoy, weaklink, endline (lobster pot and unknown gear)	Mouth of Penobscot Bay, ME
E21-03	8/6/2003	Minke	Disentangled	10 nm E of Chatham, MA	6 traps, 3 pairs	1.5 nm E of Bunker Ledge, Mt Desert, ME (inshore)
E35-03	9/11/2003	Minke	Disentangled	1 nm E of Baileys Island, ME	2 – 5 trap and 1 – 2 trap trawl	1 nm E of Baileys Island, ME (inshore)
E02-04	3/17/2004	Right #3346 Kingfisher	Partially disentangled	2 nm E of Anastasia Island, FL	Lobster trap, buoy stick, rope, wire mesh	2 nm from Harpswell, ME
E10-06	7/15/2006	Humpback	Disentangled	18 nm SE of Bar Harbor, ME	2 foam bullet buoys on spindles, 4' of 3/8" sink rope	18 nm SE of Bar Harbor, ME
E21-06	8/23/2006	Minke	Disentangled	5 nm SSE of Seguin Island, ME	6 trap trawl and 2 pairs	Local to 5 nm SSE of Seguin Island, ME
E24-06	8/26/2006	Minke	Disentangled	5 nm E Great Duck Island, ME	4 buoys, 6 traps, endlines	5 nm E Great Duck Island, ME

Though the total number of entanglements which originate in the Maine coastal lobster fishery is unknown (and unknowable without reporting and gear-marking requirements), the 13 traceable events over the 1997-2007 time period probably represent the "tip of the iceberg." The data suggest that the actual number of whales entangled in the Maine lobster fishery may have been 3 to 10 times greater.

Right whales, humpback whales, and fin whales are listed as endangered under the Endangered Species Act, and all large whales on the east coast of the United States are protected under the Marine Mammal Protection Act. The status of each is as follows, including estimates of mortality and serious injury due

to human interactions[3], as reported by NMFS in their annual Marine Mammal Stock Assessment Reports[4]:

- Right whales - NMFS estimates that there are a minimum of 313 North Atlantic right whales remaining, based on a census of whales identified using photo-identification techniques. Mortalities appear to be limiting population recovery. The two leading sources of mortalities and serious injuries are entanglements in fishing gear and vessel strikes. NMFS estimates that for the period 2001-2005, 1.4 North Atlantic right whales were killed or seriously injured each year due to fishery entanglements, and 1.8 right whales were killed or seriously injured each year due to vessel strikes.
- Humpback whales – The best estimate of abundance for the Gulf of Maine stock of humpback whales is 847 whales (CV=0.55), and the minimum population estimate is 549 whales. Current data suggest that the Gulf of Maine stock is steadily increasing. NMFS estimates that for the period 2001-2005, 2.8 Gulf of Maine humpback whales were killed or seriously injured each year due to fishery entanglements, and 1.4 humpback whales were killed or seriously injured each year due to vessel strikes.
- Fin or finback whales - The best estimate of abundance for the Western North Atlantic stock of fin whales is 2,269 (CV=0.37), and the minimum population estimate is 1,678. There are insufficient data to determine population trends for this species. NMFS estimates that for the time period 2001-2005, 0.8 Western North Atlantic fin whales were killed or seriously injured each year due to fishery interactions, and 1.6 fin whales were killed or seriously injured each year due to vessel strikes.
- Minke whales – Minke whales are a protected species under the MMPA. The best estimate of abundance for minke whales is 3,312 whales (CV=0.74); the minimum population estimate for the Canadian east coast stock is 1,899 whales. Trend data are not available. NMFS estimates that for the period 2001-2005, 2.2 Canadian east coast minke whales were killed or seriously injured each year due to fishery entanglements, and 0.4 minke whales were killed or seriously injured each year due to vessel strikes.

Entanglements of endangered right whales, humpback whales, and fin whales[5] in commercial gillnet and trap/pot fisheries are managed by NMFS under the Atlantic Large Whale Take Reduction Plan (Plan, see section 118 of the MMPA for more information about this process). However, despite 10 years of management of lobster and gillnet fisheries under the Plan, entanglements continue to occur at the same rate. The first regulations to implement the Plan were published in 1998 (at 50 CFR 229.33), and these regulations have been revised and refined numerous times since then. The most recent revisions became

[3] Mortality and serious injury estimates are derived from whales that have been reported to NMFS as entangled or having signs of entanglement, and for which NMFS subsequently determined entanglement to be the primary cause of death or injury. These estimates of mortality and serious injury are likely to be underestimated, as an unknown number of whales may never be encountered at-sea or stranded, and those that are encountered may be in a state that does not allow for the determination of cause of death.

[4] Waring, G., E. Josephson, C.P. Fairfield-Walsh, and K. Maze-Foley (Eds.). 2007. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2007. NOAA Technical Memorandum NMFS-NE-205. 415 pp.

[5] While minke whales are not a species included in the Plan, the measures implemented as a part of the Plan are expected to reduce takes of minke whales as well.

effective on April 5, 2009, and included measures to require trap/pot and gillnet fishermen throughout the East Coast to use sinking groundline to tether traps together instead of floating line. Certain areas of the coast were exempted from the sinking line requirement, including 71% of Maine state waters. In December 2008 and January 2009, a record 5 right whales were identified as entangled off Florida and Georgia. Gear recovered from one of these whales was recovered and determined to be Canadian lobster gear. Gear from the other whales has yet to be identified.

The Maine Department of Marine Resources (DMR), local fishery representatives, and elected officials from Maine have actively worked to have NMFS weaken protections in Maine state waters, including increasing the extent of inshore waters that are exempt from sinking groundline requirements under the Marine Mammal Protection Act. For example, when the rule implementing the latest version of the Plan was proposed, 50% of state waters would have been exempt from the rule. State officials pushed for broader exemptions, citing the lack of right whale sightings in Maine coastal waters (primarily due to a lack of dedicated survey effort). NMFS subsequently changed the rule so that the final rule exempted 71% of Maine state waters from the sinking groundline requirement, with no other mitigating restrictions applied. Many of the positively identified locations of known entanglements occurred within the 71% of state waters that were exempted from the sinking groundline requirements, and there is a significant amount of fishing effort in these nearshore waters. As a result, we anticipate that the exemption will result in an increase in the number of entanglements and injuries in the Maine lobster fishery.

NMFS also delayed the implementation date for the sinking line requirement from October 5, 2008, to April 5, 2009, as a result of Congressional pressure and again with no other mitigating restrictions. Two other environmental non-governmental organizations sued to restore Dynamic Area Management (DAM) protections during this period. DAMs are temporary management zones to temporarily restrict the use of lobster trap and gillnet fishing gear within defined areas to protect North Atlantic right whales, and they are triggered wherever there is a reliable report from a qualified individual of 3 or more right whales within an area (67 Fed. Reg, 1134, January 9, 2002). During the delay, 6 DAMs were triggered in the Gulf of Maine, with 3 extending into Maine state waters.

Despite the fact that NMFS has found endlines and surface systems (buoys) on the majority of entangled right whales in which gear was recovered, neither NMFS nor state regulators in Maine have yet to implement an effective process for minimizing entanglements from lobster trap endlines. NMFS has stated that their plan is to publish rulemaking to address risk from endlines no earlier than 2014. Maine DMR officials indicated at the April 2009 Atlantic Large Whale Take Reduction Team their opposition to proposals to reduce the number of traps in Maine, as one mechanism for reducing endlines.

For the reasons cited above, Ocean Conservancy contends that the Maine lobster fishery is currently conducted in a manner that threatens the biological diversity of endangered large whales, especially critically endangered North Atlantic right whales, at the species level. It also does not adequately avoid or minimize mortality of, or injuries to endangered and protected large whale species.

The Maine Lobster Fishery and MSC Principle 3

There are several criteria under MSC Principle 3 that should be reviewed not only with respect to the target species of the Maine lobster fishery, but also other species that are impacted by this fishery, including endangered and protected large whales. We contend that the current management system for the Maine lobster fishery violates several of these criteria, as follows:

- Criteria 3: The management system lacks specific objectives, procedures for implementation, process for monitoring and performance evaluation for reduction of whale takes
- Criteria 7: The management system does not apply the precautionary approach to whale mortality or injuries.
- Criteria 8: The management system has no research plan for determining whale bycatch solutions appropriate to the scale of the fishery.
- Criteria 11: The management system does not contain appropriate procedures for effective compliance, monitoring, control and surveillance within established limits of exploitation of threatened whale species.
- Criteria 12: Fishing operations do not make use of fishing gear or practices designed to avoid capture of non-target species, or minimize mortality.
- Criteria 15: Fishing operations do not minimize lost fishing gear which may contribute to entanglements and habitat degradation.
- Criteria 17: Fishing operations do not routinely cooperate with management authorities in collection of information essential to the reduction of entanglements.

The state of Maine issues approximately 3.2 million trap tags each year to over 5,000 license holders throughout the state. Despite the size of the fishery and the importance of this fishery to the Maine economy, there are currently no state-wide, uniform data collection requirements for all fishermen to report landings or effort. In 2007, the state began collecting landings data from a randomly selected subset of fishermen, with a target of 10% of harvesters reporting each year. The data reported are limited to landings data only and there is no reporting on effort, as defined by how much gear is being fished (i.e., number of traps fished by area and/or time) and how long gear is left to soak.

To manage whale interactions, the Atlantic Large Whale Take Reduction Team has recommended that states not only collect information on fishing effort but also how the gear are configured (i.e., how many traps are set per endline). There are no plans to expand harvester reporting in the near future to collect this information.

The state has a limited at-sea sampling program, covering approximately 1500 trips per year, and these observers are collecting information on gear configuration. However, without data on distribution of effort throughout the state, by time and area, or the total number of trips fished annually by the fleet as a whole, these data are of limited value in terms of extrapolating to unobserved vessels. And there is no apparent effort to map the temporal and spatial distribution of lobster effort using other means.

Fishermen in Maine can fish up to 800 traps, with the exception of certain apprentice classes of lobstermen, and certain areas that have lower, self-imposed, trap limits (e.g., Monhegan Island). Apart from trap limits, there are no individual, regional, or state-wide limits on effort or landings. Recent studies suggest that trap densities could be reduced 50% to 80% in heavily fished areas with little effect on total lobster landings[6]. There are measures in place to reduce the number of license holders over time, through exit ratios established by the Lobster Zone Councils, but these measures will take many years to significantly reduce the number of licensees in the fishery.

The state has developed a take reduction plan for large whales, which includes a disentanglement network, disentanglement training for fishermen, and a sightings website. Information about the plan is posted online at: http://www.maine.gov/dmr/rm/whale/whaletakereduction.htm. The plan, as posted, does not discuss how the risk of entanglements will be reduced, or how whale presence in Maine waters will be monitored. It is not clear how effective the state's take reduction plan is at preventing entanglements, or minimizing serious injuries and mortalities due to entanglements, as the site does not post performance indicators such as number of fishermen trained, how many whales have been reported as entangled, how many whales have been disentangled, or the disposition of disentangled whales. There is also no information posted on ongoing or planned research efforts to reduce interactions between whales and lobster gear through gear modifications or other means. Data presented in the NMFS 2007 Final Environmental Impact Statement on the Atlantic Large Whale Take Reduction Plan indicates that neither the state nor the federal government has adequately invested in tracking and mapping areas of whale presence, as coastal waters are largely unsurveyed for whale presence.

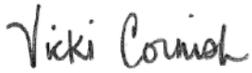
Another source of risk to whales is entanglement in lost or abandoned fishing gear. Past studies indicate that 20-30% of all lobster pots fished along the Atlantic seacoast may be lost each year[7], yet there are no ongoing, consistent efforts to assess or clean up derelict gear by the state. The Main Island Trail Association conducts annual beach cleanups using volunteers, and in 2007 reported that two-thirds of all trash found during cleanups are from the commercial lobster fishery[8].

For these reasons, and the reasons stated above under Principle 2, we contend that the Maine lobster fishery is not subject to an effective management system that … incorporates institutional and operational frameworks that require the use of the resource to be responsible and sustainable, both with respect to management of the lobster resource and also management of interactions with endangered whales.

[6] Wilson, C. 2007. Manipulative trapping experiments in the Monhegan Island Lobster Conservation Area. NEC Award #05-949.
[7] Smolowitz, R. 1978. Trap Design and Ghost Fishing: Discussion. Mar. Fish. Rev. Paper 1310.
[8] MITA. 2007. What's trashing Maine's islands? The Island Trail: The newsletter of the Maine Island Trail Association. Fall/Winter 2007.

In summary, Ocean Conservancy recommends that certification of the Maine lobster fishery be withheld until these shortcomings are addressed. Thank you again for the opportunity to comment on the assessment of the Maine lobster fishery for MSC certification, and we look forward to additional opportunities to comment on the assessment process as it proceeds.

Sincerely,



Vicki Cornish
Vice President for Marine Wildlife Conservation

Figure 1. Diagram showing locations of confirmed entanglement events involving interactions between U.S. lobster gear and humpback and right whales, from 1997-2005.

New England Aquarium

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www.neaq.org/rwcatalog
(617) 226-2195

May 25, 2010

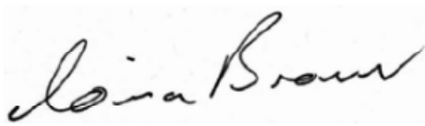
Paul Knapman
Moody Marine Ltd.
28 Fleming Drive
Nova Scotia B3P 1A9

Re: Selection of Peer Review Nominees MSC assessment of the Maine Lobster Fishery

Dear Mr. Knapman,

I have reviewed the list of nominees of proposed peer reviewers for the MSC assessment of the Maine Lobster Fishery. I would like to suggest one additional reviewer be added that has extensive experience in the biology of large cetaceans, in particular right whales, humpback whales, fin and minke whales. A person with this expertise would be a worthy addition to the team given the whale by catch issue for this fishery.

Yours sincerely,



Moira W. Brown, PhD
Senior Scientist
Right Whale Research,
Edgerton Research Laboratory

Ref: 82075

Date: 1st June 2010

Dear Mo

MSC Peer Review Nominees

Thank you for your emailed letter regarding our peer review nominees for the on-going assessment of the Maine Lobster Trap Fishery against the MSC standard for sustainable fisheries in which you suggest we include an expert on the biology of large whales, in particular, right, humpback, fin and mike whales.

We are required to appoint a minimum of two peer reviewers. As you will appreciate the status of the stock, the environmental interaction of the fishery and its management are three key areas of the assessment. We consider that Julian Addison and Simon Northridge are appropriately qualified to cover these.

We very much appreciate the importance of marine mammal interaction with this fishery. In making the selection for our peer review team we were cognisant that we needed to appoint someone with a high level of understanding of this subject as well as someone who would be regarded as being impartial by the broad range of stakeholders that have an interest in this fishery. We consider that Simon Northridge's qualification, experience and track record of working with industry and environmental groups fulfills this requirement and believe he is able to adequately assess and appraise the report.

Following peer review the assessment team will take account of the peer review comments. The peer review comments and how the team took account of them will be made clear within the report. The report will then be made available for a 30 day period of stakeholder consultation. This will provide opportunity for stakeholders to submit their comments and supporting information. The assessment team will then review and take account of these and the subsequent revised draft report will clearly show how comments and supporting information was taken into account.

Therefore, there will be opportunity for the report to be reviewed by experts on the biology of large whales.

Thank you for your continued input into the assessment process.

Best regards

Paul

WDCS
Whale and Dolphin Conservation Society

Tuesday, May 18, 2010

Re: Maine MSC Peer Review Nominees

To Whom It May Concern:

While we do not dispute the credibility of the proposed reviewer panel, we are deeply concerned that no one on the panel appears to have intimate knowledge of, or experience working with, critically endangered North Atlantic right whales or US legal obligations.

Entanglement in lobster gear is a chronic and significant threat to the continued survival of this species. Large whale entanglements, including North Atlantic right whales, have been documented involving Maine lobster gear. These entanglements are a violation of both the US Endangered Species Act and the Marine Mammal Protection Act. As such, we would request that the panel be increased to include a North Atlantic right whale researcher as well as specialist in US marine mammal policy and legislation.

Thank you for your consideration.

Sincerely,

Regina A. Asmutis-Silvia

Regina Asmutis-Silvia
Senior Biologist
WDCS (North America)

MOODY INTERNATIONAL

Ref: 82075

Date: 1st June 2010

Dear Regina

MSC Peer Review Nominees

Thank you for your emailed letter regarding our peer review nominees for the on-going assessment of the Maine Lobster Trap Fishery against the MSC standard for sustainable fisheries in which you highlight your concern that none of our nominees have intimate knowledge or experience working with North Atlantic right whales.

We very much appreciate the importance of marine mammal interaction with this fishery. In making the selection for our peer review team we were cognisant that we needed to appoint someone with a high level of understanding of the subject as well as someone who would be regarded as being impartial by the broad range of stakeholders that have an interest in this fishery. We consider that Simon Northridge's qualification, experience and track record of working with industry and environmental groups fulfills this requirement and believe he is able to adequately assess and appraise the report.

Following peer review the assessment team will take account of the peer review comments. The peer review comments and how the team took account of them will be made clear within the report. The report will then be made available for a 30 day period of stakeholder consultation. This will provide opportunity for stakeholders to submit their comments and supporting information. The assessment team will then review and take account of these and the subsequent revised draft report will clearly show how comments and supporting information was taken into account.

Therefore, you and others with an intimate knowledge or experience of working with North Atlantic right whales will have opportunity to contribute.

Thank you for your continued input to the assessment process.

Best regards

Paul

APPENDIX E
DRAFT CLIENT ACTION PLAN

Draft Action Plan for Maine Lobster Fishery
November 2012

Note (1). The following action plan involves working with the Maine Department of Marine Resources (DMR) and the Atlantic States Marine Fisheries Commission (ASMFC). The Client has established a reasonable timeline and milestones for each Condition, and is confident they will be met. However, the Client wishes to point out that certain factors, such as Agency budgets, priorities and staffing levels are beyond its control. Should these factors impact the Client's ability to reach stated milestones, the Client will work with the Review Team to make any necessary adjustments to the Action Plan milestones.

Note (2). The state of Maine is a member of the ASMFC, and as such its lobster fishery is under the jurisdiction of the ASMFC management plan. However the lobster resource in state waters is also subject to a separate management program. Because of a long tradition of state water management and a desire to protect those resources critical to the health of Maine's commercial fisheries, Maine's marine resource laws are in effect and are enforced in both Maine and federal waters. The following is an excerpt from Maine Marine Resources Laws Section 6002, Department of Marine Resources Rules of Construction, section 3:

> *Marine resources' laws shall apply to all registered vessels and to all persons where their activities occur within the State, within the coastal waters of the State or where the product of those activities are brought into the State or its coastal waters. They shall also apply to all residents of the State wherever those activities are conducted, but not within the jurisdiction of another state. These laws do not apply to marine organisms passing through the State under the authority of the laws of the United States.*

As evidenced by this statute, DMR regulations and laws apply to Maine license holders regardless of where they fish, meaning DMR regulations and laws implemented as a result of this action plan will be in effect throughout the entire geographic range considered in this assessment.

This action plan involves working with both DMR and the ASMFC to incorporate management more consistent with MSC Principles. However the majority of the work will be accomplished through DMR processes. Because DMR regulations and laws are in effect for all Maine-licensed harvesters in both state and federal waters, changes enacted through DMR will impact the entire geographic range considered in this assessment.

CONDITION 1
The client is required to present evidence by the fourth annual audit that shows:

- **There is a partial strategy in place that is expected to at least achieve the SG 80 level of performance for PI 2.4.1, i.e. "The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm"**
- **There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or habitats involved.**
- **There is some evidence that the partial strategy is being implemented successfully.**

The client will meet this Condition through the following Action Plan:

A.) The client will conduct research on the Maine lobster fishery's potential spatial and temporal impacts on habitat. Research will account for the frequency and intensity of impacts on marine habitats found where the fishery is conducted, and will consider the question of cumulative effects. The client will assess impacts to biodiversity as a proxy for ecosystem resilience and develop a strategy, if warranted, to mitigate these impacts. The client will:

1. Identify the spatial and temporal extent and intensity of lobster fishing by habitat and depth (2013/2014).
2. Conduct habitat stratified Before After Control Impact (BACI) experiments on biodiversity and ecosystem resilience that may be impacted by traps. These studies will account for trap placement and different hauling practices (2014/2015).
3. Develop a spatial, temporal and intensity model of lobster fishing impacts on habitat for the assessment area similar to or expanded from the SASI model including identification of habitats of particular concern (2016).
4. Using the data from the research listed above, consider the lobster fishery's impact on habitat and determine if a strategy to mitigate these impacts is warranted (2016).

5. If warranted, develop and begin to implement a partial strategy or strategies to mitigate impacts on habitat (2017).

The client will work with DMR to ensure research results are considered and incorporated as the state's management plan for lobster is developed. The client will also work with DMR and the ASMFC in the event that it becomes necessary to investigate and assess strategies to mitigate impacts on habitat.

B.) The ASMFC's Habitat Committee has recommended the habitat section of the Lobster management plan be updated in 2013, and this recommendation was approved at the Commission's October 2012 meeting, creating an excellent opportunity to address the concerns raised by the MSC review. In 2012, the habitat committee will proceed with developing an updated habitat section for the Lobster FMP. Generally, when a species' habitat section is updated, the Habitat Committee will seek an author from one of the states or may contract out for a comprehensive literature review and report describing the important habitat for each life stage (of the species in question), as well as a description of the habitat condition and any relevant threats to these habitat areas of concern. Some of those threats may be other fisheries or other anthropogenic causes. This review is examined by the habitat committee, and any new information is incorporated into the habitat section of the management plan. As part of this review, the habitat committee will make management recommendations, as well as provide a list of research recommendations for future research.

The Client will advocate for the consideration of the lobster fishery's impact on habitat throughout the process of updating the lobster habitat section. The client will work with DMR's appointee to the Habitat Committee to ensure he is familiar with the type of research needed to better understand the lobster fisheries impact on habitat, and is prepared to advocate for such types of research.

Additionally, the client will advocate for the explicit consideration of the (MSC) reviewer's concerns as the literature review moves forward. The client will correspond with members of the habitat committee and the author of the literature review, and will attempt to influence the literature review *if and as appropriate*. The client will also attempt to influence the update of the lobster habitat section *as appropriate*. Although it is likely the ASMFC will continue to focus their research on how other factors influence lobster habitat rather than how the lobster fishery itself impacts habitat, the client will advocate for research on and consideration of the lobster fishery's impact on habitat in the Gulf of Maine, and will advocate for an examination and determination of this impact by the ASMFC.

Milestones:
By the first annual audit, the client will provide documented evidence that a plan for the assembly of available information and a program for the evaluation has been developed and data collection and assembly for this purpose has commenced. The client will accomplish this by:

- Working with DMR, and possibly other research entities in Maine, to design and implement the research listed in A1 and A2 (listed above). By the first annual audit, the client will provide a written update of where these projects stand, including identification of investigators, research plans, and results to date.
- Providing written documentation of the progress made at the ASMFC concerning the update to the lobster habitat section and identification of research priorities (as outlined in section B above).

By the second annual audit, the client will provide documented evidence showing the information that has been assembled and the results of the analysis to date. The client will accomplish this by:

- Sharing the results of A1 and A2 with auditors.
- Providing the updated habitat section to the ASMFC lobster management plan and any research recommendations resulting from the update.
- Providing a summary of all habitat research to date, including, if relevant, the literature review conducted by the ASMFC habitat committee.
- Sharing with the reviewers the planned approach for accomplishing A3.

By the third annual audit, the client will provide documented evidence to show the likely significance of the potential cumulative impacts on habitats and, if necessary, implement a partial strategy. The client will accomplish this by:

- Providing a final report of the results of A1 and A2.
- Providing a report on A3, which may or may not be a final report depending on the research timeline.
- Providing an initial determination, based on these studies, of the lobster fishery's impact on habitat, which will include justification for that determination.

- Sharing the initial plan for a partial strategy to mitigate that impact, if warranted, OR providing justification for a determination that a partial strategy is not necessary.

By the fourth annual audit, the client will provide evidence that the partial strategy (if warranted) is being implemented successfully. The client will accomplish this by

- Providing a final determination of the impact of the fishery's impact on habitat.
- Providing documentation of the partial strategy
- Providing written documentation that shows the partial strategy is being implemented successfully.

Note 1: The fourth annual audit milestone listed above indicates the client will provide documentation of the steps being taken to implement the partial strategy. If such a strategy is warranted, it will be implemented in cooperation with DMR. Implementation would likely be conducted through the DMR rulemaking or Maine state legislative process. Once the strategy is identified, outreach will need to be conducted with the lobster zone councils, and possibly with other stakeholders. This outreach may result in slight changes to the strategy. Once the final strategy is identified, changes required through rulemaking will take at least 120 days, and changes required through the legislative process will take up to 18 months, depending on when the process starts. Draft legislation must be submitted in October in order to be considered in the upcoming session. If the legislation is not submitted by October, it must be submitted in the subsequent session. It is not uncommon for significant changes to require several attempts prior to adoption. For that reason, the client believes it is reasonable to provide a progress report by the fourth annual audit on where things stand, rather than guaranteeing such strategies will be fully implemented.

Note 2: In earlier correspondence, the review team indicated a determination of "No Impact" would be cause to reconsider the score on PI 2.4.2. If such a determination is made by the ASMFC or NOAA Fisheries, the client will present the determination and the data used to make it to auditors. If it is determined that the lobster fishery has no adverse impact on habitat, the client will request the score for 2.4.2 to be raised to 80, which would obviate the need for further pursuit of the action plan.

CONDITION 2

The client is required to show by the third annual audit that clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within management policy.

This condition will be met through the following actions . The first action deals with adoption of a precautionary approach; the second focuses on goals to guide decision-making; and the third, the advocacy and adoption of clear long term ecosystem related objective.

A.) The client will advocate for the adoption of biological-based reference point within the ASMFC's management plan. The client will also advocate for the continued analysis of stock and fishery health relative to these reference points, and for the adoption of conservative management measures when necessary.

The next American lobster stock assessment is scheduled to be completed in 2014. The Lobster Management Board and Lobster Technical Committee have indicated a desire to adopt biological-based reference points during this process. In a memo dated April 5 (see attachment), the Lobster Technical Committee recommended a number of terms of reference for the assessment and subsequent peer review. Of particular interest are the recommendations to:

- Develop simple, empirical, indicator-based trend analyses of reference abundance and effective exploitation for stocks and sub-stock areas.
- Characterize uncertainty of model estimates, reference points, and stock status.

This Technical Committee has recommended that the Lobster Management Board adopt biological-based reference points and explicitly consider the potential impacts of uncertainty. In an August 2012 discussion, Fisheries Management Plan Coordinator for American Lobster Toni Kerns indicated the board is currently moving forward with this recommendation. Biological based reference points and an explicit consideration of uncertainty will likely be adopted by 2016, although the interactive nature of ASMFC processes precludes identifying a definite implementation date.

Maine representatives to the ASMFC will participate in discussions in which the adoption of biological based reference points and an explicit consideration of uncertainty are deliberated. Maine representatives participate in all forums where this issue will be addressed, including the lobster technical committee, the lobster advisory panel, the plan review team,

the species management board, the Interstate Fisheries Management Policy Board, and/or either of the annual meetings of the Commission itself.

B.) The Client will advocate through the Maine representatives to the ASFMC the adoption of clear long term ecosystem related objectives consistent with MSC Principles Criteria within the ASFMC's management plan.

C.) Maine's lobster fishery is managed under a number of regulations designed to accomplish specific (but not always explicitly articulated) goals. DMR has stated an intention to proceed with the development of management plans for state water fisheries, containing clearly defined resource and ecosystem related goals and objectives.

The high degree of stakeholder involvement in lobster management will make the lobster management plan even more interactive and time consuming than other plans, further augmenting the time necessary to incorporate management changes. The client will continue to meet with DMR to ensure the MSC Conditions and recommendations are considered as they develop a state management plan for lobster.

DMR has reviewed and endorsed the client's Action Plan (see letter), and is aware of the importance of clearly articulating long term objectives and acknowledging the impact of uncertainty in the state management plan.

Milestones:

By the first annual audit, the client will provide evidence that action has been taken and a commitment has been made by the management organizations to incorporate explicit long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, within management policy. The client will do this by:

4.) Providing evidence that Maine representatives at the ASMFC have participated in the deliberations regarding the development and adoption of biological-based reference points and an explicit consideration of the impacts of uncertainty.
5.) Providing a letter of commitment from DMR to incorporate explicit short and long term resource and ecosystem related management objectives into its management program for the lobster fishery. This letter will also include a commitment to acknowledge uncertainty where it exists and consider these impacts to the extent practicable as they proceed with management. As noted above, DMR is just beginning to develop management plans for Maine's fisheries. During the consultation phase of the Lobster Management Plan the Client will advocate for an explicit consideration of the lobster fishery's interaction with the ecosystem, including habitat, non target and ETP species as the lobster plan is developed. The Client will provide evidence of this advocacy and an update of progress at the first annual audit.
6.) Providing evidence of advocacy for the adoption of clear long-term ecosystem related objectives consistent with MSC Principles and Criteria within the ASMFC management plan.

By the second annual audit, the client will provide the review team with an update of progress at the ASMFC as they deliberate adoption of biological based reference points, incorporation of an explicit consideration of uncertainty and the adoption of clear long-term ecosystem related objectives consistent with MSC Principles and Criteria. The client will also provide a report of progress in DMR's development of a management plan for lobster (see action plan for Condition 2 for details).

By the third annual audit, the client will show that biological-based reference points have been adopted, and that the precautionary approach, in the form of an explicit consideration of uncertainty, is embedded within ASMFC management policy. They will also provide evidence that the ASMFC and state management plans for lobster include clear long term goals for the resource and ecosystem related aspects of the fishery as well as an explicit consideration of the impacts of uncertainty (see action plan for Condition 3 for details).

CONDITION 3

The client is required to show by the fourth annual audit that short and long term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.

Action Plan: As noted in the action plan for Condition 2, DMR will soon be developing a management plan for lobster. This condition will be met by working with DMR as this process moves forward.

Milestones:

By the first annual audit, the client will present evidence that action has been taken and a commitment has been made by the management organizations to incorporate short and long term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, within the management system. The client will accomplish this by providing a letter of commitment from DMR to incorporate explicit short and long term management objectives into its management program for lobster. This letter will also include a commitment to incorporate the information resulting from the habitat impact analysis (see condition 1) and, to the extent practicable, to include MSC's Principle 2 issues in the management plan as appropriate.

By the second annual audit, the client will provide evidence that the process is underway. This may include but is not limited to:

- Minutes from meetings of the Lobster Advisory Council, and Zone Councils
- Any relevant testimony to the Legislature's Joint Standing Committee on Marine Resources Committee at which standards for fisheries management plans were discussed.
- DMR policy memos and other evidence of internal DMR discussions indicating progress in the development of management objectives.
- Correspondence between industry associations, DMR, and other lobster stakeholders indicating progress in the development of management objectives.

By the third annual audit, the client will provide documentation and a written summary of the steps taken to incorporate Principle 1 and 2 issues into the state management plan for lobster. This summary will include a draft management plan if it is available at that time.

By the fourth annual audit, the client will provide evidence that the goals and objectives, consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the management system. This will be done by providing a copy of the state management plan for lobster.

APPENDIX F

Letter of support for the client action plan from the Commissioner of the Department of Marine Resources, State of Maine

STATE OF MAINE
DEPARTMENT OF MARINE RESOURCES
21 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0021

PAUL R. LEPAGE
GOVERNOR

PATRICK C. KELIHER
COMMISSIONER

November 14, 2012

Paul Knapman
Intertek Moody Marine
99 Wyse Road, Suite 815
Dartmouth, NS B3A 4S5
Canada

Dear Mr. Knapman:

I have reviewed the Draft Action Plan submitted by the Fund for The Advancement of Sustainable Maine Lobster (the Client Group), and believe the actions described within it are realistic in scope and represent a worthwhile effort to improve our understanding and management of Maine's lobster fishery.

Over the past five years, members of my staff have been in communication with members of the Client Group, and have worked with them as they have sought information required by MSC reviewers. My staff will continue to work with the Client Group as necessary and appropriate as they design the research necessary to meet Condition 1.

As noted in the Action Plan, the Department is in the process of developing management plans for many of Maine's state water fisheries. It is our intention to adopt a standardized approach for all fisheries. That approach has not yet been finalized, but issues of stock health and ecosystem impacts will certainly be considered, so at this point I do not foresee a problem with meeting Conditions 2 and 3.

Maine's lobster fishery practices sustainable fishing methods on a thriving resource. I sincerely hope MSC Certification will help illustrate this to consumers, and that this renewed appreciation will result in increased economic benefits for everyone in Maine's lobster fishery.

Sincerely,

Patrick C. Keliher
Commissioner