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The sea scallop, *Placopecten magellanicus* (photograph by Dann Blackwood, USGS).

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MSC Assessment Report for

USA Sea Scallop Fishery

Client: American Scallop Association

Version 3: Public Comment Draft Report

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1 SUMMARY

This report sets out the results of the assessment of the American Scallop Association Fishery against the Marine Stewardship Council (MSC) Principles and Criteria for Sustainable Fishing.

The assessment began in March 2010 using the MSC Fisheries Assessment Methodology (FAM) (v2). During the period between the commencement of the assessment and production of the Public Comment Draft Report the MSC has superseded the FAM with the introduction of the MSC Certification Requirements (CR) and MSC Guidance to the Certification Requirements (GCR). These were introduced in November 2011 and have since been revised (CR January 2012 and 2013; GCR January 2013). As the site visit and preliminary client draft report were produced prior to the introduction of the CR this assessment uses the FAM V2 default assessment tree and the Intertek Moody Marine (IMM) report template but, because this report was not published prior to the implementation of the CR and GCR v1.3 the requirements and guidance within these documents is followed.

A team of three assessors carried out the assessment: Andrew Brand, Jason Hall-Spencer and Don Aldous. Andrew Brand led the assessment of Principle 1; Jason Hall-Spencer led Principle 2; and Don Aldous lead Principle 3 and led the assessment. A full account of the assessment team's relevant experience is set out in section 10 of this report.

To date, the following required steps have been undertaken in this assessment:

- 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 preliminary client draft report that describes the background to the fishery, the fishery management operation and the evaluation procedure and results
- The development of a draft client action plan
- Peer review of the draft report
- Production of this Public Consultation Draft Report.

The evaluation process for this assessment involved gathering information relevant to the fishery during a site visit to New Bedford, Boston and Gloucester during August 9-13, 2010, through discussions with other stakeholders, and by reviewing relevant literature. The assessment team then compiled a draft report, and met to "score" the performance of the fishery.

The fishery attained a score of between 60 and 80 against four Performance Indicators. This resulted in the fishery achieving an overall average score of above 80 for MSC Principles 1, 2 and 3 with four conditions. Therefore it was concluded that the American Sea Scallop Fishery could be recommended for certification.

This report is based on information collected during the site visit in August 2010 and owing to the extended period of the assessment the report has been updated with additional information provided by the client.

1.1 Scores of the Principles

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

Principle 1: 96.3
Principle 2: 81.3
Principle 3: 95.4

The main strengths of this fishery are the strong stock status, the reference points, the consultation mechanism, the long term planning objectives and decision-making process. These all scored very highly against the performance indicators.

The main weaknesses of this fishery lies in the information on bycatch species and its impact on habitat and the ecosystem.

1.2 Conditions

The assessment team has recommended that this fishery should be certified according to the MSC Principles and Criteria, and identifies four conditions of certification. These conditions are summarised below:

- Improving the availability of information collected on all bycatch species to estimate outcome status with respect to biologically based limits (PI 2.2.3)
- Taking measures to reduce the significant alteration of habitat cover/mosaic that causes major change in the structure or diversity of the species assemblages. (PI 2.4.1)
- Preparing a strategy to ensure the fishery does not cause significant alteration of habitat cover/mosaic that results in major change in the structure or diversity of the species assemblages. (PI 2.4.2)
- Taking measures to ensure it is highly unlikely that the scallop fishery disrupts the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. (PI 2.5.1)

2 INTRODUCTION

This report sets out the results of the assessment of the American Sea Scallop Fishery against the Marine Stewardship Council (MSC) Principles and Criteria for Sustainable Fishing.

2.1 The fishery proposed for certification

The MSC Certification Requirements specify that the unit of certification is: the fish stock or portion of a fish stock being targeted; the fishing method/gear and practice pursuing the fish of that stock; and management framework. The fishery proposed for this particular certification is therefore defined as:

Species:	Atlantic Sea Scallop (*Placopecten magellanicus*)
Geographical Area:	The US Exclusive Economic Zone in the N.W. Atlantic
Method of Capture:	New Bedford Dredge
Management System:	National Marine Fisheries Service **(**NMFS) / New England Fisheries management Council (NEFMC)
Client Group:	American Scallop Association

This assessment covers Atlantic Sea Scallop where it is fished from ports along the US Atlantic coast from Maine to Virginia by limited entry permits. There are processors, buyers and about 350 vessels in this assessment. The fleet comprises all those vessels with limited entry permits to direct their fishery for scallops and accounts for 95% of the total US catch of this species. The remaining vessels not covered in this assessment are in the General Category (see Section 4.4). In the course of the certification it is possible that further companies/vessels may join the client group. This would be in accordance with the MSC's stated desire to allow fair and equitable access to the certification.

2.2 Report Structure and Assessment Process

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

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 Scoring Indicators adopted by the assessment team and Scoring Guidelines 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 Indicators.
- A draft client action plan
- Peer review comments

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

As a result of the scoring, the certification recommendation of the assessment team is presented, together with any conditions attached to the certification recommendation.

Once agreed by the client, 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.

Stakeholder comments are appended to the report along with responses by the assessment team and any amendments resulting from the evidence based information provided stakeholders.

The report containing the recommendation of the assessment team, stakeholder 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, will be released for further stakeholder scrutiny with an opportunity to object to the determination. The objections procedure can be found in annex CD of the MSC Certification Requirements.
(http://www.msc.org/documents/scheme-documents/msc-scheme-guidance-documents/guidance-to-the-msc-certification-requirements-v1.3/view).

If no objections are lodged, a Public Certification Report is produced and once the report is on the MSC website the fishery can be issued a certificate. The certificate is valid for 5 years. The fishery is subject to annual surveillance audits to ensure that it is performing at least at the same level as when it was certified and, if any conditions have been set, that progress toward the conditions is on target

2.3 Stakeholder meetings attended

Information used in the main assessment has been obtained from interviews and correspondence with stakeholders in this fishery, notably:

- A meeting on board a scallop vessel in New Bedford harbour, August 9, 2010
- A meeting with Oceana at the Fairfield hotel in New Bedford, August 9, 2010
- A meeting with the American Scallop Association at Sea Trade International, August 10, 2010
- A meeting with Conservation Law Foundation at the Fairfield hotel, August 10, 2010
- A New England Fisheries Management Council meeting, Revere, August 11, 2010
- A meeting with NOAA staff in Gloucester, August 11, 2010
- A meeting at SMAST in New Bedford, August 12, 2010

2.4 Other information sources

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

Law

Magnuson-Stevens Fishery Conservation and Management Act (MSA) Provisions; Fisheries of the Northeastern United States; Atlantic Sea scallop fishery; Amendment 15 to the Atlantic Sea Scallop Fishery Management Plan (Scallop FMP). Federal Register Vol. 76, No. 140. 21 July 2011. P. 43746.

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3 GLOSSARY OF ACRONYMS AND ABBREVIATIONS USED IN THE REPORT

ABC	Acceptable Biological Catch
ACL	Annual Catch Limit
ACT	Annual Catch Target
AM	Accountability Measures Management controls that prevent ACLs or sector-ACLs from being exceeded
APA	Administrative Procedures Act
$B_{THRESHOLD}$	Biomass, $B_{THRESHOLD} = ½ B_{TARGET}$
B_{MSY}	That level of biomass resulting in maximum sustainable yield
BPR_{MAX}	The biomass per recruit obtained when fishing at F_{MAX}
B_{TARGET}	Biomass, $B_{TARGET} = B_{MSY}$
CASA	A size-structured forward projecting stock assessment model
DAS	Days at Sea
EEZ	Extended Economic Zone
EFH	Essential Fish Habitat
ETA	Elephant Trunk Access Area
ETP	Endangered Threatened Protected
F_{MAX}	The maximum rate of fishing mortality, the overfishing threshold
FMP	Fisheries Management Plan
F_{MSY}	The rate of fishing mortality that results in the maximum sustainable yield
GB	Georges Bank
ICNAF	International Commission for North Atlantic Fisheries
IFQ	Individual Fishing Quota
ITQ	Individual Transferable Quota
LPUE	Landings Per Unit Effort
MAFMC	Mid-Atlantic Fisheries Management Council
MSA	Magnuson-Stevens Act
MSRA	Magnuson-Stevens Reauthorized Act
MSY	Maximum Sustainable Yield
NEFMC	New England Fisheries Management Council
NEFSC	New England Fisheries Science Council
NEPA	National Environmental Policy Act
NGOM	Northern Gulf of Maine
NGOM	Northern Gulf of Maine
NLCA	Nantucket Lightship Closure Area
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OFL	Overfishing Limit: OFL is an estimate of the catch level above which overfishing is occurring
OLE	Office of Law Enforcement
PDT	Plan Development Team
SAMS	Scallop Area Management Simulator
SARC	Stock Assessment Review Committee
SASI	Swept Area Seabed Impact
SAW	Stock Assessment Workshop
SMAST	School for Marine Science and Technology
SSC	Stock Status Committee??
SSC	Science and Statistical Committee
SYM	Stochastic Yield Model

4 BACKGROUND TO THE FISHERY

4.1 Introduction

The scallop fishery dates back 120 years. It is presently conducted over a wide area by a large fleet of 348 boats and achieved its highest landing in 2004 of 24,494t of meats. Landings remain high today. The use of rotational closed areas has enabled managers to protect high densities of young scallops and target larger scallops.

4.2 Biology of the Target Species

There is a very large body of literature on the biology and fisheries of the Atlantic sea scallop, *Placopecten magellanicus* (Gmelin), with excellent recent reviews by Hart & Chute (2004) and Naidu & Robert (2006).

Placopecten magellanicus is a large scallop that commonly reaches 100–150 mm shell height but individuals >200 mm have occasionally been reported (Naidu & Robert, 2006). The species occurs in the Northwest Atlantic, with a geographical range that extends from Pistolet Bay, Newfoundland and the north shore of the Gulf of St Lawrence to Cape Hatteras, North Carolina (Posgay, 1957; Squires, 1962; Naidu & Robert, 2006).

All scallop species have a highly aggregated (i.e. contagious) spatial distribution within their geographical range (Brand, 2006). Localized, dense aggregations are referred to as beds. Some beds are essentially permanent, being fairly precise in their location and separated by clearly demarked areas that are unsuitable for scallops, while others vary in their location from year to year, resulting from sporadic settlement or differences in early survival. The more permanent beds appear to be in areas where oceanographic features ensure a regular larval supply but suitable temperatures, food availability and substrate are also important (Sinclair *et al.*, 1985; Thouzeau *et al*., 1991; Tremblay & Sinclair, 1992). Not all suitable substrates support high densities of scallops. The major aggregations of sea scallops that support commercial fisheries are the inshore populations in coastal bays and estuaries along the coast of Maine in the USA and in the Bay of Fundy and southern Gulf of St Lawrence in Canada and offshore populations on the Mid-Atlantic Shelf, Georges Bank, Browns Bank, German Bank, Lurcher Shoals, Grand Manan, around Sable Island, Middle Ground, Banquereau Bank and on St Pierre Bank (Serchuk *et al*., 1982; Hart & Chute, 2004; Naidu & Robert, 2006). Of these, the Georges Bank fishing grounds, a resource shared between the USA and Canada, have traditionally been by far the most productive and have been exploited consistently for more than 50 years (Serchuk *et al*., 1979; Sinclair *et al*, 1985; Murawski *et al*., 2000). However, in recent years, the Mid-Atlantic grounds have become more important, particularly the grounds off Long Island and New Jersey, Delmarva and Virginia-North Carolina, sometimes contributing more than half of the USA total scallop catch (Naidu & Robert, 2006). This rise in the Mid-Atlantic region is due in part to the closure of large areas of Georges Bank since December, 1994 to protect groundfish stocks (Murawski *et al*., 2000; Stokesbury 2002), but the Mid-Atlantic grounds have also benefited from increased recruitment, reduced fishing mortality and the rotational closure of an area south of Hudson Canyon for a three year period (1998-2001) (Hart & Chute, 2004; NEFSC, 2004; Hart & Rago 2006; Stokesbury 2012).

Sea scallops have separate sexes that can be differentiated by the colour of the gonads, which is creamy white in males and red in females. The onset of sexual maturity occurs at a very young age with mature gametes having been observed in one-year old females (Langton *et al*., 1987) and sea scallops have been reported to spawn during the second year (Naidu, 1970; MacKenzie, 1979). Fecundity is high, with females producing 1-270 million eggs per individual (Langton *et al*., 1987), increasing rapidly with shell height. Individuals less than four years old contribute little to total egg production (MacDonald and Thompson, 1985; McGarvey et al. 1992). Fecundity is generally greater in scallops from shallow water (10-20 m), where the food supply is typically greater and temperatures higher than in deep water (170-180 m) (MacDonald and Thompson 1986; MacDonald *et al.* 1987; Barber *et al.* 1988).

Spawning in US waters generally occurs as a single peak in late summer or early autumn (August to October), but there is evidence of a biannual spawning cycle on the Mid-Atlantic shelf south of Hudson Canyon, with both spring and autumn spawning (DuPaul *et al*., 1989; Schmitzer *et al*, 1991; Davidson *et al*., 1991; Sarro and Stokesbury 2009) and some additional winter or early spring spawning on Georges Bank (Almeida *et al*., 1994; Dibacco *et al*., 1995). The timing of spawning can vary with latitude, starting in summer in southern areas and in autumn in the northern areas but there are exceptions to this pattern with scallops off New Jersey spawning up to two months later than scallops from Newfoundland (MacDonald & Thompson, 1988).

At spawning, eggs and sperm are released into the water column where fertilization takes place. A rapid change of temperature, the presence of gametes from other scallops in the water, physical agitation, or tides may trigger sea scallop spawning (Parsons *et al.* 1992), which is often closely synchronised between individuals so that all scallops on a bed may go from completely ripe to completely spent in a few days (Posgay & Norman, 1958; Posgay, 1976). However, "dribble spawning", where gametes are released over an extended period of time, has been reported in some sea scallop populations (Naidu, 1970; Langton *et al*., 1987; MacDonald & Thompson, 1988). Langton *et al.* (1987) suggest that year-class strength may correlate with the degree of spawning synchrony, rather than the absolute level of egg production.

The fertilized eggs develop first into ciliated trophophore larvae, then veliger larvae that continue to swim and filter feed in the water column for some 4-7 weeks, depending on temperature and food supply (Hart & Chute, 2004). They then develop a foot and byssus gland and enter the pediveliger stage, searching the seabed for somewhere suitable to settle. Pediveligers can delay settlement for up to a month until a suitable substrate is encountered (Culliney, 1974) when they secrete a number of byssus threads and attach to the seabed as spat (attached juveniles), rapidly taking on the adult characteristics of morphology, feeding and locomotion. Initial settlement of sea scallops can be on gravelly sand, small pebbles or shell fragments (Langton and Robinson, 1990), or on filamentous plants and animals, many of which colonise the shells of adult scallops (Stokesbury & Himmelman, 1995). Close associations have been reported with algae (Naidu, 1970), hydroids and amphipod tubes (Larsen & Lee, 1978) and bryozoans (Baird, 1953; Caddy, 1972), while Parsons *et al*. (1993) conclude that settling larvae actively select substrates with a high biofilm coverage. The availability of suitable settlement surfaces seems to be a primary requirement for successful scallop reproduction (Hart & Chute, 2004) and spat settlement, and the period immediately after, is considered to be a critical period in the formation of scallop beds (Posgay, 1953) and in determining year-class strength (Bourne, 1965: Caddy, 1975).

Juvenile sea scallops retain the ability to secrete a byssus for several years, though they can detach the byssus, move and re-settle elsewhere. However, the proportion that is byssally-attached declines with age and the maximum size for frequent byssal attachment is about 110 mm (5-6 years) (Caddy, 1972). Sea scallops are very good swimmers when young, swimming actively to avoid predators or fishing gear (Brand, 2006). While swimming, young scallops can be carried long distances downstream by currents (Baird, 1954) but there is no evidence of mass migrations in this or any other scallop species (Stokesbury & Himmelman 1996; Hart & Chute, 2004; Brand, 2006). Since byssal attachment inhibits swimming (Caddy, 1972), the retention of a functional byssus to quite a large size may serve to reduce dispersal of the highly mobile sea scallop away from favourable settlement areas (Minchin, 1992).

Scallops are opportunistic filter feeders, utilizing food of both pelagic and benthic origin. Adult sea scallops filter sedimenting phytoplankton and microscopic zooplankton, resuspended benthic diatoms and organic detritus and bacteria from the bottom of the water column (Shumway *et al*., 1987). They are unable to efficiently filter very small particles (<about 7 µm) but can pump large volumes of water at relatively low metabolic cost, hence their preference for areas with relatively high current velocities and low suspended sediment concentrations. However, low concentrations of inorganic particles in the diet may be important in enabling sea scallops to utilize phytoplankton cells efficiently (Cranford & Gordon, 1992). Scallop larvae filter feed but it has been suggested that they also utilize dissolved organic matter, absorbed through the tissues, as an additional minor source of nutrition (Marshall & Lee, 1991).

Many populations of sea scallops can be reliably aged from prominent concentric growth rings on the left (upper) shell valve, which have been verified as annual in various studies (Stevenson & Dickie, 1954; Posgay, 1962, Naidu, 1969; Tan *et al*, 1988). However, in some deeper water southern populations, and on heavily exploited grounds where frequent contact with fishing gears causes additional shock rings on the shell (Naidu, 1975), the interpretation of shell rings can be difficult or sometimes impossible and it may be necessary to use growth bands in the resilium (hinge ligament) (Merrill *et al*., 1966). The oldest sea scallop recorded was 29 years old (Naidu & Robert, 2006) but this is exceptional and was from an unexploited population; for exploited populations the maximum age is much lower. Sea scallops are first detected in surveys at 2 years old (about 40mm shell height) and now recruit to the commercial fishery at 4-5 years (90-105 mm shell height). The size and age at recruitment has increased somewhat in recent years, due to the introduction of 4-inch belly rings and the controlled exploitation of older scallops, but prior to the mid-1990s 3-year-old (70-90 mm SH scallops were common in landings. Growth rates of sea scallops are fast and between the ages of 3 to 5 years old shell height can increase 50-80% and meat weights can quadruple (NEFSC, 2004; NEFSC, 2007a). Growth rates vary on different grounds; they are positively correlated with temperature and food supply and negatively correlated with depth, latitude and age (Harris & Stokesbury 2006).

Sea scallops have numerous predators. During the pelagic phase, the larvae are eaten by larger zooplankton and planktivorous fish. After settlement, the principal predators are starfish, crabs, lobsters, predatory snails and various bottom feeding fish species (including cod, American plaice, wolfish and winter flounder) (Elmer & Jamieson, 1979; Barbeau & Scheibling, 1994 a, b; Stokesbury & Himmelman 1995). These animals prey particularly on smaller scallops and individuals >70 mm shell height are rarely preyed upon (Hart & Chute, 2006).

4.3 History of the Fishery

The sea scallop is the most important commercial bivalve in North America and has been exploited throughout its geographical range for more than 120 years. In both the USA and Canada the first recorded landings were in the 1880's, and for more than 50 years the fisheries in both countries exploited only inshore grounds. In the USA, the inshore fishery first developed off New England, when several beds were discovered near Mt. Desert Island, Maine (Smith 1891; Premetz and Snow, 1953). Then, in the early 1920's, scallop beds were discovered off Long Island and the Mid-Atlantic ports became the centre of the US scallop fishery for a number of years (Stevenson 1936; Naidu & Robert, 2006). However, with the discovery of offshore beds on Georges Bank in the early 1930's (O'Brien, 1961) these grounds became the main focus of the US fishery and New Bedford became, and continues to be, the leading US port for the sea scallop industry.

The sea scallop fishery in Canada followed a similar pattern and, as fishing increased after World War II, Canadian boats moved increasingly offshore onto Georges Bank and other offshore banks so that, by 1954, landings by the Canadian offshore fleet exceeded those of the inshore fleet for the first time (Bourne, 1964). With Canadian effort on Georges Bank mainly on the very productive Northern Edge and Peak, by 1965, 75% of the annual removals from Georges Bank were taken by the Canadian fleet (Caddy 1989).

The competitive fishery on Georges Bank by US and Canadian boats required a joint management regime, set up under the auspices of the International Commission for the Northwest Atlantic Fisheries (ICNAF). This continued to operate with very limited success until 1984 when the International Court of Justice in the Hague adjudicated on a boundary line (the so-called Hague line) separating the exclusive fishing grounds of the two countries and restricted the US, and Canadian offshore fleets to their respective national zones. Since then, two very different systems for stock assessment and management have developed on either side of the Hague line. A comparative assessment of the consequences of this on the scallop stocks, the fisheries and the management regime over the first 15 years after the Hague line had been established has been made by Repetto (2001).

Following the adoption of a 200-mile Fisheries Conservation Zone by the USA the New England Fisheries Management Council (NEFMC) and the Mid-Atlantic Fisheries Management Council (MAFMC) implemented the Atlantic Sea Scallop Fishery Management Plan (FMP) in May 1982 (NEFMC, 1982). Since its introduction the FMP has been subject to a series of Amendments, and Framework Adjustments (FW). These can be introduced more rapidly and with a lower level of consultation than Amendments and are set out in more detail in Section 5 of this report. Many of these Amendments or FWs are introduced to comply with amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSA), which is the primary domestic legislation governing fisheries management in the US Exclusive Economic Zone (EEZ).

4.3.1 Harvest control

From 1982 till 1993 the Scallop FMP attempted to manage the fishery with only an average meat count restriction, while entry into the fishery remained open to all boats. This approach proved to be inadequate to prevent overfishing so limited entry was introduced in March 1994 through a moratorium on issuing new licenses. However, with the qualification for a license dependent only on historical participation in the fishery, about 350 license holders remained. This was acknowledged to greatly exceed the capacity consistent with rebuilding the depleted stocks (Repetto, 2001) and, with an industry strongly resistant to reducing or consolidating the number of licenses, a system of stringent effort controls was also introduced. This included allowable days at sea (DAS), initially set at 200, a minimum ring diameter on scallop dredges to allow small scallop to escape and a reduction in the maximum crew size to 7 including the skipper; this latter is a major limitation on fishing effort since shucking takes place at sea and is very labour-intensive.

These effort restrictions may have eventually led to the rebuilding of stocks but perhaps the most significant event to affect the subsequent development of the US sea scallop fishery was the closure of three large areas of Georges Bank in December 1994 to all fishing vessels capable of retaining groundfish, following the collapse of groundfish stocks (Figure 1). Since scallop dredgers were included in this ban, this cut the sea scallop fishery off from a substantial part of their resource (approximately half of the productive scallop grounds on Georges Bank) and resulted in the diversion of fishing effort onto the remaining parts of Georges Bank and other open areas, particularly the Mid-Atlantic grounds. With relatively low recruitment on all open grounds and increasing fishing effort, stocks fell and by 1997 the sea scallop fishery was formally declared to be overfished (NEFSC, 2010a). The fishery was also strongly affected by the Sustainable Fisheries Act of 1996, which required fisheries management to develop plans to eliminate overfishing and to restore stocks to a level that would produce the Maximum Sustainable Yield (MSY). Since the stocks were well below that level and the capacity in the fleet was excessive, a plan was adopted in 1998 to reduce the allowable days at sea from 120 to 51 over three years (Repetto, 2001). This plan aimed to rebuild the stocks within ten years. Such a rapid reduction in the number of days at sea would have been financially disastrous for the scallop industry so an industry body, the Fisheries Survival Fund, was established to lobby for access to scallops in the closed areas, which had been shown by cooperative research surveys to have increased 8-14 fold over four years (Murawski *et al*., 2000; Stokesbury 2002; Stokesbury et al. 2004; Hart & Rago 2006). As a result of these cooperative research surveys demonstrating higher biomass (and published in the peer-reviewed scientific literature) permission was given for limited harvesting in one of the closed areas on Georges Bank in 1999 and in all three areas in 2000. The closure of the fishery, coupled with some reasonably good recruitment years and the various effort reduction measures, resulted in a rapid rebuilding of the stock. This revived the fishery, and made it unnecessary to reduce the allowable days at sea beneath 120 days per year since average mortality over the entire Georges Bank stock became consistent with rebuilding targets. In 2004, area based management was formalized (Amendment 10) with separate arrangements for re-opened closed areas (the so-called access areas shown in (Figure 2) and the general open areas. In this, the annual days at sea allocation for the open areas was reduced substantially but, in addition, full-time vessels were allocated 5 access area trips, with catch limits of 18,000 lb of meats per trip and part-time vessels received a *pro rata* allocation. In addition, from 2005, the minimum dredge ring size was increased to 4-inch and the minimum twine top mesh increased to 10-inch. These changes in the regulations for the period 1994 to 2009 are summarized in Table 1. The success of closed areas in promoting profitable fisheries created substantial support from both the industry and government for rotational harvesting (Valderrama & Anderson, 2007) and a program of limited openings to allow scallop fishing in closed areas has continued on Georges Bank and contributed more than half of Georges Bank landings in 1999-2000 and 2004-2006 (NEFSC, 2007a). However, substantial portions of the original closed areas remain closed to scallop fishing, shown in red in (Figure 2).

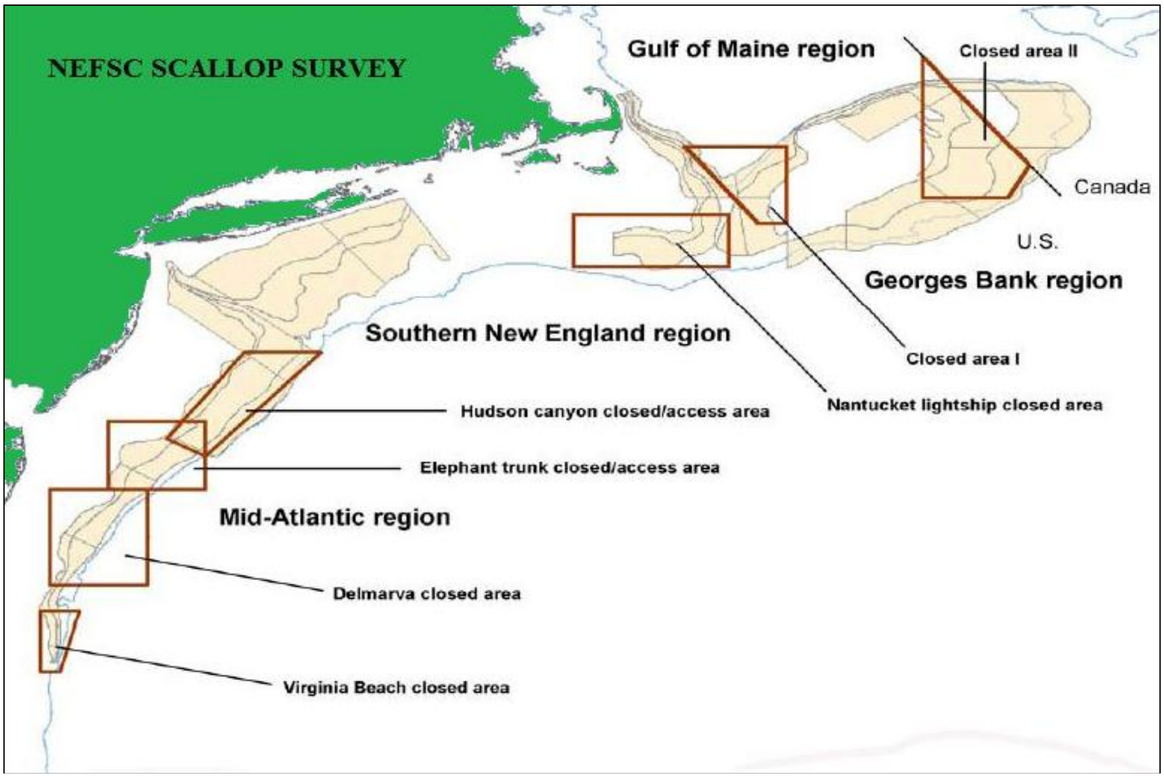


Figure 1: NEFSC Scallop Survey

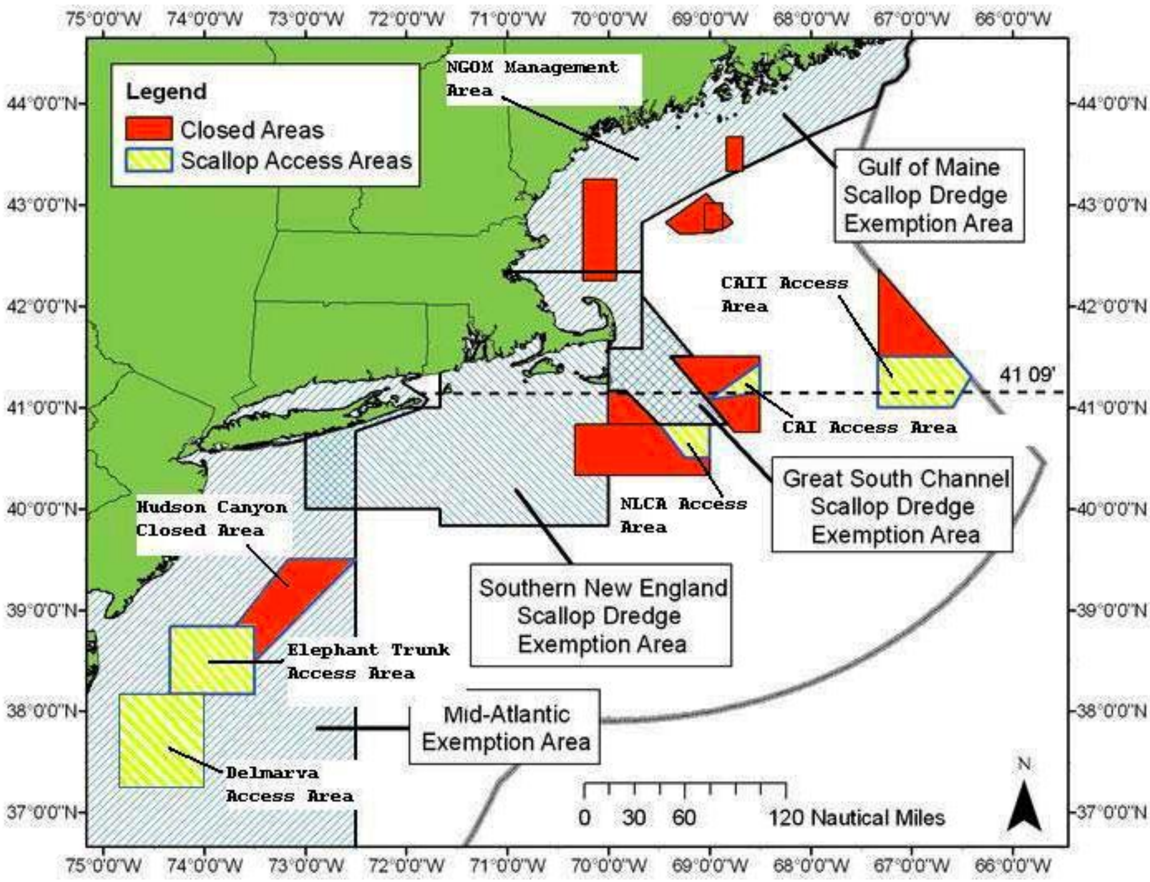


Figure 2: Scallop Dredge Exemption Areas (scallop dredging is permitted in these areas), Access Areas (scallop dredging is permitted in these areas) and Closed Areas.

(http://www.nero.noaa.gov/nero/fishermen/charts/scal1.html)

Table 1: Summary of management regulations in the US sea scallop fishery, 1982-2009. (from NEFSC, 2010a)

Period	Days at sea#	Minimum Ring Size	Minimum Twine Top	Maximum Crew Size	GB Closures	GB Access Areas	MA Closures	MA Access Areas
1982-1993	N/A	N/A	N/A	N/A	0	0	0	0
1994	204	3"-3.25"	5.5"	9	3	0	0	0
1995	182	3.25"	5.5"	7	3	0	0	0
1996	182	3.5"	5.5"	7	3	0	0	0
1997	164	3.5"	5.5"	7	3	0	0	0
1998	142	3.5"	5.5"	7	3	0	2	0
1999	120	3.5"	5.5"	7	3	1	2	0
2000	120	3.5"	8"	7	3	3	2	0
2001	120	3.5"	8"	7	3	1	0	2
2002	120	3.5"	8"	7	3	0	0	2
2003	120	3.5"	8"	7	3	0	0	2
2004	42*	3.5"	8"	7	3	2	1	1
2005	40*	4"	10"	7	3	2	1	1
2006	52*	4"	10"	7	3	2	1	1
2007	51*	4"	10"	7	3	2	1	2
2008	35*	4"	10"	7	3	1	2	1
2009	37*	4"	10"	7	3	1	1	2

Full-time permit
*Does not include access area trips; for each year between 2005-2009, full-time vessels were allocated 5 access area trips, with trip limits of 18,000 lbs meats.

Four rotational closed areas have also been established in the Mid-Atlantic fishery (Figure 2). Two areas, Hudson Canyon South and Virginia Beach were closed in 1998 and re-opened in 2001. The small Virginia Beach closure was not successful but scallop biomass built up strongly in the Hudson Canyon closed area and produced a very good fishery when it re-opened during 2001-5. The third closed area, the Elephant Trunk area east of Delaware Bay, was closed in 2004 after very high densities of small scallops were detected in surveys during 2002 and 2003 (Stokesbury et al.2004). This area re-opened in March 2007 and produced very high catch levels. The fourth closed area, Delmarva, directly south of the Elephant Trunk, was closed in 2007 and scheduled to re-open in 2010.

The introduction of rotational closed areas into the US sea scallop fishery has been important as it has enabled managers to protect high densities of young scallops and target larger scallops. Together with the increase in ring size, this has led to a substantial increase in yield per recruit. The mean meat weight of a landed scallop during 2005-2009 was over 25 g, compared to less than 14 g during the early to mid-1990s. The effect of this on the commercial landings for the period 1998-2009 is shown in Table 1, which is based on dealer size-categories.

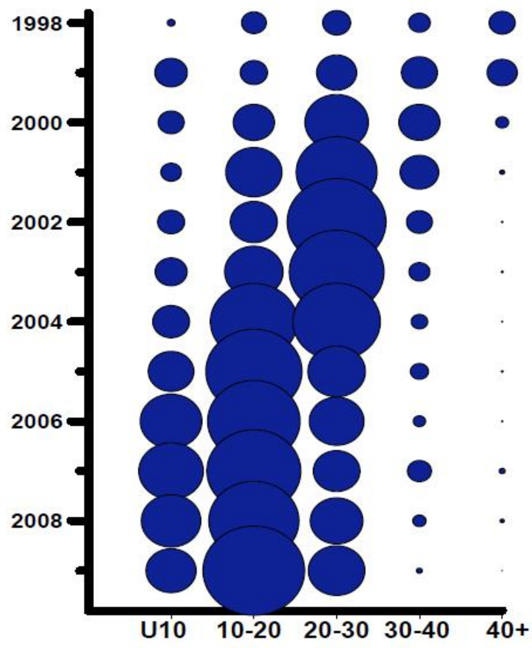


Figure 3: Commercial landings by meat count category (number of meats per pound, U10= less than 10 meats per pound). (from NEFSC, 2010a)

The MSA, originally passed in 1976, was reauthorized in 2006 with several new legal requirements, the most important of which was the requirement for each US fishery to use annual catch limits (ACLs) to prevent overfishing and to introduce accountability measures (AMs). Since the sea scallop stock is not currently overfished the Scallop FMP is required to comply with these new regulations by 2011.

The commercial landings of Atlantic sea scallop in the USA and Canada from the Georges Bank region for the period 1900 - 2009 are shown in Figure 4 This shows the slow early development of the fishery, followed by rapid growth from 1945, after the end of WWII. The strongly fluctuating nature of the fishery is also evident. This is caused mainly by very variable recruitment (Caddy 1989). For example, very strong year-classes in 1957, 1972, 1977 and 1982 produced major peaks in landings in the Georges Bank fishery prior to 1990 (Naidu & Robert, 2006). These large, natural, fluctuations in biomass suggest strong environmental influences and led Caddy (1989) to describe sea scallop fisheries as cyclical, irregular or spasmodic.

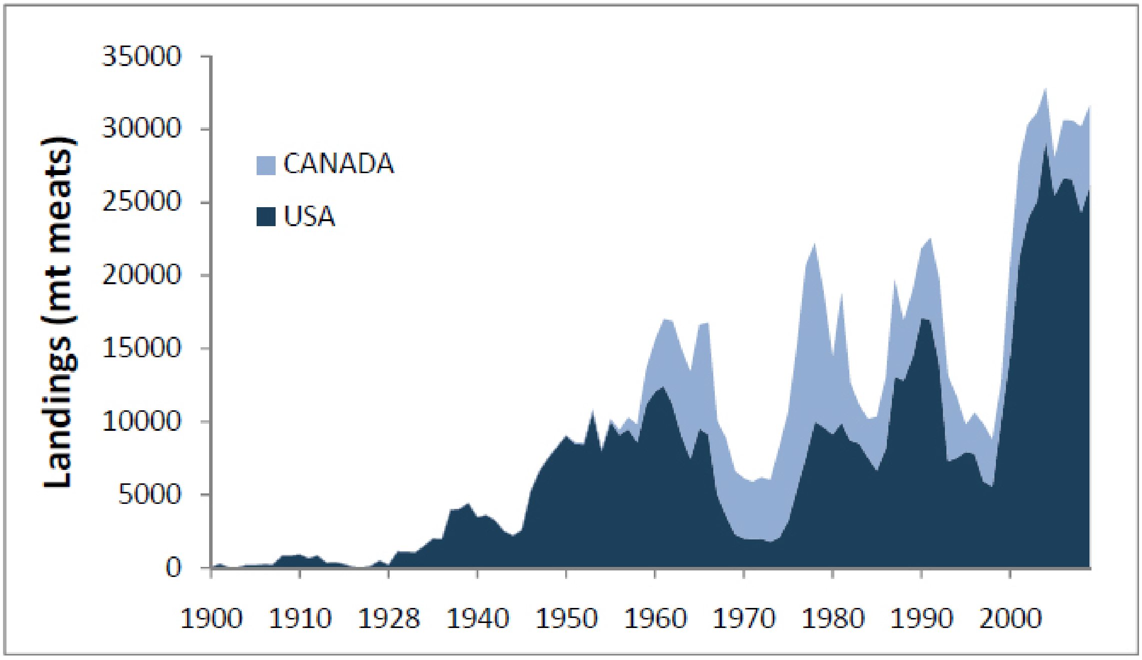


Figure 4: US and Canadian Sea scallops landings from Georges Bank, 1900-2009.

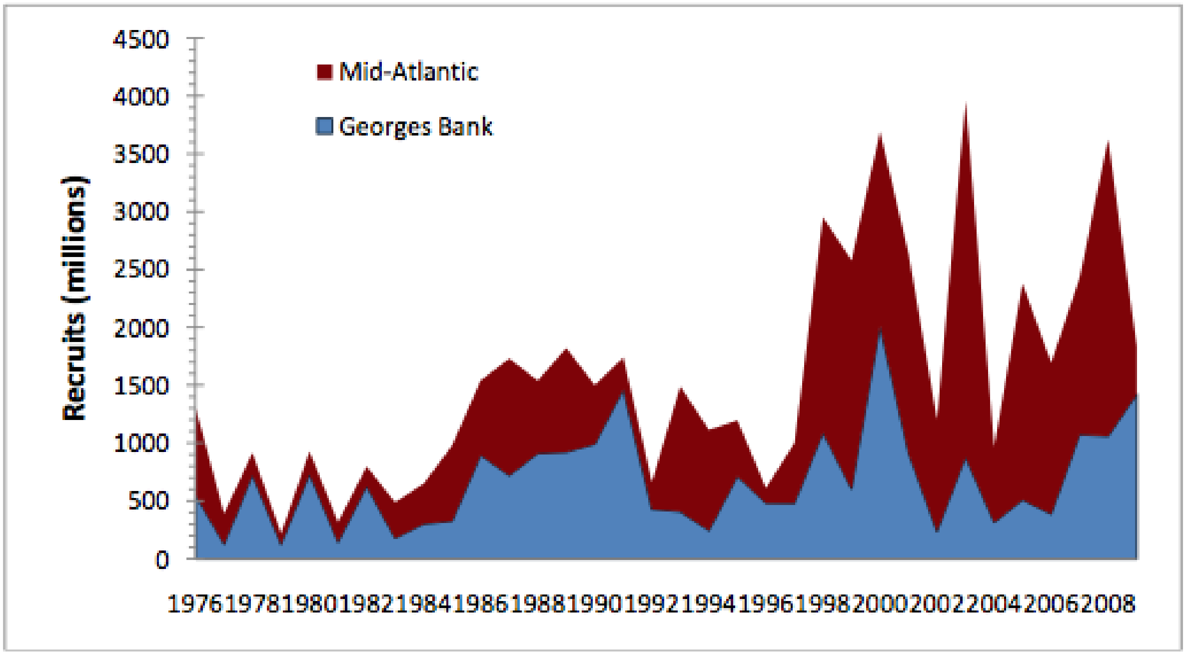


Figure 5: US Sea scallop landings by region, 1975-2009.[1]

In the US, landings from the Georges Bank and Mid-Atlantic regions dominate the fishery (Figure 5). There were major peaks in Georges Bank landings in the early 1960s, in 1980 and 1990 but these fell to a very low level in 1993 then built up, slowly at first, then more rapidly to a high level, primarily due to the reopening to scallop dredging in the access areas.

Mid-Atlantic landings were generally lower than those from Georges Bank until the mid-1980s, but since then, with good recruitment and the diversion of effort from the closed areas on Georges Bank, there has been a strong upward trend to a high peak of 24,494 t meats in 2004 and Mid-Atlantic landings in most years have exceeded those from Georges Bank.

Landings continued to remain strong with NOAA stating that, "the Atlantic sea scallop resource is healthy and the fishery is operating sustainably," said Patricia Kurkul, regional administrator, Northeast Region, NOAA Fisheries Service. "In 2010, the fishery had a catch target of 47 million pounds. We were able to raise 2011 catch limits to 51 million pounds and increase them again in 2012 to 54 million pounds." (NOAA press release 20 July 2011).

4.4 Fleet and Gear Description

The US sea scallop fishery is currently conducted mainly by 348 vessels with limited access permits. These boats receive two types of annual allocation: days at sea and trips. Days at sea are used on the open fishing grounds and the boats are restricted to a 7-man crew in order to limit their processing power. The "trips" allocations, currently 5 per year, are permits to fish for scallops in the access areas within the groundfish closed areas that had been initially closed to scallop fishing but parts are now open for fishing when good stocks are available. During these trips the boats operate with a trip catch limit, typically of 18,000 lbs meats. The percentage of landings from access area trips has increased since the access area program began in 1999 and is now about 60% of total landings.

In addition to the limited access fleet, there are also many boats that fish for scallops under "General Category" permits (some 600 vessels made landings in 2005), though these vessels are not part of the unit of certification in this application. General category boats are restricted to 400 lbs meats per trip, with a maximum of one trip per day. Landings from these vessels made up less than 1% of total landings in the late 1990s, but increased to 10% or more of landings during 2007-2009. This type of permit was converted to an individual transferable quota (ITQ) fishery in March 2010 under Amendment 11 (NEFSC, 2010a).

[1] *50th SAW assessment summary report. Pg 35. Sea Scallop Landings 1975-2009*

The general category vessels tend to fish the nearshore grounds, though they can make excursions to the offshore grounds during the summer months (Naidu & Robert, 2006). The limited access boats are generally larger and are designed and equipped to fish the offshore grounds.

The majority of US boats fishing for scallops use two 13-17 foot wide New Bedford-style scallop dredges (Figure 6) although some smaller nearshore boats use Digby-type dredges off the coast of Maine (where there is also a very small recreational catch by divers), and some boats in the Mid-Atlantic use modified otter trawls (Naidu & Robert, 2006).

The New Bedford scallop dredge is one of the sturdiest and heaviest fishing gears used in the capture of scallops worldwide (Lart, 2003), and has changed very little since it was first introduced (Bourne, 1964). Essentially it consists of a heavy metal frame and a steel mesh bag to retain the scallops. The lower side of the bag, that comes in contact with the seabed, and the rear portion of the top side, is constructed of a mesh of steel rings that allows small scallops, bycatch and bottom debris to escape, unless the rings become clogged, while the front section of the top of the bag is made up of a panel of large-mesh twine netting though which fish can escape (Figure 7). Since 2005, the legal minimum ring size has been increased to 4-inches internal diameter to increase yield-per-recruit and the minimum twine top mesh increased to 10-inches to reduce fish bycatch. Across the mouth of the dredge there is a pressure plate at the top and a steel cutting bar on the bottom. The cutting bar normally runs at or just above the seabed, supported by skid-like shoes at the sides, but on uneven bottoms it can impact the seabed, knocking the tops off sand and gravel waves. Behind the cutting bar, one or more tickler chains run across the mouth of the dredge. The cutting bar and the tickler chains stimulate scallops to swim up (Walsh, 2008), or they are lifted hydrodynamically into the bag, together with other epibenthos, stones and bottom debris. Behind the tickler chains there is the sweep chain, which forms the leading edge of the steel ring belly and is attached at each end to the dredge frame, sweeping back in an arc so that the bottom of the bag starts well back from the cutting bar. In addition to the tickler chains that run from side to side, there are also rock chains that run from front to back making up a chain matrix on the underside of the dredge. Together with the vertical support bars on the dredge frame, rock chains prevent boulders or large rocks from entering the dredge bag and fishermen can vary the number of rock chains they put in depending on the nature of the seabed they are fishing. In recent years NMFS and the scallop industry have been investigating ways to modify the New Bedford dredge in order to prevent turtles entering the dredge or being damaged (DuPaul *et al*. 2004; Smolowitz *et al*., 2005; Haas *et al*. 2006; Smolowitz, 2006) and many boats now use these modified dredges but, despite progress in reducing interactions (NMFS, 2008), concerns about their effectiveness remain (Haas *et al*., 2008). FW 23 has been implemented presenting “measures to minimize impacts on sea turtles through the requirement of a turtle deflector dredge” (Federal Register Vol. 77, No. 67: 20728-20742, 6 April 2012).

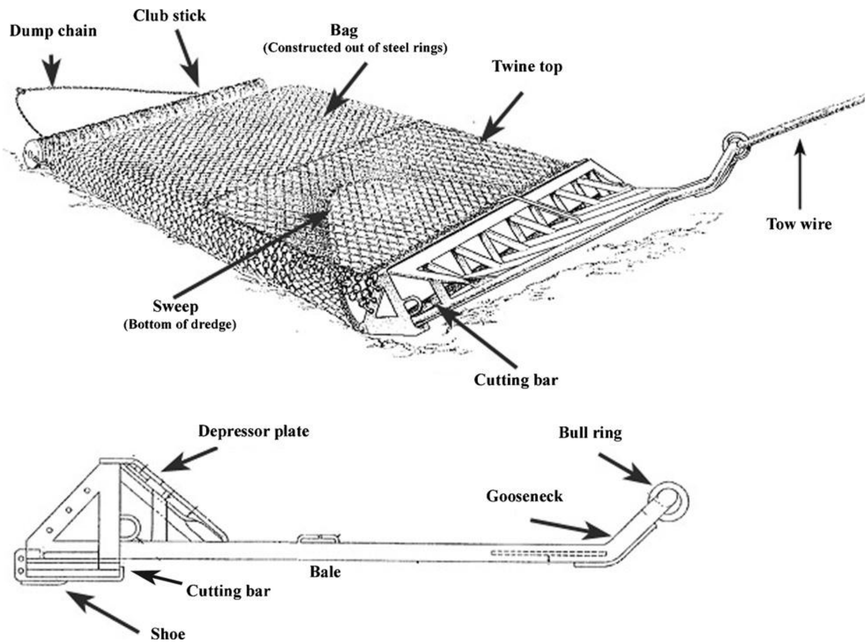


Figure 6: Diagram showing the construction of the New Bedford scallop dredge. (from Haas *et al*., 2008).

New Bedford dredges are towed at speeds of 3 - 5.5 knots and tow duration is generally of 20-30 minutes depending on conditions. Dredge efficiency (the % of scallops in the dredge path that are caught) varies considerably with seabed type and weather but is generally in the range 20-55%, with an average of 46% (Gedamke, *et al*, 2004; Walter, *et al*., 2007). The numerous studies observing the action of New Bedford dredges on the seabed and testing modifications to reduce bycatch have been well reviewed by Walsh (2008). During towing, the cutting bar and shoes make only limited contact with the seabed but the bottom of the steel mesh bag, some 3-4 m long, is in contact with the seabed for much of the tow and this extends for the full width of the dredge. Its weight also increases as the dredge fills with scallops, rocks and other materials during the tow.

Figure 7: New Bedford sea scallop dredge, showing the steel ring bag and twine mesh panel in the top of the dredge.

5 STOCK ASSESSMENT

5.1 Management Unit

There are major fishable aggregations of sea scallops off the eastern seaboard of the USA and Canada throughout the geographical range from Cape Hatteras to Newfoundland. Genetic studies by Beaumont and Zouros (1991), and more recently by Kenchington *et al*. (2006), have shown significant differences between populations in different fishing regions so these cannot be considered a single randomly mating unit. However, this genetic differentiation is weak and the geographical patterns are primarily determined by currents that promote the retention or mixing of the planktonic larvae. For the purposes of fishery management, all sea scallops in the US EEZ are considered to belong to a single stock and this can be divided into Georges Bank, Mid-Atlantic, Southern New England, and Gulf of Maine regional components based on biometric data, fishery patterns and other information (NEFSC 2004; Hart & Rago 2006; Stokesbury 2012). For assessment purposes, Southern New England is considered to be part of the Georges Bank region. Most of the Gulf of Maine scallop population is assessed and managed by the State of Maine because it is primarily in state waters. However, the Northern Gulf of Maine (NGOM) occurs in federal waters and is managed by the New England Fishery Management Council. The NGOM fishery is important locally but amounts to only a small very portion (<1%) of the total US sea scallop landings and is managed by a TAC independently of the rest of the EEZ sea scallop stock.

The US sea scallop fishery is managed under the New England Fisheries Management Council (NEFMC) and the Mid-Atlantic Fisheries Management Council (MAFMC) Scallop Fishery Management Plan (NEFMC,1982; NEFMC, 2003). Under this plan the two major components of the sea scallop stock (Georges Bank and the Mid-Atlantic) are assessed separately and then combined to evaluate the stock as a whole (Hart & Rago 2006; Stokesbury 2012).

The scallop stocks on Georges Bank straddle the international boundary between the USA and Canada set up in 1984 and, since then, two very different systems for stock assessment and management have develop on either side of the boundary (Repetto, 2001). The extent to which scallop stocks in the US fishery depend on the settlement of larvae arising in Canadian waters (and *visa versa*) has not been thoroughly established (Kenchington, 2006). This could potentially be a management problem, but as both management systems have been successful in restoring stocks to high levels, it is not currently an issue.

5.2 Assessments and stock status

5.2.1 Catch and Landing Effort

Total landings by region are shown in Figure 5. During 2002-2009, US landings have averaged 26,000 t meats, about twice the long-term average, and they have been particularly high in the Mid-Atlantic region. Fishing effort (days fished) in the US sea scallop fishery generally increased from the mid-1960s to about 1991, and then decreased during the 1990s, first because of low catch rates, and later as a result of effort reduction measures. Effort increased in the Mid-Atlantic during 2000-2005, initially due to reactivation of latent effort among limited access vessels, and then due to increases in general category effort, which were not restricted in number. Total effort has remained fairly stable since 2005, though there have been shifts between regions. See Figure 8.

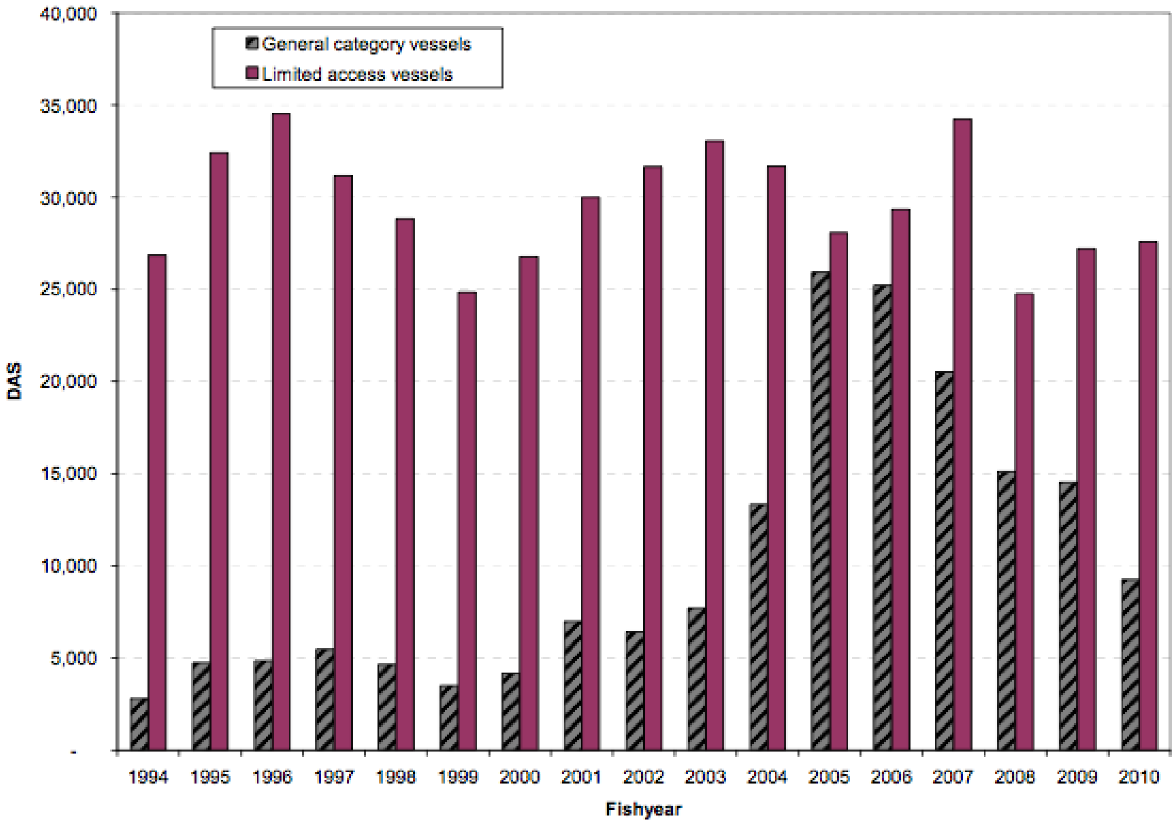
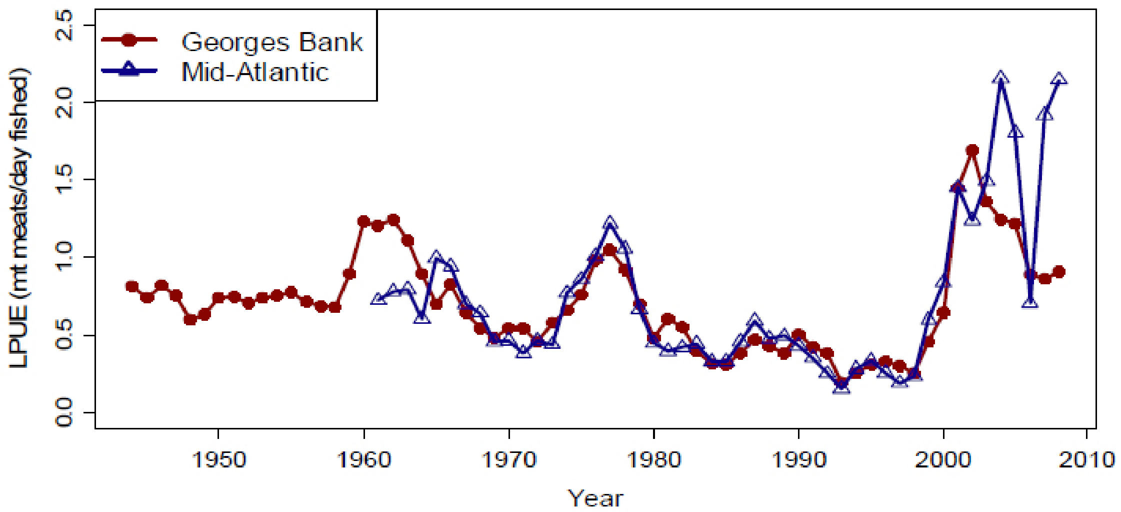


Figure 8 : Total DAS-used by plan (VTR data: date landed - date sailed) (Appendix I Framework 23 Figure 6)

Landings Per Unit Effort (LPUE), measured here in "days fished"(Figure 9a), showed a general downward trend on the open areas of both Georges Bank and the Mid-Atlantic from the beginning of the time series until 1998, though there were occasional small increases for a few years corresponding to strong recruitments. Between 1998 and 2001, LPUE more than quadrupled and remained high but variable through 2001-2009. LPUE has been especially high in the access areas reopened for rotational fishing, particularly those on Georges Bank (Figure 9b). Discards of sea scallops were unusually high during 2002- 2004, averaging about 10% of landings (by weight), but have declined since then, probably due to the changes in gear regulations that have reduced catches of small individuals.

a)



b)

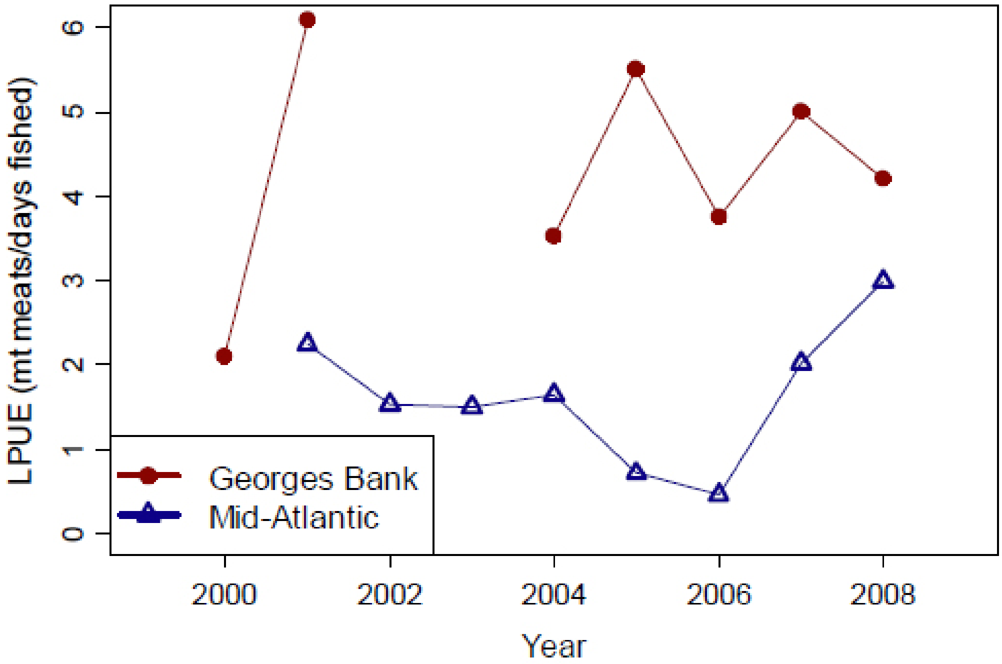


Figure 9: Landings per day fished in a) open areas and b) access areas for Georges Bank and Mid-Atlantic regions of the US sea scallop fishery. (from NEFSC (2010a)

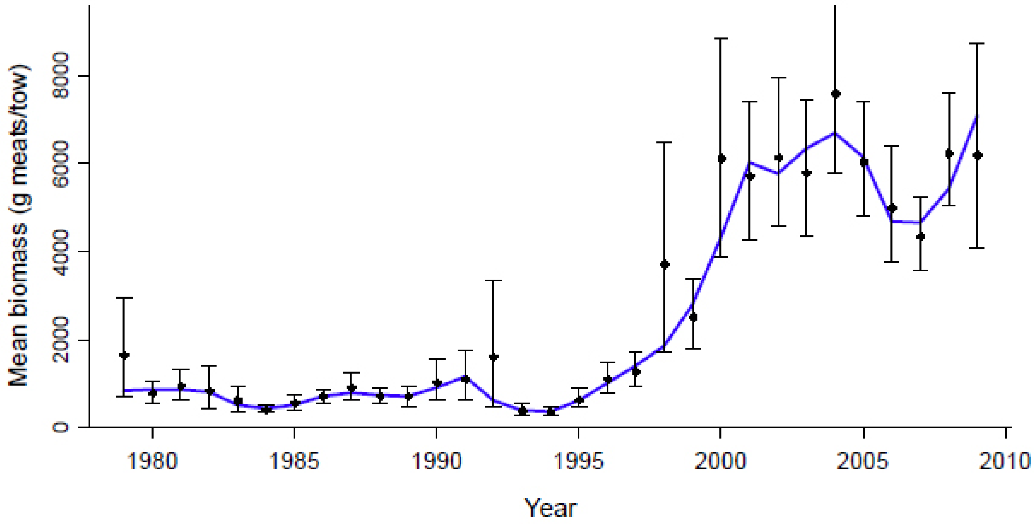
5.2.2 Survey biomass and abundance trends

Biomass trends for Georges Bank and the Mid-Atlantic Bight for the period 1979-2009 are shown in Figure 10. On Georges Bank, biomass increased rapidly from 1995-2000 after the implementation of closures and effort reduction measures. It then declined from 2004-2007 because of poor recruitment, and the reopening of portions of the groundfish closed areas, and increased again from 2007 due to strong recruitment. In the Mid-Atlantic Bight, biomass was at a low level from 1979-1997, but increased rapidly during 1998-2003, due to area closures, reduced fishing mortality, changes in fishery selectivity, and strong recruitment. The sea scallop resource was highest in 2003 and has declined by about 50,000 metric tons almost entirely from the Mid-Atlantic (Stokesbury 2012). This coupled with poor recruitment from 2009 to 2011 has reduced the total biomass. The NMFS, after increasing the allowable catch to 51 million lbs in 2011 and 54 million lbs in 2012 (NOAA press release 20 July 2011), has subsequently reduced the total allowable harvests for 2013 to 37. 8 million lbs (FW 24 adopted by the council in November 2012 and is available at http://www.nefmc.org/scallops/council_mtg_docs/Nov%202012/doc%201%20Draft%20FW24%20November%201.v2.pdf)

The FW 22 estimate acceptable biological catch was 32,935 mt, this was reduced in FW 24 to 21,004 mt for 2013, 23,697 mt for 2014 and 27,185 mt for 2015 (http://www.nefmc.org/scallops/cte_mtg_docs/121107-08/doc%202%20Draft%20Bio%20and%20Eco%20Impacts%20FW24.pdf).

Further, due to a large recruitment event observed in the Mid-Atlantic in the 2012 research surveys (SMAST, VIMS and NMFS), the NMFS initiated an emergency action to re-establish the Elephant Trunk Closed area to protect the small scallops, thereby avoiding high incidental mortality (as observed in the 2003 recruitment event Stokesbury et al.2011) and strengthening the rotational management plan (Federal Register Vol 77, No 239, 12 Dec 2012 Docket No. 121203677–2677–01). In conclusion, although the overall total biomass of the scallop resource has decreased by about 100 million lbs the overall abundance has increased from 5.5 to 8.0 billion scallops, similar to the abundance from 2004 to 2010 (Stokesbury 2012 and the updated SMAST survey data reviewed by the scallop PDT on 19 and 20 August 2012).

(a)



(b)

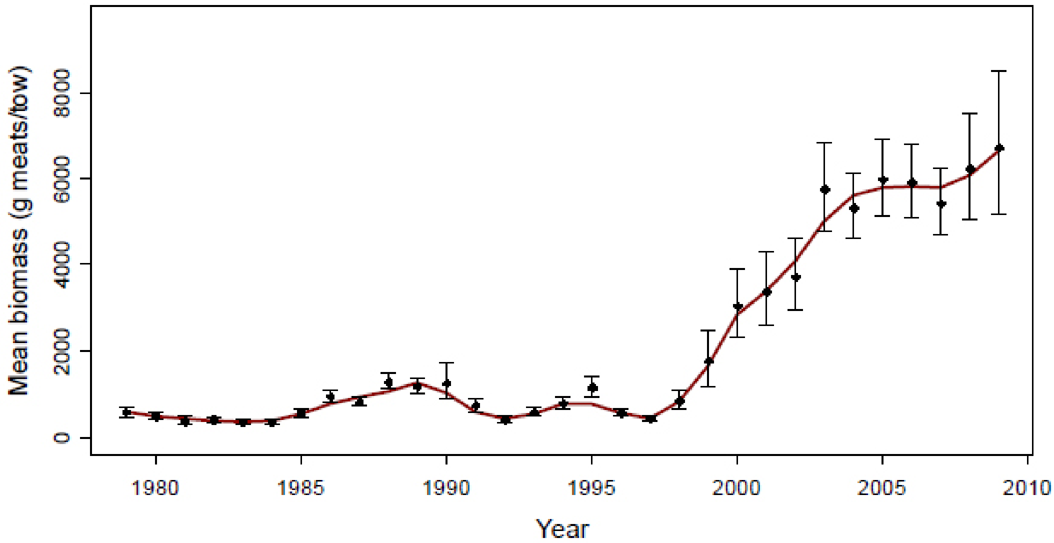
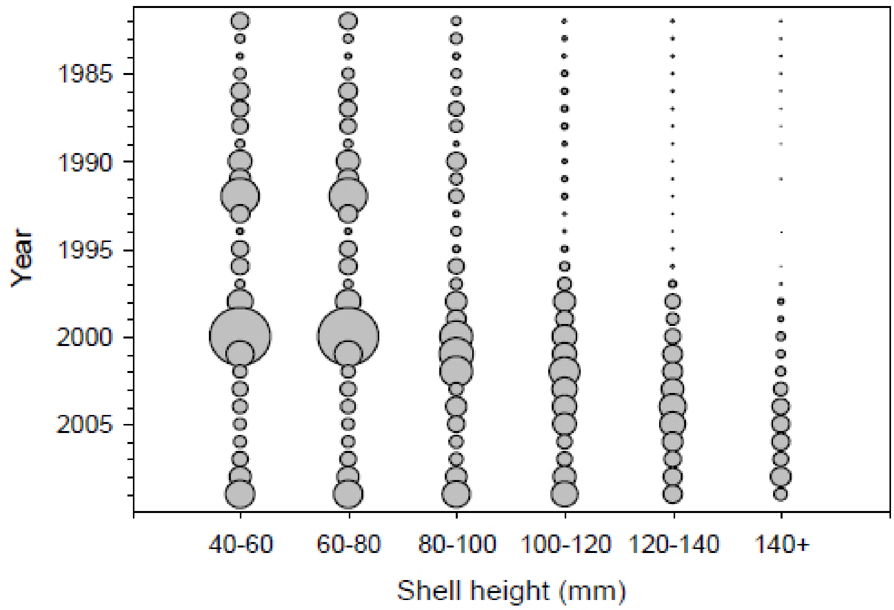


Figure 10: Trends in biomass, 1979-2009, for (a) Georges Bank and (b) Mid-Atlantic, based on NEFSC lined dredge sea scallop survey (with 95% confidence intervals). (from NEFSC, 2010a)

5.2.3 Commercial shell height data

The collection of reliable commercial size compositions is of crucial importance for the use of size-based assessment models. This has been problematic in the US sea scallop fishery because most scallops are shucked at sea. In the past, port samples of shells brought in by commercial fishermen were used, but there were concerns about whether these samples were randomly collected. Some substance for this concern is based on the observation that port samples collected during 1992-1994, when meat count regulations were in force, differed considerably from those collected by at-sea observers during the same period. For this reason, size compositions from port samples after 1984 have not been used in recent assessments and observers have collected shell height data of kept scallops from commercial vessels since 1992, and discarded scallops since 1994. Although these data are likely to be more reliable than those from port sampling, they must still be interpreted with caution for years prior to 2003 due to limited observer coverage, particularly in the open area fisheries.



(b)

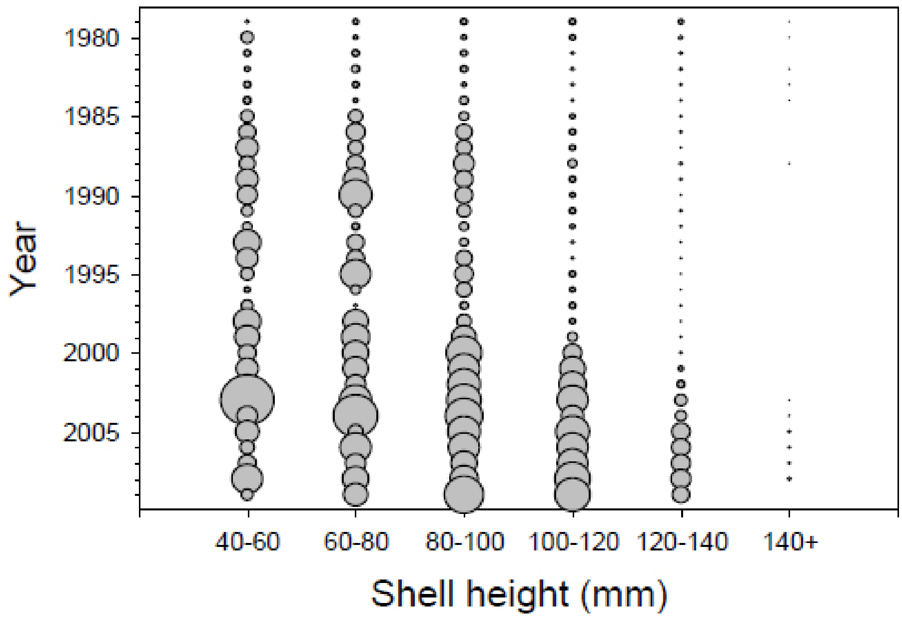


Figure 11: Trends in shell height distribution for (a) Georges Bank and (b) Mid-Atlantic, based on the NEFSC lined dredge survey. (from NEFSC, 2010a)

5.2.4 The CASA model

A dynamic, spatially explicit, size-based stock assessment model (CASA) is used to estimate biomass, abundance and fishing mortality for the Georges Bank and Mid-Atlantic components of the fishery and these are then combined to assess the stock as a whole. These assessments are made every three years. The CASA model was introduced in a preliminary version in NEFSC (2004) and used as the primary assessment model in NEFSC (2007a). CASA uses commercial landings, commercial kept and discarded shell heights from port and sea sampling, shell height/meat weight data and growth increment data from analysis of shell growth rings to model transitions between shell height classes over annual time intervals. The model is then tuned using the annual NEFSC dredge survey data (unlined for 1975, 1977 and 1978, lined for 1979 onwards, see Figure 1for the area surveyed), the SMAST large camera video survey (2003 onwards) and the NEFSC winter trawl survey for the Mid-Atlantic (1992-2007).

The dredge surveys provide annual biomass and abundance indices, with uncertainty within surveys expressed by confidence intervals, calculated using standard methods for stratified random surveys; care was taken to demonstrate that the survey methodology was robust to changes in survey vessel and dredge modifications. Dredge efficiency was estimated by sampling survey tows together with the HabCam towed digital camera which enabled efficiency-corrected swept area biomass estimates to be made; this is valuable because it provides information on absolute scale to be incorporated in the stock assessment (NEFSC, 2010b). Similarly, the SMAST large camera video survey (Stokesbury, *et al*., 2004) provides information on both scallop density and shell height frequency, and comparisons with the "small camera" survey data gave estimates of selectivity to be used in the assessments.

The input data used in the CASA model is generally of a high order, in terms of both the duration and quality of the datasets and it is a great strength that there are two excellent, very large-scale, fishery-independent surveys of scallop abundance and biomass based on the dredge and video surveys. For both of these surveys the data are well characterized and there has been a very rigorous examination of sources of uncertainty and calibration issues (NEFSC, 2010b). Data on discard rates and discard mortality, however, has not been so reliably determined. Small scallops are often discarded because they are uneconomical to shuck, or because of high-grading, particularly in access areas trips where the boats are fishing with a catch limit. There are no data on discards before 1992, when observers started recording discard ratios, but observer coverage was low until 2003, particularly on non-access area trips. Discarded scallops may be damaged or killed in the dredge or on the deck due to crushing, high temperatures or desiccation. On return to the seabed there may be additional mortality due to physiological stress or reduced ability to swim to avoid predators (Veale *et al*., 2000; Jenkins & Brand, 2001). Total discard mortality is uncertain but has been estimated at 20% in this, and previous assessments (NEFSC, 2007a). Since discard frequency and mortality are poorly known for the data series as a whole, discards are not included explicitly in the CASA model but are included with other non-yield mortality sources in a single incidental mortality estimate.

For the first time the 2010 assessment used the 1st July rather than 1st January estimate of biomass to determine overfished status and stock trends. There are several advantages of this. Firstly, it is preferable because growth parameters are estimated from mid-year surveys and because the CASA model does not consider seasonal growth. In addition, 1st July biomass estimates from CASA are directly comparable to survey swept-area biomass estimates. This date change does not change the estimated F or affect the definition of overfishing (NEFSC, 2010a).

The combined abundance and biomass estimates from CASA increased rapidly in the decade starting in 1994, and have been stable or slightly increasing since then. Estimated biomasses (1st July) for 2009 were 62,470 t meats for Georges Bank and 67,233 t meats in the Mid-Atlantic, giving a whole stock biomass of 129,703 t meats and stock abundance of 4,446 billion scallops. Both biomass and abundance for 2009 were at the maximum of the 1975-2009 time series.

5.2.5 Biological Reference Points

In the 2007 sea scallop assessment the per recruit reference points F_{MAX} and B_{MAX} were used as proxies for F_{MSY} and B_{MSY} giving estimated values of F_{MAX} =0.29 and B_{MAX}=109,000 t meats (1st January biomass) (NEFSC, 2007a; NEFSC, 2007b). However, with the increase in dredge ring size to 4-inches and targeting of older scallops in the access areas in recent years, changes in selectivity in the fishery have made yield per recruit curves increasingly flat, making F_{MAX}, both more difficult to estimate and sensitive to small changes in parameters so it was recommended that alternative reference points should be explored (NEFSC, 2007a). In response, the Stochastic Yield Model (SYM) was developed. This is an innovative approach that uses Monte Carlo simulations to make direct estimates of F_{MSY} and B_{MSY} and has the great strength that it includes information on uncertainty among the parameters. Furthermore, unlike the previous proxy-based methods, SYM incorporates stock-recruitment relationships, which may be important given recent evidence of strong recruitment in the Mid-Atlantic when biomass has also been high. The use of SYM for estimating biological reference points in this fishery was examined by an external international peer review panel (NEFSC, 2010b) and fully endorsed. The new reference points calculated in the 2010 assessment using SYM are F_{MSY}=0.38 and B_{MSY}=125,353 t meats. The updated biological reference points are shown in Table 2 in comparison with those from the 2007 assessment.

Together with the change of reference points from *Fmax* and *Bmax* to *Fmsy* and *Bmsy* recommended by the 50th Stock Assessment Workshop (NEFSC, 2010a), Amendment 15 (NEFMC, 2010a) approved a new overfishing definition that was more consistent with rotational area management. The 'hybrid' approach chosen combines the overfishing threshold (formerly *Fmax*, now *Fmsy*) from the status quo overfishing definition with a fishing mortality target that separates open from access areas. The *Ftarget* for open areas would be constant, and the *Ftarget* in access areas would be allowed to fluctuate with time.

Table 2: Biological reference points from the 2007 and 2010 sea scallop assessments(from the CASA model) (from NEFSC, 2010a) and from 2011 to 2013 (from Framework 22 published in the Federal Register Vol 76. No. 140. 21 July 2011 page 43775).

Reference point	SARC-45, whole Stock	Updated		
		GBK	MAB	Whole stock
F_{MSY}	--	0.21	0.47	0.38
B_{MSY} (July 1, 40+ mm SH)	--	41,468	86,330	125,358
$B_{Threshold}$=1/2 B_{MSY}	--	20,734	43,165	62,679
MSY	--	6,410	19,040	24,975
F_{MAX} (SYM)		0.295	0.835	0.48
F_{MAX} (CASA)	0.29	0.23	0.375	0.30
B_{MSY} proxy (CASA) (Jan. 1, 40+ mm)	108,628	--	--	127,000
$B_{Threshold}$=1/2 B_{MSY} proxy	54,314	--	--	63,500

TABLE 1—SCALLOP CATCH LIMITS FOR FYS 2011 THROUGH 2013 FOR BOTH THE LA AND LAGC IFQ FLEETS (MT)

	2011	2012	2013
OFL	32,387	34,382	34,081
ABC/ACL	27,269	28,961	28,700
Incidental TAC	23	23	23
Research Set-Aside (RSA)	567	567	567
Observer Set-aside (1 percent of ABC/ACL)	273	290	287
LA sub-ACL(94.5 percent of total ACL, after deducting set-asides and incidental catch)	24,954	26,537	26,293
LA sub-ACT (adjusted for management uncertainty)	21,431	23,546	19,688
LAGC IFQ sub-ACL (5.0 percent of total ACL, after deducting set-asides and incidental catch)	1,320	1,404	1,391
LAGC IFQ sub-ACL for vessels with LA scallop permits (0.5 percent of total ACL, after deducting set-asides and incidental catch)	132	140	139

5.2.6 Fishing Mortality

In earlier assessments of this stock the rescaled catch-biomass method was used as the primary method to estimate fishing mortality rates (NEFSC 1999, 2001, 2004; Hart & Rago, 2006) but, for the last two assessment (NEFSC 2007a and NEFSC,2010a).), the CASA model has become the primary tool. Fully recruited fishing mortality rates for the whole stock for the period 1997 – 2009 from the CASA model are shown in Figure 12, together with the total biomass estimates. Biomass fluctuated down to a low level from 1975 to 1993, while F rose strongly to a high peak. F then fell sharply until 1998 and has remained low since, while the biomass has risen strongly to a very high level.

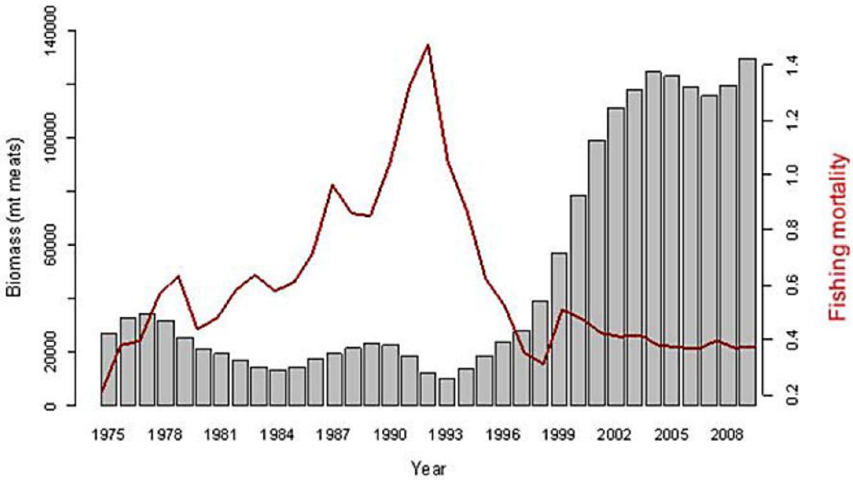


Figure 12: Whole-stock estimates of fully recruited fishing mortality (line) and biomass (bars) (from the CASA model) (from NEFSC, 2010a)

Fishing mortality on Georges Bank for different size classes (Figure 13) shows significant exploitation of the 80mm shell height size class prior to 1992 but, since then, the fishery has increasingly targeted larger scallops and F on the 100 mm size group is very low and on the 80 mm size group is negligible.

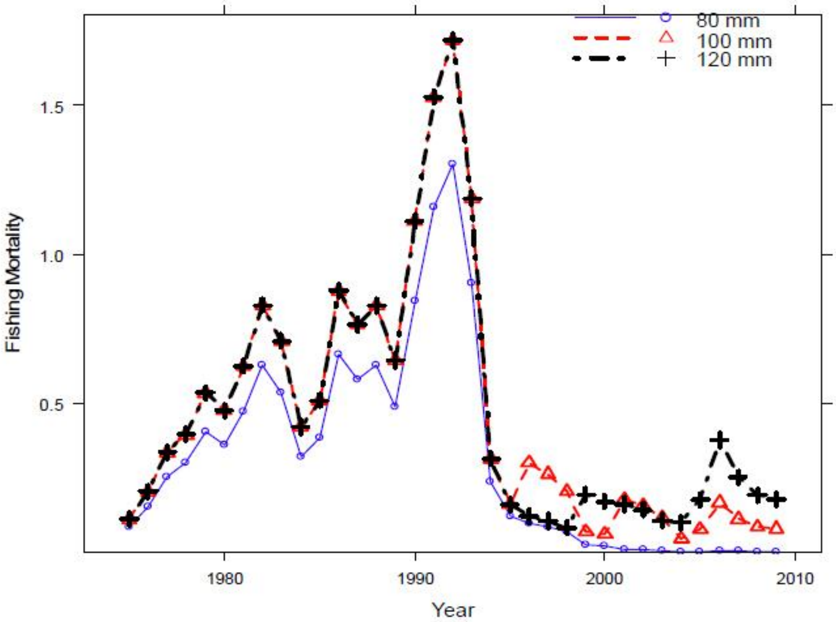


Figure 13: Fishing mortality for Georges Bank estimated for 80 mm, 100 mm and 120 mm shell height size groups (from the CASA model). (from NEFSC, 2010a)

Fully recruited fishing mortality rates for the whole stock ranged from 0.37 – 0.4 for the period 2005-2009 with an average of 0.38. These values cannot be compared with the fully recruited F values calculated prior to 2006 due to the changes in size selectivity over time, which has made it necessary to calculate the new biological reference points (Table 2).

5.2.7 Recruitment

Because of its spatial and temporal variability, recruitment is an important factor in sea scallop fisheries. For Georges Bank, recruitment was relatively low during 2002-2006 but has been above average for 2007-2009. For the Mid-Atlantic populations, recruitment was good during 1998-2008 but below average in 2009. For the combined stock, recruitment has been above average since 2005. The scallop resource seems to have two recruitment patterns: a relatively constant rate at roughly 35% of the total population but with lows down to 17% and then occasional extreme events such as the Mid-Atlantic 2003 recruitment of roughly 12 billion scallops (Stokesbury et al.2011a; Hart & Shank 2011; Stokesbury et al.2011b; Stokesbury 2012).

5.2.8 Natural Mortality

Natural mortality (M) is one of the most difficult parameters to estimate in fishery research and previous sea scallop assessments have generally used the value of M=0.1 y^{-1} based on some early studies (Dickie, 1955; Merrill & Posgay, 1964) of the ratio of clappers (dead shells still connected by the hinge) to live scallops in survey catches. For the 2010 assessment, the basis for this calculation was re-examined and it was concluded that a value of M=0.12 was more appropriate for Georges Bank. As no direct estimate of *M* is available for Mid-Atlantic sea scallops this was calculated from the well known constant relationship between M and the growth constant *k* (Charnov, 1993) and a value of M=0.15 was used in the 2010 assessment. While these values are the best currently available it would be beneficial to initiate studies to evaluate the variability of M on different fishing grounds and with age of scallops. Mass mortalities also occur in scallop aggregations: in 2007 an event occurred in the Nantucket Lightship closed area resulting in a decline in density of 50% in the access area, equal to 6484 mt of harvestable biomass (Stokesbury et al.2007).

5.2.9 Incidental Mortality

New Bedford scallop dredges are extremely heavy steel structures and it is likely that they kill many scallops that pass under or through the dredge, while others are injured and eaten by predators: this non-yield mortality is called incidental mortality. Despite its likely importance, there appear to have been only two estimates of incidental mortality for New Bedford dredges, neither of them recent and neither on grounds typical of the main US sea scallop fisheries. Caddy (1973), working on a hard-bottomed area in Canada, estimated that 15-20% of the scallops remaining in the track of a dredge were killed, while Murawski and Serchuk (1989) estimated incidental mortality to be less than 5% on a sandy bottom area off the coast of New Jersey. It seems likely that this difference is due to the nature of the seabed in the two studies. Based on these values, and estimates of dredge efficiency, incidental mortality was estimated as 0.2 that of landed fishing mortality on Georges Bank and 0.1 in the Mid-Atlantic (Hart, 2003) and these values were used in the CASA assessment model. However, there is considerable uncertainty in these numbers so it important that new studies should be carried out on the main fishing grounds, and using modern dredges, particularly since a greater proportion of young scallops will now be passing through dredges with 4-inch rings.

5.2.10 Stock Status

Consideration of the current state of the stock is confused by the fact that the 2010 assessment recommends the acceptance of new biological reference points that differ from those used for previous assessments (Table 2.) According to the Amendment 10 overfishing definition (NEFMC 2003), sea scallops are overfished when the survey biomass index for the whole stock falls below 1/2 B_{TARGET}. The target biomass estimated in NEFSC (2007a), B_{TARGET} = 109,000 t on January 1, was calculated as the median recruitment in the survey time series times BPR_{MAX}, that is the biomass per recruit obtained when fishing at F_{MAX}. NEFSC (2007a) estimated F_{MAX}= 0.29, which has been used since then as the overfishing threshold. The updated values for these in the 2010 assessment are F_{MAX} = 0.30 and B_{MAX} = 85,000 t (1st July biomass) and the proposed new stochastic MSY reference points are F_{MSY} = 0.38 and B_{MSY} = 125,358 t (1st July). Estimated whole-stock biomass for 1st January 2009 was 158,610 t meats, and 129,703 t for 1st July. These estimates are above the biomass target of 109,000 t meats from NEFSC (2007a), as well as the new biomass targets (85,000 t meats 1st July using per recruit analysis; 125,358 t meats using the stochastic yield approach). Thus, the current estimated biomass is more than twice the biomass threshold of 1/2 B_{TARGET}, regardless of which reference point approach is used. The sea scallop stock was therefore not overfished in 2009.

The estimated fishing mortality was 0.38 for the whole stock which is above the NEFSC (2007a) overfishing threshold of 0.29 and its updated value of 0.30, but equal to the proposed estimate of F_{MSY} = 0.38. Therefore, overfishing was not occurring in 2009, based on the new recommended overfishing definition. However, the current estimate of fishing mortality is only fractionally below F_{MSY} and the fishery is harvesting the stock at very close to MSY levels. This could be of concern if the current very high productivity of the Mid-Atlantic region is not maintained (Bell, 2010).

5.2.11 Stock Projections

Projecting future stock sizes in this fishery is a complex problem. Because of the sedentary nature of sea scallops, fishing mortality can vary considerably in space even in the absence of area specific management (Hart, 2001). With area management, such as the rotational and long-term closures utilized in this fishery since 1994, this variation can be even more extreme and projections that ignore this variation may be unrealistic and misleading. For this reason, the Scallop Area Management Simulator (SAMS) has been developed and versions of this model have been used since 1999. This is a spatially explicit forecasting model (designed to be consistent with the CASA model) that simulates size-based population dynamics for two regions (Georges Bank and the Mid-Atlantic) and 16 sub-regions, each of which can be set for rotational or long-term closure. For each sub-region, the model accommodates differences in recruitment, growth, initial size structure, shell height/meat weight relationships, management approach (open vs. closed areas and catch quota vs. limits on fishing effort), intensity of fishing effort, and other factors. As Bell (2010) states “this is a sophisticated solution to a complex problem” and the use of this model as a forecasting tool was endorsed by the SARC review Committee (NEFSC, 2010b).

There is a multiplicity of situations that can be modeled using SAMS and it will be used in future to evaluate possible management alternatives. Projections done assuming status-quo management but varying initial conditions, natural mortality and recruitment indicate that, under current selectivity patterns, biomass and landings are expected to increase modestly from 2009 and there is a very low risk of overfishing by 2014.

The SSC met on September 13, 2012 and reviewed OFL and ABC recommendations prepared by the Scallop PDT. The same control rules were used: 1) OFL is equivalent to the catch associated with an overall fishing mortality rate of 0.38; and 2) ABC is set with a 25% chance of exceeding OFL where risk is evaluated in terms of the probability of overfishing compared to the fraction loss to yield. The overall fishing mortality rate used for setting ABC is 0.32. Adjusting for discard mortality the estimates are 21,004 mt for 2013, 23,697 mt for 2014 and 27,185 mt for 2015 (FW 24 pages 18 and 19).

5.3 Harvest controls

From 1982 to 1994, the primary management control in the US Scallop fishery was the minimum average meat weight requirement for landings. In 1993, management strategy changed from meat counts to effort control regulation for the entire USA EEZ (FMP amendment 4 NMFS 1993). Controls were implemented that restricted days-at-sea (DAS), minimum ring size, and crew limits. DAS limits were modified when analysis determined that closed areas would allow targets to be reached with less severe DAS. Consequently temporary access was permitted to Georges Bank closed areas in 1999-2001 (FWs 12-15).

The area-based management system was formalized in 2004 (Amendment 10) with provisions and criteria for rotational closures and allocations of DAS and TACs in closed areas. Amendment 10 also closed the Elephant Trunk area offshore of Delaware Bay, where high numbers of small scallops were observed; and increased the ring size to 4 inches. Limited access vessels were also restricted to a seven-man crew limiting the processing power of the vessels since most scallops are shucked at sea (NEFSC, 2007b)).

FW 16 to the Scallop FMP, implemented in November 2004, adjusted DAS allocations and defined the area rotation schedule for part of the 2004 fishing year and the 2005 fishing year.
It also included:

- An access program for vessels with general category scallop permits with enhanced reporting requirements and a 2% TAC set-aside;
- Yellowtail flounder TACs and provisions to minimize bycatch;
- Changes in finfish possession limits to minimize bycatch and bycatch mortality;
- Seasons when scallop fishing would be allowed to minimize bycatch and bycatch mortality;
- Enhanced sea sampling (through observers) to improve precision of bycatch estimates;
- Provisions to enhance enforcement monitoring and compliance; and
- A dredge-only restriction for fishing in the access areas to minimize bycatch and bycatch mortality. (NEFMC, 2010a)

In 2006, limited access vessels were allocated a specific number of open area DAS for each fishing year in Closed Area II and Nantucket Lightship, as well as a maximum number of trips for different access areas depending on their permit category.[2] Nantucket Lightship and Closed Area I were open in 2007. Both areas were subject to a bycatch TAC of yellowtail flounder. The Elephant Trunk area opened as a result of this action in 2006 with specific allocation of trips, opening dates, and seasonal

[2] Framework 18 provided the regulatory measures for 2006 and 2007.

closures to reduce potential interactions with sea turtles. An area called Delmarva was closed under this action to protect small scallops found in that area.

In 2007, in response to advice from the Plan Development Team (PDT) that overfishing may occur under the current set of management measures, NMFS, acting on advice from Council implemented new measures to: reduce the allocated number of trips for all scallop permit categories in the Elephant Trunk Access Area (ETA); delay the opening of the ETA; and prohibit vessels from possessing more than 50 bushels of in-shell scallops when leaving any controlled access area. These measures were implemented for 2007.

In 2008 FW 19 included the fishery specifications for 2008 and 2009 including the access area schedule, DAS allocations and general category measures. The limited access fishery was allocated a series of access area trips and DAS allocations to achieve an overall F of 0.20. A new rotational area was closed to all scallop fishing (Hudson Canyon area) to protect small scallops. Other measures related to access area fishing were adopted including the continuation of eliminating the crew size restriction on access area trips and prohibiting all scallop vessels from "deckloading", and prohibition from leaving an access area with more than 50 bushels of in-shell scallop onboard.

FW 21 became effective in summer 2010 and includes:

- An acceptable biological catch (ABC) as required by the reauthorized Magnuson Act
- (2007);
- Total allowable catch (TAC) specifications for the 2010 fishing year, DAS allocations, and access area schedule based on a target fishing mortality of $F = 0.24$;
- A provision to allow limited access general category to lease a portion of their IFQ;
- Provisions to minimize impacts of incidental take of sea turtles; and
- A measure to improve the observer set-aside program.

In addition to annual planning process, the scallop plan includes Accountability Measures AM that provide controls preventing ACLs from being exceeded and, where possible, correct or mitigate overages if they occur. These AM's are either in-season, in response to an ACL being exceeded or multi-year in nature where annual data is not available.

For the scallop fishery, in-season AM's include Annual Catch Target (ACT), closure of a fishery, closure of a specific area, reductions in effort, or changes in trip size or bag limits based on in-season monitoring of the fishery. When ACL is exceeded, measures are triggered and implemented as soon as possible to correct the operational issue that caused the ACL overage. This can include modifications to in-season AMs and/or overage adjustments.

Scallop catch is monitored throughout the year. Vessels are required to report landings after each trip, and dealers are required to report landings each week. Since 1999 more effort has been allocated to access areas rather than open areas, so the number of open area DAS allocated has continued to decline. Currently, open area DAS allocations are closer to 40 DAS and five access area trips for a full-time vessel. For an average full-time vessel, that represents about 80 DAS per year – about 40 in open areas and 40 in access areas (Amendment 15 DEIS pg 83). For 2013, effort has been reduced due to the lower biomass estimated observed in the latest stock assessment surveys; Elephant Trunk area and Hudson Canyon area are closed, trip allocations are: 210 to the Hudson Canyon, 116 to the Nantucket Lightship area, 182 to Closed area II southern portion, and 118 to Closed area I; all trips have been reduced from 18,000 lbs to 13,000 lbs. Further each vessel will have 33 DAS in open areas. (FW 24).

This limited fishing time per vessel has its own set of consequences that are under review by Council. Council is concerned the current level of effort is insufficient to maintain vessels and crew throughout the year with increasing costs. Some ports are congested with vessels tied to the dock for the majority of the year causing safety and space issues. While this fishery remains profitable, concerns have been raised about the continued ability to remain profitable while operating inefficiently: wasting fuel, electricity, and maintenance expenses. The Council is considering a range of options to reduce excess capacity in the limited access fishery and thereby increase the efficiency of the fishery overall, improve safety, and reduce costs of the limited access harvest of scallops. One of the options under consideration is "stacking of licenses" enabling a vessel to carry more than one limited access scallop permit.

6 FISHERY MANAGEMENT FRAMEWORK

Although all sea scallops in the US EEZ are managed as a single stock, four regional components and six resource areas are recognized. Major aggregations occur in the Mid-Atlantic from Virginia to Long Island (Mid-Atlantic component), Georges Bank, the Great South Channel (South Channel component), and the Gulf of Maine (Figure 1). These four regional components are further divided into six resource areas: Delmarva (Mid-Atlantic), New York Bight (Mid-Atlantic), South Channel, southeast part of Georges Bank, northeast peak and northern part of Georges Bank, and the Gulf of Maine (NEFMC, 2007a). Assessments focus on two main parts of the stock and fishery that contain the largest concentrations of sea scallops: Georges Bank and the Mid-Atlantic, which are combined to evaluate the status of the whole stock (NEFMC, 2007a).

6.1 Legislation and Regulation

The Magnuson Fishery Conservation and Management Act of 1976, (renamed the Magnuson-Stevens Fishery Conservation and Management Act when amended on October 11, 1996) established a US exclusive economic zone (EEZ) between 3 and 200 miles offshore, and created eight regional fishery councils to manage the living marine resources within that area. The Act was passed principally to address heavy foreign fishing, promote the development of a domestic fleet and link the fishing community more directly to the management process.

The New England Fishery Management Council, one of eight regional councils established by federal legislation in 1976, is charged with conserving and managing fishery resources from three to 200 miles off the coasts of Maine, New Hampshire, Massachusetts, Rhode Island and Connecticut.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) was reauthorized and amended through January 12, 2007. Section 104(a) (10) of the Act established new requirements to end and prevent overfishing, including annual catch limits (ACLs) and accountability measures (AMs). Section 303(a)(15) was added to the MSA to read as follows:

> *"establish a mechanism for specifying annual catch limits in the plan (including a multiyear plan), implementing regulations, or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability."*

ACLs and AMs were required for all fisheries by fishing year 2010 if overfishing was occurring, and they were required for all other fisheries by fishing year 2011. The Council approved this action in 2010 so that measures establishing ACLs were implemented for the start of the 2011 fishing year, as required by the MSRA.

The Magnuson-Stevens Act provides a mechanism for identifying and evaluating environmental issues associated with Federal actions and for considering a reasonable range of alternatives to avoid or minimize adverse impacts to the extent practicable. The scoping process includes opportunity for the public to raise issues and concerns for the Council to consider during the development of the amendment. The Council relies on input during scoping to both identify management measures and develop alternatives that meet the objectives of the Scallop Fisheries Management Plan (FMP).

The Scallop FMP includes alternatives for in-season AMs and AMs for when ACLs are exceeded. Use of an ACT is recommended as a "proactive" in-season accountability measure to help ensure the ACL is not exceeded. The FMP also includes several other "reactive" AM alternatives if the fishery exceeds sub-ACLs (Scallop FMP Section 3.2.3.9).

Adjustments to a management plan created under the Magnuson-Stevens Fishery Conservation and Management Act may be made via an Amendment, which is a full rule making process including extensive public consultations; or via an abbreviated rule-making process used in a FW adjustment.

The specific ACL related measures that may be modified by FW include:

- modifying associated definitions and specification of Over Fishing Limit (OFL), ABC, ACLs and Annual Catch Target (ACTs), all of which are specifically intended to be changed in future

FWs or specification packages as new information becomes available about the resource and fishery;

- the buffers identified for management uncertainty or scientific uncertainty;
- AM's for scallop ACLs and other sub-ACLs allocated to the scallop fishery;
- monitoring and reporting requirements associated with ACLs, timing of AM measures; and
- new ACLs that are not currently part of this program.

The Scallop FMP management measures are generally set two years at a time. Biennially, the Plan Development Team (PDT) evaluates whether management measures need to be revised in order to meet mortality objectives. The PDT is required to submit suggested measures to the Council by September 1 (or November 1 if the fishing year is changed in this action) if revisions are necessary.

During this same process, the PDT develops recommendations for ABC for the scallop stock based on mortality objectives (*Fmax, Fthreshold, Ftarget*). These recommendations form the basis for setting ACLs. The PDT recommendations include the following elements:

- OFL estimate for the next two fishing years;
- ABC recommendation for the length of time the action is in place;
- An evaluation of whether the ABCs have been exceeded in earlier years; and
- Whether rebuilding is needed and adjust as necessary to account for exceeding the OFL.

Once the Council has approved ACLs, they are submitted to NMFS prior to November 1 (or January 1 if the fishing year is changed in this action) for approval and implementation. ACLs can be implemented in several ways. If the Council is submitting a management action as part of the periodic adjustment process, the ACLs can be included in that document. Alternatively, the ACLs can be submitted as part of a specification package supported by the appropriate NEPA document. It should be noted that in many instances, ACLs merely reflect the catch associated with the mortality targets determined by the management plan and therefore the impacts are consistent with those evaluated when the mortality targets were adopted. For this reason, in those instances that an ACL is not revised, it is anticipated that there will not be a need for a new supporting National Environmental Policy Act (NEPA) document.

The NEMFC has passed Amendment 15 to the Scallop Fishery Management Plan to include Annual Catch Limits (ACLs) and accountability measures (AMs) to prevent overfishing. The AM for the Limited Access General Category LAGC fishery is on an individual basis with Individual Fishery Quota (IFQ) reductions the following year if an overage occurs. Yellowtail flounder will be managed in the scallop fishery through a non-target species sub-ACL. If the yellowtail flounder sub-ACL is exceeded, the following AM will apply: "If, by January 15 of each year, the Regional Administrator determines that a yellowtail flounder sub-ACL for the scallop fishery will be exceeded, the specified statistical areas with highest YT bycatch rates will be closed to scallop fishing on March 1 and remain closed for a specified length of time depending on the percentage overage." (Amendment 15, NEFMC, 2010a)

6.2 Fishing rights, licensing etc

The largest numbers of permitted limited access scallop vessels currently are in the ports of New Bedford, MA and Cape May, NJ, which represent 37% and 19% of the total, respectively (Figure 14). Of the 348 permitted limited access vessels in 2009, 203 originate from New Bedford, MA and Cape May, NJ. Although the number of permitted limited access vessels has only increased from 308 in 1994 to a peak in 2005 and New Bedford has always had the largest number of permitted limited access vessels, the port with the next greatest number of contributors shifted from Norfolk, VA (18% in 1994 to 3% in 2009) to Cape May, NJ (9% in 1994 to 19% in 2009).

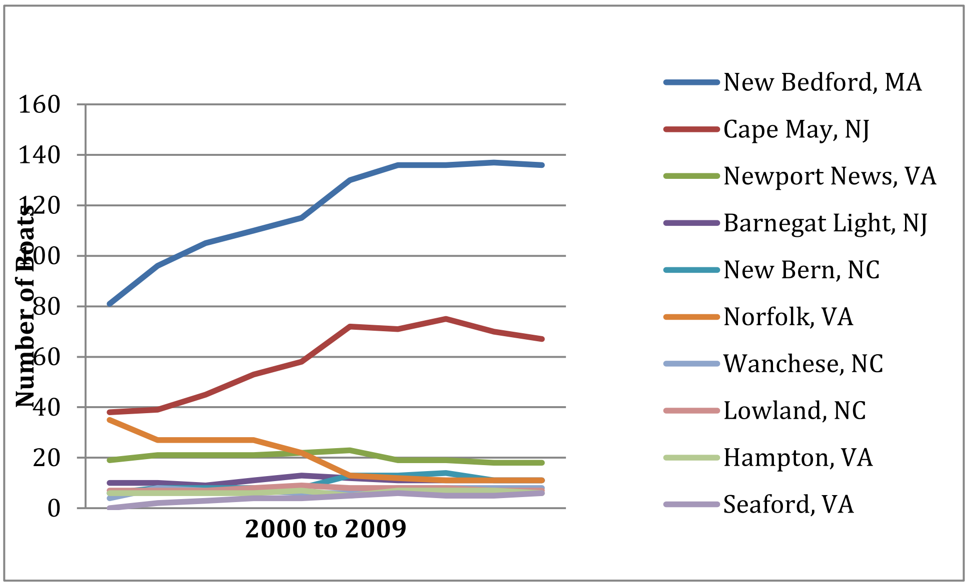


Figure 14: Permitted Limited Access Licenses 2000-2009[3]

In addition to having the greatest number of permitted limited access scallop vessels, New Bedford, MA also has the greatest number of general category scallop vessels. Cape May, NJ, Barnegat Light, NJ, and Gloucester, MA also have high numbers of general category scallop vessels. Generally, ports that had a higher number of general category scallop vessels from 1994-2004, such as New Bedford, Gloucester, and Chatham, have seen a significant decrease in these vessels in recent years.

6.3 Scallop Landings

In the fishing years 2001-2010, the landings from the northeast sea scallop fishery stayed above 100,000 lb pounds of meat per vessel, surpassing the levels observed historically (Figure 15) The recovery of the scallop resource and consequent increase in landings and revenues was striking given that average scallop landings per year were below 50,000 lbs per vessel during the 1994-1998 fishing years, less than half the present level of landings. The increase in the abundance of scallops coupled with higher scallop prices increased the profitability of fishing for scallops by the general category vessels.

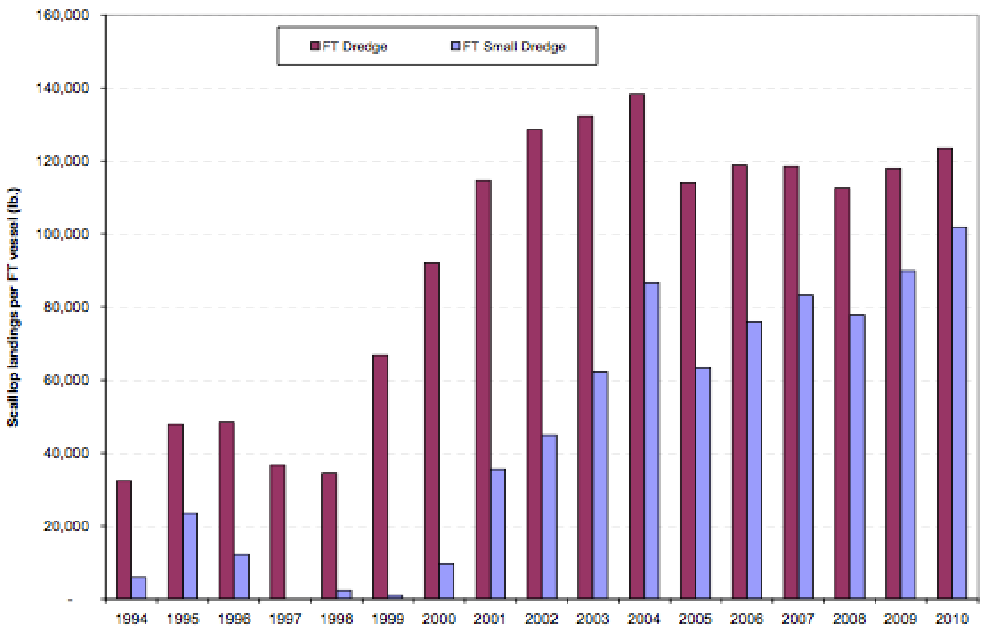


Figure 15: Scallop landing (lbs meat) by Full Time (FT) Dredge permits (Framework 23 Appendix I Figure 5)

[3] **Selected data from Amendment 15 Final DEIS**

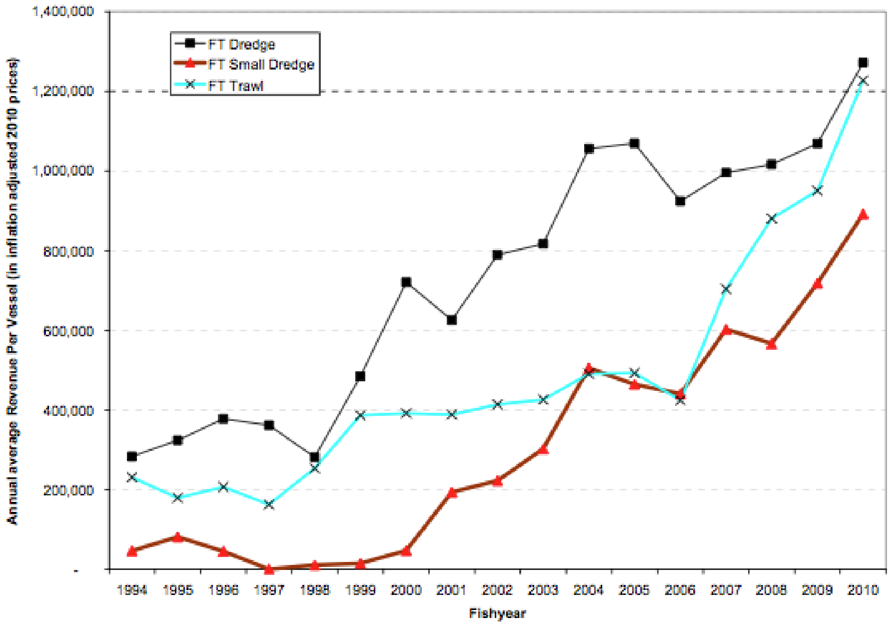


Figure 16: Trends in average revenue per full time vessel by category. (Framework 23 Appendix I Figure 4)

The trends in revenue per full-time vessel were similar to the trends for the fleet as a whole. Figure 16 shows that average scallop revenue per limited access vessel more than tripled from about $300,000 in 1994 to about $1,000,000 in 2008 despite the fact that inflation adjusted ex-vessel price per pound of scallops was slightly higher in 1994 ($7.15 per pound) compared to the ex-vessel price in 2008 ($6.92 per pound). In other words, the increase in revenue was the result of the increase of the average scallop landings per vessel in 2008 (over 136,000 pounds) from its level in 1994 (over 57,000 pounds). The total fleet revenue for all the limited access vessels more than tripled during the same years as new vessels became active. Average scallop revenue per full-time vessel peaked in the 2005 fishing year to over $1.1 million as a result of higher landings combined with an increase in ex-vessel price to about $8.50 per pound of scallops (in terms inflation adjusted 2008 prices).

There has been a steady decline in the total Days at Sea (DAS) used by the limited access scallop vessels from 1994 to 2000 fishing years as a result of the effort-reduction measures of Amendment 4 (1994). DAS allocations during this period were reduced almost by half from 204 DAS in 1994 to 120 DAS for the full-time vessels and in the same proportions for the part-time and occasional vessels from their base levels in 1994. As a result, DAS used reached the lowest levels of about 23,000 days in the 1999 and 2000 fishing years from about 35,000 days in 1994. (Figure 8)

After fishing year 2000, fishing effort started to increase as more limited access vessels participated in the sea scallop fishery. The increase in total effort was mostly due to the increase in the number of vessels because total DAS allocations (mostly less than 120 days) were lower than the DAS allocations in the mid-1990s (over 142 days) (Figure 8). The recovery of the scallop resource and the dramatic increase in fishable abundance after 1999 increased the profits in the scallop fishery, thus leading to an increase in participation by limited access vessels that had been inactive during the previous years. Georges Bank closed areas were opened to scallop fishing starting in 1999 by FW 11 and later by FW 13, encouraging many vessel owners to take the opportunity to fish in those lucrative areas. FWs 14 and 15 provided controlled access to Hudson Canyon and VA/NC areas. As a result, 45 new limited access vessels became active in the sea scallop fishery after 2000 during the next four fishing years. The total number of full-time equivalent vessels reached 310 in 2003 and total fishing effort by the fleet increased to 31,864 days in 2003 from about 22,627 in 2000.

6.4 Administrative Management Committees

The scallop fishery is managed under the Scallop Fishery Management Plan, implemented in 1982 and has been subject to amendment by the New England Fisheries Management Council (NEFMC) under FWs and amendments since then.

The Science and Statistical Committee. From the MSA: Each Council shall establish, maintain, and appoint the members of a scientific and statistical committee to assist it in the development, collection, evaluation, and peer review of such statistical, biological, economic, social, and other scientific information as is relevant to such Council's development and amendment of any fishery management plan. Each scientific and statistical committee shall provide its Council ongoing scientific advice for fishery management decisions, including recommendations for acceptable biological catch, preventing overfishing, maximum sustainable yield, and achieving rebuilding targets, and reports on stock status and health, bycatch, habitat status, social and economic impacts of management measures, and sustainability of fishing practices.

The Scallop Oversight Committee, is made up of members of the NEFMC and the Mid Atlantic Sates Fisheries Management Council (MAFMC) meets regularly to review and discuss the scallop fishery management plan (FMPs) and develop specific measures that will form the basis of the plan, plan amendment or FW adjustment to an FMP. Oversight committee recommendations are forwarded to the respective full Council for their approval before inclusion in any draft or final version of an FMP

The Scallop Advisory Panel, is made up of members from the fishing industry (from both commercial and recreational sectors), scientists, environmental advocates, and others with knowledge and experience related to fisheries issues. They meet separately or jointly with the relevant oversight committee and provide input and assistance in developing management plan measures. Advisors are appointed every three years following a solicitation for candidates. After reviewing applications, the respective oversight committee recommends new or returning advisors. The Council's Executive Committee provides the final approval of advisory panel members.

The Scallop Plan Development Team (PDT) is made up of scientists, managers and other experts with knowledge and experience related to the biology and/or management of a particular species. Individuals serve as an extension of the Council staff. PDTs meet regularly to respond to any direction provided by the oversight committee or Council, to provide analysis of species-related information and to develop issue papers, alternatives, and other documents as appropriate. A member of the Council staff generally chairs each PDT and the team members are from state, federal, academic or other institutions.

6.5 Monitoring, Control and Surveillance

The Northeast Division of the Office of Law Enforcement (OLE) of NOAA has primary enforcement responsibilities for the scallop fishery in federal waters. Programs include days-at-sea, record keeping/reporting, observers and enforcement of area closures. OLE Special Agents and Enforcement Officers conduct complex criminal and civil investigations, board vessels fishing at sea, inspect fish processing plants, review sales of wildlife products on the internet and conduct patrols on land, in the air and at sea. NOAA Agents and Officers can assess civil penalties directly to the violator in the form of Summary Settlements or can refer the case to NOAA's Office of General Counsel for Enforcement and Litigation, which can then assess a civil penalty or they can refer the case to the US Attorney's Office for criminal proceedings.

The scallop fishery is one of the few fisheries in the Northeast that has an industry- funded observer program in place. Since 1999, the majority of observer coverage in the scallop fishery has been funded through the scallop observer set-aside program. A percentage of the total allowable catch (TAC) in access areas has been deducted before allocations are made to generate funding for vessels required to carry an observer. Observer coverage in the scallop fishery is used to monitor bycatch of finfish and to monitor interactions with endangered and threatened species.

Since 1999, vessels required to carry an observer are authorized to land more than the possession limit from trips in access areas, and in open areas, vessels are charged a reduced amount to help compensate for the cost of an observer.

In 2008 and 2009, a total of 629 trips and 404 trips, respectively, were observed on both limited access and general category vessels from the observer set-aside program (**Error! Reference source not found.**). 2009 numbers are through 11/30/09). An additional 96 (in 2008) and 58 (in 2009) sea days were observed and paid for fully with federal funds.

Table 3: Summary of Observed trips in the scallop fishery[4]

	2008		2009		2010* (as of 1/06/11)	
	Trips	DAS	Trips	DAS	Trips	DAS
Elephant Trunk	*4 trips allocated*		*3 trips allocated*		*2 trips allocated*	
Limited Access	213	1752	113	1007	49	497
General Category	150	246	116	268	0	0
Delmarva	*Closed*		*1 trip allocated*		*1 trip allocated*	
Limited Access	Closed		37	299	36	300
General Category	Closed		37	82	19	33
Closed Area II	*Closed*		*1 trip*		*Closed*	
Limited Access	Closed		23	199	NA	NA
General Category	Closed		NA		NA	
Nantucket Lightship	*1 trip allocated*		*Closed*		*1 trip allocated*	
Limited Access	34	244	Closed		31	221
General Category	106	193	Closed		Closed	
Open Areas	*35 DAS allocated*		*37 DAS allocated*		*29 DAS allocated*	
Limited Access	126	1195	135	1359	119	1200
General Category	N/A – not part of set-aside program		N/A – not part of set-aside program		N/A – not part of set-aside program	
TOTAL	***675***	***3726***	***461***	***3214***	***223***	***2030***
Limited Access	**373**	**3191**	**308**	**2864**	**204**	**1997**
General Category	**256**	**436**	**153**	**350**	**19**	**33**
Additional non-RSA federally funded days (GC Open Area)	46	96	41	66	84	124

**2010 data is incomplete and considered preliminary*

There is a relatively high degree of certainty regarding the catch from access area trips since these trips are subject to a possession limit with high penalties for noncompliance.

6.6 Consultation and Dispute Resolution

Consultation in fisheries management is governed by the National Environmental Policy Act (NEPA) guiding the participation of individual citizens, private sector applicants, members of organized groups, or representatives of Tribal, State, or local government agencies in assessment of environmental impacts conducted by Federal agencies (A Citizen's Guide to the NEPA, December 2007)

NEPA applies to a very wide range of federal actions that include, but are not limited to, federal construction projects, plans to manage and develop federally owned lands, and federal approvals of non-federal activities such as grants, licenses, and permits. NEPA requires Federal agencies to consider environmental effects that include, among others, impacts on social, cultural, and economic resources, as well as natural resources.

Public comments are accepted at NEFMC meetings on all major agenda items to the extent practicable, and on those items requiring final action. The Chairman or presiding officer will schedule comments at an appropriate time during the meeting that is consistent with the orderly conduct of business. This opportunity may occur after the Council has discussed the action items and once motions have been made and are under consideration. Council members may ask questions of individuals offering comments. Any interested party may address the Council during this period concerning future direction, issues or initiatives that are relevant to Council business.

[4] Source: Framework 24, Table 25

The Council considers public comments at a minimum of two Council meetings before making its recommendations to the NMFS Regional Administrator on any FW adjustment to a fishery management plan. Options are developed at the first FW meeting, analyses are conducted between the meetings to determine if the options meet the conservation objectives of the action, and the results of the analyses are available in a document 7 days prior to the final meeting. At the final meeting the Council votes on and approves one of the options that meets the conservation objectives for which the measure was developed.

Public comments are accepted at the first or initial FW meeting on the development and selection of various management options. Comments are accepted at the final meeting (and there may be interim meetings), but only on the range of options already selected at the first meeting. The Council will not consider new options at this time.

The NEFMC posts on its website the members of the Scallop Oversight Committee, the members of the Scallop Advisory Panel, and members of the Scallop Survey Advisory Panel. All documents concerning the original Scallop Fishery Management Plan, committee meeting minutes, scoping meeting minutes, and all materials for consideration of amendments and FWs are posted for public information and comment. Public input is encouraged at all meetings and written submissions are considered by Council committee meetings.

Dispute resolution is available through elected representatives and the courts.

6.7 Council Multi-Year Research Plans

The Council has developed, in conjunction with the Science and Statistical Committee (SSC), multi-year research priorities for fisheries, fisheries interactions, habitats, and other areas of research that are necessary for management purposes, for 5-year periods. These research priorities are updated as necessary and submitted to the Secretary and NMFS regional science centers for consideration in developing research priorities and budgets for the region of the Council. (Reference: SSC at http://www.nefmc.org)

7 ECOSYSTEM CHARACTERISTICS

7.1 Ecosystem characteristics

The sea scallop is essentially a continental shelf species, usually found in depths ranging from 18-110m but it occurs in shallower water in the northern part of its range and has been reported from depths as shallow as 2m (Naidu & Anderson, 1984). It is restricted to waters with a maximum temperature of less than 20°C, so towards the southern end of its geographical range it is found in much deeper water, usually in excess of 55m (Bourne, 1964), and the known bathymetric range extends down to 384m (Merrill, 1959). Sea scallops are generally found in areas of seabed with firm sand, gravel, shells and cobble substrate and are typically abundant in areas with low levels of silt (Hart & Chute, 2004).

7.2 Retained Species

MSC Certification Requirements (V1.3 CB3.5.2) refer to "main" retained species. The assessment team are required to identify main retained species if they comprise more than 5% of the total weight of the catch; are of high value; or are considered to be vulnerable (MSC GCR v1.3 GCB 3.5.2). The assessment team concluded that yellowtail flounder was a main retained species. While the yellowtail flounder catch is less than 5% of the total weight of the catch, the Georges Bank and Southern New England/Mid-Atlantic stocks are overfished and in a phase of rebuilding, and so the assessment team considered them to be vulnerable.

7.2.1 Yellowtail Flounder

The US limited access scallop fishery lands yellowtail flounder (*Limanda ferrugineus*) and has a TAC for this species. The distribution of the US scallop fishery overlaps significantly with the Georges Bank, and Southern New England/Mid-Atlantic stocks of yellowtail flounder and more marginally with the Cape Cod - Gulf of Maine yellowtail stock. Yellowtail flounder are managed under the Northeast Multispecies Fisheries Management Plan. In the case of the Georges Bank stock the TAC, and the US share, is set by the Transboundary Management Guidance Committee operating under the US/Canada Resource Sharing Agreement.

A Groundfish Assessment Review Meeting in August 2008 (at the Northeast Fisheries Science Centre, Woods Hole) reported that yellowtail flounder biomass was 22% of the MSY for Georges Bank stock and 13% of the MSY for the Southern New England/Mid-Atlantic stock, and experienced Fmsy levels of 114% and 160% respectively. Available data show that US Sea scallop stocks have increased dramatically since areas were temporally and spatially closed to towed demersal fishing gear, but that the Georges Bank and Southern New England/Mid-Atlantic stocks of yellowtail flounder are currently overfished, such that landings had declined to low levels (Figure 17). Both these stocks of yellowtail flounder are currently in rebuilding plans as mandated by the Magnuson-Stevens Fishery Conservation and Management Act. While the biomass is still low, there has been some increase in recent years in both stocks and fishing mortality is decreasing (NEFMC, 2011a).

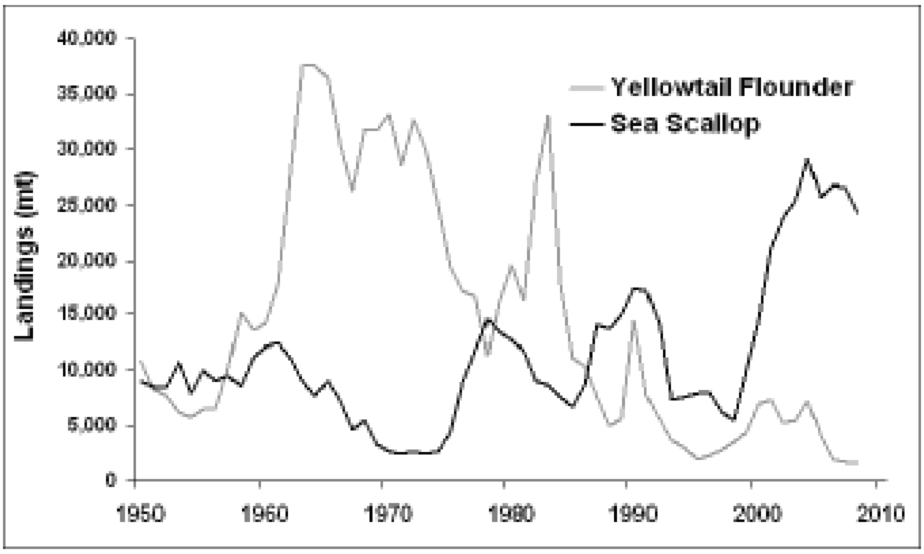


Figure 17: Landings of yellowtail flounder and sea scallops (t) from Georges Bank since 1950 (O'Keefe *et al.* 2010).

Concerns over the declining state of yellowtail flounder stocks have resulted in reduced yellowtail flounder TACs for the scallop fishery within limited access areas in recent years. In an assessment of the Georges Bank yellowtail stock, Legault *et al*. (2010) estimate that the yellowtail flounder catch by the scallop fleet was 112t or 6.6% of the total that year and that the current US rebuilding strategy could not be achieved even with an F=0. There have been recent instances where the US scallop fleet has exceeded its TAC for the closed areas (e.g. an estimated 462,312 yellowtail flounder were caught in Closed Area II and 55,458 were caught in the Nantucket Lightship Closed Area in 2006, representing 103% and 176% of the TAC permitted). In 2008 scallop fishery management had no limits on the catch of yellowtail flounder in the Open Area fishery which is thought to account for 28% and 27% of the allowable biological catch of Georges Bank and Southern New England/Mid-Atlantic yellowtail flounder stocks. Under FW Adjustment 45, the Georges Bank yellowtail rebuilding target was modified to extend the formal rebuilding period from 2014 to 2016 with a probability of success reduced from 75% to 50%. By extending the period it was considered that the US would have more flexibility in co-ordinating management of this trans-boundary stock with the Canadians. It also provided some economic benefits to US fishermen, while retaining the strategy within US legal requirements (NEFMC, 2011a).

In 2009 the National Marine Fisheries Service (NMFS) began publishing its northeast region Standardized Bycatch Reporting Methodology Annual Report, a summary of all observed catches of the federally managed fisheries of the NE region. The 2010 report shows that of the vessels that had observers on board, 2,593 yellowtail flounder were landed whereas 56,748 were discarded.

The scallop fishery has management strategies in place that limit days at sea, limit crew numbers on board and sets quotas for scallops; these were not designed to protect yellowtail flounder but help to do so by reducing the time spent dredging the seabed. Yellowtail flounder, and other groundfish, were afforded protection from direct and indirect effects of scallop dredging when large areas of the US Atlantic continental shelf were closed year-round to towed demersal gear in the 1990s (Murawski *et al*. 2000). Management strategies are currently in place to allow a "limited access" scallop dredge fishery in parts of the previously closed areas. Scallop dredging is now spatially limited in these areas to protect important juvenile groundfish habitat and temporally restricted to avoid spawning times for groundfish (O'Keefe *et al*., 2010). No such measures are in place for the areas outside the historical closures and re-opening parts of the previously closed areas increased interactions of the scallop dredge fishery with yellowtail flounder.

FW 44 of the Northeast Multispecies Fishery Management Plan mandated the retention of all legal-sized yellowtail flounder caught in the scallop fishery and set a TAC for yellowtail flounder in the scallop fishery. The allocation of yellowtail flounder within the Georges Bank access area fisheries is currently capped at 10% of the overall Annual Catch Limit for the yellowtail stocks. For Closed Area I and Closed Area II this applies to the Georges Bank yellowtail stock; for the Nantucket Lightship Closed Area this applies to the Southern New England/Mid-Atlantic yellowtail stock. The scallop fishery has also been allocated 100% of its projected needs for yellowtail catch in 2010 and 90% of the projected needs for 2011 and 2012. This provision was enacted to recognize the importance of yellowtail allocation for the prosecution of the more valuable scallop fishery. This allocation is applied to both open area Days-At-Sea and access area harvest. The 10% cap is dedicated to the access areas, and once that limit is reached scallop fishing in the access areas is prohibited. Of the projected need of yellowtail for the scallop fishery, the 10% access area cap is removed first from the yellowtail stock area and the remaining allocation of yellowtail is applied to the open area Days-At-Sea.

One reason for overages of yellowtail TAC in the access area fisheries is that there is a time lag in data collection from observed trips to reporting of these data from the NMFS. Currently, data from observed trips are reported within 24 h of the trip landing. These data are then compiled and analyzed by the NMFS Northeast Regional Office (e.g. Table 4).

The CAII scallop fishery opened on 15 June 2009 and within the first three days (18 June) 56% of the yellowtail flounder TAC had already been taken. The overage could not have been stopped by the scallop industry as the reporting was time-constrained. Another example of this time lag occurred in NLCA in 2010. The fishery opened on 28 June, but the first NMFS report was not available until 7 July (Table 5).

Table 4: Yellowtail flounder landings data collected for the 2009 Closed Area II scallop fishery.

Recorded on Week Ended	Declared to Closed Area II					Total			
	Kept (lbs)	Discarded (lbs)		Caught (lbs)		Cumulative Caught to Date			
		Estimate	Report	Estimate	Report	With Estimate Discards	With Report Discards	With Estimate Discards	With Report Discards
	1	2	3	4=1+2	5=1+3	(lbs)	(lbs)	% of Quota (349,354 lbs)	% of Quota (349,358 ibs)
06/18/09	3,235	192,928	31,321	196,163	34,556	196,163	34,666	56%	10%
06/25/09	2,915	102,511	15,232	105,426	18,147	301,589	52,703	86%	15%
07/02/09	615	10,351	1,770	10,966	2,385	312,556	55,089	89%	16%
07/09/09	0	0	0	0	0	312,556	55,089	89%	16%
Total	6,765	305,790	48,323	312,555	55,088				

Table 5: Yellowtail flounder landings data collected for the 2010 Nantucket Lightship Closed Area scallop fishery.

	Weekly			Cumulative	
Date	Kepts (lbs)	Estimated Discards (lbs)	Catch (lbs)	Catch (lbs)	% Quota (101,547 lbs)
07/07/10	2,193	14,905	17,098	17,098	16.8%
07/14/10	670	8,631	9,301	26,400	26.0%
07/21/10	375	2,250	2,625	29,024	28.6%
07/28/10	6	763	769	29,793	29.3%
08/04/10	6	394	400	30,194	29.7%

For 2010, the scallop fishery was allocated a total of 135 t of the Southern New England/Mid-Atlantic yellowtail flounder stock. Of this, 47 t was dedicated to the Nantucket Lightship access area (NLCA) fishery. If the fishery harvested the entire 47 t within the NLCA, they would have 88 t to apply towards the open area. The fleet was concerned that the NLCA could be shut down to scallop harvest before the entire scallop allocation had been fished due to bycatch of yellowtail flounder. In an effort to avoid this loss of scallop yield, the scallop industry collaborated with SMAST to devise a yellowtail bycatch avoidance system. The system was comprised of two phases. In phase one, existing survey information (dredge and video surveys for scallops and yellowtail) was analyzed to produce a traffic-light analogy map showing areas where scallops and yellowtail were distributed. This information was provided to the entire fleet prior to the opening of the access area.

Phase two consisted of real-time communication of spatially-specific yellowtail catch data by the fleet to SMAST. The data was compiled and information was sent back to the fleet by daily email to advise on areas of high and low bycatch. The fleet used the information to actively avoid fishing in areas where bycatch rates were high. The fishery was able to complete the entire scallop harvest and only caught 29% of the allocated yellowtail TAC.

The industry participated in the development and implementation of this yellowtail catch reduction program. Over one third of the vessels signed up to participate in the program and received the daily bycatch advisories. Radio broadcasts from active fishing captains alerted the remainder of the fleet to the areas of high bycatch rates and encouraged fishing in areas with lower bycatch rates. Feedback from the industry has been positive with a consensus that the program should continue for future access area fisheries. The industry and SMAST are currently examining the feasibility of conducting the program in all fishing areas and for other species and funding for implementation in future years has been obtained.

To comply with the Magnuson-Stevens Act, Annual Catch Limits (ACL) for yellowtail flounder were introduced in Amendment 15 (NEFMC, 2010a) and the scallop fishery was allocated sub-ACL's for the Georges Bank and Southern New England/Mid-Atlantic yellowtail stocks. Accountability Measures (AM's) included in Amendment 15 make provision for dealing with instances when the sub-ACL is exceeded, including time/area closures in the rotational management areas. Under these arrangements, pre-identified areas within the Georges Bank and Southern New England/Mid-Atlantic yellowtail stocks would close to scallop fishing in the fishing year following a fishing year in which the yellowtail sub-ACL for the scallop fishery was exceeded. These areas will remain closed for a length of time necessary to reduce yellowtail catches by the same percentage as the sub-ACL was exceeded. These measures, together with the reduction in the scallop fishery allocation to 90% of the projected yellowtail catch, provide incentives for the scallop fishery to reduce yellowtail bycatch in order to maximise their scallop catch.

The scallop fleet used only 29.5% of its yellowtail by-catch allocation in 2011. (Table 6)

Table 6: Yellowtail Flounder Catch in Directed Scallop Fishery Georges Bank Access Areas 2011[5]

Access Area	Cumulative kept (lb)	Cumulative estimated discards (lb)	Cumulative catch (lb)	Percent of quota (306,000 lb)
CAI	137	8,618	8,755	2.9
CAII	18,776	62,719	81,495	26.6
Total	**18,913**	**71,338**	**90,251**	**29.5**

In 2012 area specific allocations were replaced with a single stock level allowable catch limit. If this is exceeded accountability measures are implemented the following year as a series of area-based closures for specific periods of time (listed in Amendment 15; Federal Register Vol 76, No 140 July 21, 2011, p 43746). The yellowtail allocation to the scallop fleet was also reduced by 50%. As of 20 December 2012 95.5% of the allocation had been collected (Yellowtail Flounder Sub-ACL for the Directed Scallop Fishery NOAA NMFS regional office website). The 2013 allocation is not defined as a scientific debate over the Georges Bank yellowtail stock size continues. Presently the yellowtail flounder allocation ranges between 1,150 mt and 500 mt for both Canada and the United States fisheries. Alternatives to deal with these various scenarios are presented in FW 24 of the scallop FMP and FW 49 of the Groundfish FMP.

7.2.2 Main Bycatch (not retained/discarded) Species

MSC Certification Requirements (V1.3 CB3.8.2) refer to "main" bycatch species. The assessment team are required to identify main bycatch species if they comprise more than 5% of the total weight of the catch or are considered to be vulnerable (MSC GCR v1.3 GCB 3.8.2). The assessment team concluded that winter flounder was a main bycatch species. While the winter flounder catch is less than 5% of the total weight of the catch, the Southern New England/Mid-Atlantic stocks is overfished and in a phase of rebuilding, and so the assessment team considered them to be vulnerable.

Because of the concerns of the potential impact of the fishery on other species the assessment team have also included text showing their consideration of other species and species groups that may be part of the bycatch in the fishery.

7.2.3 Winter Flounder

While Winter flounder stocks (Gulf of Maine, Georges Bank and Southern New England) are no longer subject to overfishing (Status of Stocks 2011), the Southern New England/Mid-Atlantic winter flounder stock is at an all-time low. Recent scientific data indicate that previous assessments significantly overestimated the abundance of this stock, leading managers to believe that it was healthier than it actually was. Managers immediately responded to this new information, prohibiting harvest of Southern New England winter flounder in all fisheries. The latest science indicates that the abundance of this stock has increased slightly in the past two years and is now at 16 % of target population levels (up from 9 % in 2008). The Georges Bank winter flounder stock is no longer considered overfished and, under strict management measures, is rebuilding to sustainable levels (currently at 82 % of the target population level). The results of latest assessment for Gulf of Maine winter flounder were highly uncertain, so scientists were not able to determine the population status

[5] Source: NOAA 2011

for this stock. However, they did determine that fishing rates in recent years have been well within the sustainable level. As a result, managers were able to double the amount of Gulf of Maine winter flounder commercial fishermen can catch for the 2011/2012 fishing season. (NOAA press release 8 February 2012).

7.2.4 Other Bycatch Species

An assessment of the impact of the fishery on all minor bycatch species is complex as many invertebrate and vertebrate species are involved. The status of most of the invertebrates is poorly known but there is no evidence to suggest that the scallop fishery is causing the invertebrate bycatch to be outside biologically based limits. Sedentary bottom dwelling fish (e.g. skates, monkfish, flounders) can be injured or killed as they pass through or under the gear and larger individuals are caught and selectively removed from populations. Some skates have late ages of maturity (e.g. barn door skate 8 years and thorny skate 7 years) and together with winter and summer flounder these minor bycatch species are outside biologically based limits.

Both quantitative and qualitative information are available on the amount of bycatch taken by the fishery, based on landings data and onboard observer data. There are observers on approximately 15% of the scallop fleet providing qualitative and quantitative information on the amount of main bycatch species affected by the fishery. No information is gathered on the unseen impacts of scallop dredging on bycatch species that may pass through or under the dredges, nor on the ecological effects of scallop dredging on bycatch species populations, for example through habitat alteration, changes in biodiversity and altered productivity. The Standardized Bycatch Reporting Methodology (SBRM) Omnibus Amendment (NEFMC, 2007) established a performance standard for bycatch monitoring that is applied to the scallop fishery. Among the reported species are those that are overfished or are experiencing overfishing. These reports summarize catch composition and biomass (kept and discarded) for a broad range of species recorded on scallop boats with observers on board. Just over 18% of observed catches in the scallop fishery were discarded, a total of 7.5 million pounds. Examples of these observed catch data for 2009 include:

- Sponges 1.724 million pounds, all discarded;
- Starfish 464,000 pounds, all discarded;
- Scallops 33.28 million pounds kept, 1.39 million pounds discarded;
- Yellowtail flounder 2,593 pounds kept, 56,748 discarded;
- Summer flounder 5,217 pounds kept, 94,171 discarded;
- Winter flounder 735 pounds kept, 18,412 discarded; and
- Skates 976 pounds kept, 1.434 million discarded.

It is noteworthy that large numbers of undersize yellowtail flounder are discarded and that small or damaged scallops are also discarded. Mortality to discarded organisms is highest in summer due to heat-shock whilst on deck, especially off the Mid-Atlantic states (Stokesbury et al., 2011).

The SBRM amendment is intended to ensure that the data collected are sufficient to produce a coefficient of variation (CV) of the discard estimate of no more than 30 percent, in order to ensure that the effectiveness of the Northeast Region SBRM can be measured, tracked, and utilized to effectively allocate the appropriate number of observer sea days. The SMAST video survey has collected information on the abundance and distribution of over 60 taxa for 10 years (Stokesbury et al., 2002; 2004; Harris and Stokesbury, 2010a; Stokesbury and Harris, 2006; Harris and Stokesbury, 2010b). The quantitative information from this continental shelf-wide survey documents changes in the benthic environment. The information available is adequate to broadly understand the outcome status of the fishery with respect to the biologically based limits of bycatch species and this information is adequate to support a partial strategy to manage the main bycatch.

7.2.4.1 Other Fish Bycatch

Fish represent <5% of the total catch by weight brought up in the US scallop dredge fishery but this may have a significant impact on the populations of these species due to mortality and injury of the fish as well as through effects on fish habitat (see PI 2.4) and ecosystems (see PI 2.5). Most fish (e.g. haddock and cod) are able to escape the gear, but more sedentary bottom dwelling fish (e.g. skates, winter, summer and yellowtail flounders) can be injured or killed as they pass through or under the gear and larger individuals are caught and selectively removed from populations. Some of these fish species are slow growing and take years to reach sexual maturity.

7.2.4.2 Summer Flounder

It is reported that in 2009, the scallop fishery discarded 94,171 lb of Summer flounder. Having previously been overfished Summer flounder (*Paralichthys dentatus*) stocks were declared rebuilt in 2011 by the NMFS-NOAA. The fishing mortality rate (F) was estimated to be 0.241, below the fishing mortality threshold reference point = Fishing mortality producing Maximum Sustainable Yield (F_{MSY}) = F35% = 0.310. Spawning Stock Biomass (SSB) was estimated to be 57,020 metric tons (mt), 5% below the biomass target reference point = Spawning Stock Biomass at Maximum Sustainable Yield (SSB_{MSY}) = SSB35% = 60,074 mt. The assessment team concluded that summer flounder was not considered to be vulnerable to the fishery.

7.2.4.3 Skate

Many vessels targeting scallops also have a bycatch of skates, an amount that varies by season and area. Projected catch for 2010 was 47 million pounds, the catch in 2009 was >55 million pounds.[6] There is scant research to quantify the proportion of dredge-caught skates that perish, although based on other studies their survivorship is expected to be higher than for teleost fish. Some scallop vessels land skates, but this is rare due to the disproportionate value of scallops and skates. Management measures that allocate or redirect more effort and catch to Georges Bank and the Gulf of Maine would have a greater effect on winter skate, rebuilding barn-door skate, and overfished smooth and thorny skate. During 2010, the Scallop FMP allocated one trip for Georges Bank closed area access (the same as 2009) and three access area trips in the Mid-Atlantic (one less than in 2009). Overall scallop fishing effort in 2010 is expected to be similar to 2009 because the fishery has been allocated one less access area trip and one more open area Days-At-Sea (37 in 2009 compared to 38 in 2010). An increase in Mid-Atlantic effort would be expected to increase the catches of clear-nose skates, but this species is not overfished and overfishing is not occurring. Rosette skate would not be affected, since they occur too deep and do not overlap the geographical distribution of scallop fishing effort to any meaningful extent.

The 2012-2013 Northeast Skate Complex Specifications Environmental Assessment Regulatory Impact Review and Initial Regulatory Flexibility Analysis report (NEFMC 2012) used updated or new data about the skate resource and fishery including 2008-2010 fall survey biomass indices. These data were also used to determine whether skate stocks were overfished as of 2010 or if overfishing was occurring. Table 9 in NEFMC (2012) summarizes the status of the stocks: 3 species, little, clearnose and winter skates are above the B_{msy} proxy (target), 3 species, barndoor, rossette, and smooth are at B_{msy} proxy, and one species, thorny, is below B_{msy} proxy indicating that it is the only species considered to be overfished (NEFMC 2012 Table 9 page 43). However, thorny skates are primarily distributed in the Gulf of Maine and do not greatly overlap the scallop fishing grounds of Georges Bank (NEFMC 2012 Maps 3 and 5, pages 52 and 54). Skate were, therefore not considered to be vulnerable in the scallop fishery.

7.2.4.4 Invertebrates

Scallop dredging often kills sessile organisms that are caught in the dredges and damages those that are not caught but which pass through or under the dredges. When different fishing gears are compared, scallop dredges have amongst the highest impacts on bycatch species (Kaiser & de Groot 2000; Chuenpagdee *et al*. 2003; Kaiser *et al*., 2006; Morsan 2009; Boucott & Powell, 2011). Scallop dredges retain a diverse array of invertebrate taxa along with rocks, scallops and shells that macerate soft-bodied organisms (e.g. sponges and tunicates), fracture thin-shelled organisms (e.g. lobsters and sea urchins) and break fragile colonies (e.g. gorgonians and serpulids). The US scallop fishery has been going on for 100 years, so those organisms that are common on regularly fished scallop grounds today have life histories that are able to cope with the levels of disturbance caused by scallop dredging – these common species will therefore be within biologically based limits. There is evidence that some of the bycatch invertebrates that are vulnerable to the effects of scallop dredging start a slow process of re-colonisation in areas that are closed to demersal fishing gear. It is difficult to know the extent to which towed gear has damaged invertebrates in the region, Claesson et al. (2010) include an analysis of invertebrate data collected in the late 19th century which could be compared to the Theroux and Widley (1998) study for this purpose, although any changes could not be attributed solely to the scallop fishery. Watling & Auster (2005) noted that the benthic fauna of the Northeast Peak of Georges Bank was characterized as having two octocorals, *Primnoa resedaeformis* and *Paragorgia arborea*, as common components based on dredge sampling (Theroux and Grosslein 1987). Wigley (1968) described *Paragorgia* as a common component of the gravel fauna of the Gulf

[6] NEFMC Northeast Skate Annual Monitoring Report, 2010

of Maine and stated that representative gravel faunas occurred on "Cashes Ledge, parts of Great South Channel, the northeastern part of Georges Bank, western Browns Bank, Jeffreys Ledge, and numerous other smaller banks in the Gulf of Maine region". Extensive fishing damage to coral and sponge communities have been reported elsewhere in US waters (Reed *et al*., 2005; Heifetz *et al*., 2009). Unlike commercially important species, it is difficult to assess whether bycatch invertebrates are within biologically based limits due to a lack of data. It is reasonable to argue, however, that on some seabed types the ongoing use of New Bedford dredges maintains the benthos in an altered state such that robust animals (e.g. scallops and some starfish) or fast-growing organisms (e.g. some sponges and tunicates) are favoured (Marino II *et al*., 2007), whereas long-lived fragile fauna are selectively removed from the ecosystem unless hard grounds provide refuges that allow delicate organisms to persist (Hinz et al., 2011). Studies of closed areas have shown that scallop dredging over much of the available US scallop grounds hinders the recovery and rebuilding of bycatch invertebrates that re-colonise slowly when scallop dredging is ceased (Collie *et al*. 1997, 2005; Spencer & Collie 1997; Watling & Norse 1998; Watling *et al*. 2001; Henry & Kenchington 2004; Kenchington *et al*. 2007; Malik & Mayer 2007). In contrast, studies on the effects of scallop dredge impacts on sand were within the range of natural variation of benthic communities such that impacts were minor and hard to detect (Lindholm et al., 2004; Link et al. 2005). Thus scallop dredging on some sedimentary habitats could be sustainable but not on others.

7.3 Endangered, Threatened and Protected Species (ETP)

With respect to MSC assessments ETP (endangered, threatened or protected) species are those that are recognised by national legislation and/or binding international agreements (e.g. CITES) to which the jurisdictions controlling the fishery under assessment are party.

The only documented adverse effect of the Atlantic sea scallop fishery on ETP species occurs in the Mid-Atlantic region where the NMFS estimates that hundreds of threatened and endangered chelonid sea turtles have been captured and injured by the scallop dredges (Haas *et al*., 2008). Data on the scale of the problem come from the NMFS Fishery Observer Program with around 15% coverage of the 348 strong scallop fleet. Their data show that Kemp's ridley (*Lepidochelys kempii*) and green turtles (*Chelonia mydas*) sometimes suffer fatalities in this fishery but that loggerheads (*Carretta caretta*) are the turtles most commonly killed as bycatch in scallop dredges. Most of these loggerheads are thought to come from south Florida nesting populations, but there is a high level of uncertainty over these estimates (Haas *et al*., 2008).

Fisheries are thought to be the major cause of a decline in loggerhead turtles (Conant *et al*., 2009) but it is difficult to determine whether the scallop fishery has unacceptable impacts on turtle populations due to a lack of information on the numbers of unobserved fishery related mortalities, a lack of population data on turtles in general and a lack of information on the relative contribution of the US sea scallop fishery to turtle deaths. However, a recent detailed study by NOAA led the agency to the conclusion that the scallop fishery is likely to be within national and international requirements for the protection of turtles and that the known direct effects of this fishery are unlikely to create unacceptable impacts to them, yet there are high degrees of uncertainty. NOAA estimated that 619 loggerhead turtles of various age and sex classes were taken annually during 1989-2005 in all components of the US Atlantic sea scallop fishery (Merrick & Haas, 2008). They provide a quantitative assessment of the potential for these takes to jeopardize the continued existence of the US Atlantic Ocean population of loggerhead sea turtles. A population viability analysis (PVA) was used to estimate quasi-extinction likelihoods under conditions with and without fishery effects. The results suggest that the annual take of loggerhead sea turtles in the US fisheries for Atlantic sea scallops, though detectable, does not significantly change the calculated risk of extinction of the population of adult female Western North Atlantic loggerheads over the next 100 years.

NMFS described loggerhead turtles as likely to decline in the foreseeable future and that they are currently at risk of extinction throughout their range (Conant *et al*., 2009). However, Merrick & Haas (2008) conceded that the scallop fishery is not the cause of this risk of extinction, whilst Murray (2011) reports that impact of the sea scallop dredge fishery on loggerheads in U.S. waters of the Northwest Atlantic remains a serious concern. Major improvements in dredge gear, seasonal closures, and effort shifts away from turtle areas have resulted in a marked decline in potentially harmful interactions (Murray, 2011). However, there remain hot-spots where interactions between scallop fishing gear and turtles remain high (Warden, 2011). The fishery is operating under a comprehensive Biological Opinion (NOAA, 2008) with numerous conservative pro-active protective measures in place that are updated with each FW adjustment to the Fishery Management Plan. In view of the rarity of observable interactions, a very precautionary program using swept area is used to access the degree of turtle interactions. A recent compilation report by the Northeast and Southeast Fisheries Science Centers documented a preliminary population estimate of loggerhead turtles between 588,000 – 801,000 individuals (NEFSC & SEFSC, 2010). This is the first estimate of the loggerhead turtle population ever documented. The tagging research to calibrate the NMFS aerial surveys that enabled this estimate was made possible in part by funds from the scallop Research Set Aside program and in cooperation with the commercial scallop industry.

Given that interactions between sea turtles and sea scallop dredges is an important conservation issue the industry has recently worked closely with managers and scientists in attempts to reduce turtle bycatch through time-area management and gear modifications. Time-area restrictions involve rotational closed access areas off Virginia where scallop dredging is limited during the turtle season (NEFMC, 2010 FW 22 prepared by the New England Fishery Management Council, in consultation with the National Marine Fisheries Service and the Mid-Atlantic Fisheries Management Council). Murray (2011) has shown that turtle chains and effort shifting measures have been very effective in reducing takes, although the damage caused to turtles that remain on the seabed is unknown.

Sea turtle injuries resulting from interactions with scallop dredges are also being mitigated through modifications to fishing gear. Since 2006, vessels fishing south of 41º 10' latitude are required to fit chains to exclude turtles. Turtle chains are intended to reduce the potential for injury and mortality (Haas et al., 2008; Murray, 2010). There is still some concern that turtles can get run-over by a dredge on the seafloor. To address this issue, Smolowitz et al. (2010) describe further modifications to the standard New Bedford dredge designed to avoid turtles becoming trapped and crushed as they pass between the dredge frame and sea floor. Field tests using turtle carcasses have shown the new dredge to be 100% effective in preventing run-overs with minimal damage to the interacting carcasses. The NEFMC requested that the Scallop PDT develop a process to certify the CFarm Turtle Excluder Dredge for use in a regulatory framework (FW 23 to the Sea Scallop FMP) to minimize sea turtle injury and mortality. FW 23 was approved and published in the Federal Register on 6 April 2012. In the latest FW (24) under the ETP section it states:

"According to the most recent Biological Opinion (Opinion) issued by NMFS on July 12, 2012, the agency has determined that species not likely to be affected by the Atlantic Sea Scallop FMP or by the operation of the fishery include the shortnose sturgeon, the Gulf of Maine distinct population segment (DPS) of Atlantic salmon, hawksbill sea turtles, and the following whales: North Atlantic right, humpback, fin, sei, blue, and sperm whales, all of which are listed as endangered species under the ESA. NMFS also concluded that the continued authorization of the sea scallop fishery would not have any adverse impacts on cetacean prey, and that it would not affect the oceanographic conditions that are conducive for calving and nursing of large cetaceans."

The previous biological opinion (2008), which required that NMFS limit effort in the Mid- Atlantic during times when sea turtle distribution is expected to overlap with fishing activity is no longer required, since that opinion is now superseded by the 2012 opinion. The other four measures of the 2012 Opinion are related to ongoing research needs and identification of measures to reduce interactions and/or the severity of such interactions. This section was left in FW 24 because the status of this issue was unclear when the Council initiated FW24 in January 2012. However, based on the recent findings of the recent biological opinion no specific measures are required for this action.

7.4 Habitat change and ecosystem impacts

International research has shown that scallop dredging causes long-term reductions in habitat structure which cause serious harm to the biodiversity and ecological functioning of shelf areas (Caddy, 1973; Eleftheriou & Robertson, 1992; Curry & Parry, 1999; Kaiser & de Groot 2000; Morsan 2009). Mobile demersal fishing gear reduces seafloor habitat complexity by homogenising the sediment, smoothing sedimentary bedforms (which can provide habitat for fish, e.g. Auster *et al*. 2003), rolling boulders, erasing tubes, pits and burrows and killing structure-building fauna. Water movements also alter seabed habitats such that storms and shifting currents can mask the effects of towed demersal fishing gear (Stokesbury & Harris 2006). Nevertheless, the mechanical impact of the leading edge and underbelly of a scallop dredge differs from that exerted by water currents during storms (Hall-Spencer & Atkinson, 1999) as it selectively smashes the larger, longer-lived, more fragile members of the benthos that occur near or on the sediment surface. Many of the long-lived benthic organisms that survive large sediment shifts during storms are highly vulnerable to scallop dredging (Hall-Spencer &

Moore 2000a,b). When different fishing gears are compared, scallop dredges have amongst the highest adverse impacts on benthic habitats due to the power of the vessels and the weight of the gear (Chuenpagdee *et al*. 2003; Kaiser *et al*., 2006). However, attempts to design less damaging gear have been few in number and largely unsuccessful (Smolowitz 1998; Beentjes & Baird, 2004; Shephard et al. 2009) so dredge design is unlikely to change drastically any time soon, and there is little likelihood that the New Bedford dredge could be modified in a way that would render it less intrusive and still catch scallops efficiently.

The limited access offshore US scallop fishery is typically conducted by towing two 4.5-5.2 m wide steel New Bedford scallop dredges along the seabed at 3 to 5.5 knots. Modifications to the gear, for example to reduce turtle by-catch (Haas *et al*., 2008) or to increase efficiency (e.g. Shephard *et al*., 2009) do not prevent habitat impacts. Tow duration commonly ranges from 20 to 30 minutes, depending on conditions, and the target species is usually harvested using 25-30 m vessels (Stokesbury & Harris, 2006). There is evidence from research into New Bedford dredges that their effects on mud, sand, gravel and biogenic habitats are similar to those recorded for toothed European scallop dredges (e.g. Hall-Spencer & Atkinson 1998; Hall-Spencer *et al*. 1999, 2000a,b; Kaiser *et al*., 2000; Jenkins *et al*. 2001; Bradshaw *et al*. 2003).

The New Bedford dredges, together with other heavy towed demersal fishing gear, have affected a range of habitats on the US shelf area and their ongoing use maintains some benthic communities in an altered state, although sand habitats appear more resilient to ecological impacts than mud or gravel habitats (Collie *et al*. 1997, 2005; Spencer & Collie 1997; Watling & Norse, 1998; Lindhilm *et al*., 2001; Watling *et al*. 2001; Henry & Kenchington 2004; Kenchington *et al*. 2007; Malik & Mayer, 2007). Video surveys by Stokesbury & Harris (2006) revealed that a short-term sea scallop fishery in an area recently closed to demersal fishing gear visually altered an epibenthic community less than the shifts in sediment that occurred between surveys. However, Malik & Meyer (2007) suggest that such visual surveys can fail to detect the long-term changes in seabed habitats that are caused by New Bedford dredges. Their acoustic surveys revealed linear furrows up to several kilometres long that were not detectable using drop-down video on Jeffreys Ledge (Gulf of Maine) but were caused by scallop dredging gear or the dragging of boulders. The impacts of the New Bedford scallop dredging industry on EFH as detected by acoustic surveys are not minimal or temporary in nature, at least on some bottom sediments.

The use of rotational closed areas appears to be working well in maintaining stock and good recruitment of scallops on the US continental shelf, with the ecosystem being managed in a way that enhances the production of commercially valuable scallops. However, NEFMC have produced a report that indicates that areas of vulnerable seabed habitat including areas of piled cobble and piled boulders are currently impacted by the present day scallop-dredge fishery (NEFMC, 2010). To augment this report we requested an analysis of the fishery footprint from NOAA using the satellite-based vessel monitoring scheme (VMS). The data were filtered for speed to remove data that showed the vessels were moving too slowly (e.g. processing catch) or too fast (e.g. steaming) to be towing scallop dredges. Such VMS analyses are being used to improve the sustainability of fisheries worldwide (e.g. Hall-Spencer *et al*. 2009).

The benthic impact of scallop dredges may be assessed, in part, by determining the density and distribution of fishing activity, or footprint of the fishery. VMS data were used to prepare Figure 18 and show that throughout 1998-2008 the area of available scallop ground swept by the fishery was high and that the footprint of the fishery had not been greatly reduced in recent years. Closer examination shows that the areas of highest habitat impact (areas that are fished most heavily) rotate from year to year as areas that were previously closed to the scallop fishery have been opened sequentially, thereby causing cumulative effects year on year. Boxes in Figure 18 include areas that previously excluded scallop fishing. The footprint of the fishery periodically extends into many of the areas that had previously been closed to demersal towed gear. To assess the effects of the fishery on vulnerable hard and mud bottom habitats in detail, a VMS analysis should consider sediment types and predicted recovery rates.

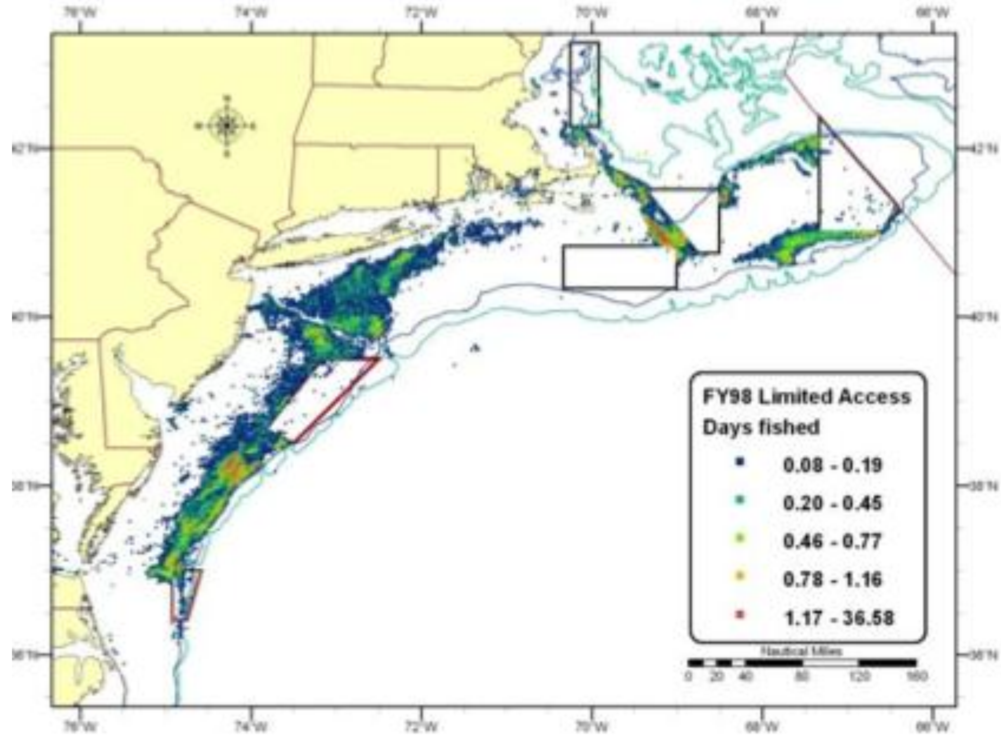
7.4.1 Swept Area Seabed Impact (SASI) Model

The MSA requires fishery management plans to minimize, to the extent practicable, the adverse effects of fishing on fish habitats. To meet this requirement, fishery managers would ideally be able to quantify such effects and visualize their distributions across space and time. The Swept Area

Seabed Impact (SASI) model provides such a framework, enabling managers to better understand: (1) the nature of fishing gear impacts on benthic habitats, (2) the spatial distribution of benthic habitat vulnerability to particular fishing gears, and (3) the spatial and temporal distribution of realized adverse effects from fishing activities on benthic habitats (NEFMC 2011b).

The impact of scallop fishing on essential fish habitat has been modelled using the geological and biological components of the SASI analysis and indicates areas of impact to key elements of ecosystem structure and function, such as impacts to cobble and boulder habitats lasting >5 years and long-term (>5 year) damage to molluscs and epifaunal bivalves on mud, sand, granule/pebble, cobble and boulder habitats (NEFMC, 2011b). A detailed high-resolution map of Georges Bank has been published showing the sediment distributions (Harris and Stokesbury 2010) and these observations have been linked to an oceanographic model to determine sediment stability (Harris et al.2011). The application of these mapping and spatial statistical methods were examined in an ICES working group entitled, "Methods for comparing and summarizing fish and fish community distributions in relation to environmental and habitat factors (Harris et al.2010).

There are, however, problems regarding implementation of the SASI model, namely (1) the density and quality of data used to produce the underlying geologic framework, (2) the global patterns of vulnerability and recovery rate used to parameterize impacts to habitats across the spatial domain, and (3) the lack of a time step component of the model to address recovery versus impact relationships. The data sets used in the scallop analyses were biased towards fine grain sediments as the US Seabed database is based primarily on grab and core samples - thereby under-sampling hard bottom habitats (cobbles, boulders). The review panels for SASI state explicitly, that SASI is a good guide to areas where attention should be directed to conserve EFH but it should not, by itself, be considered to be the final word to determine where vulnerable habitats occur in the management region.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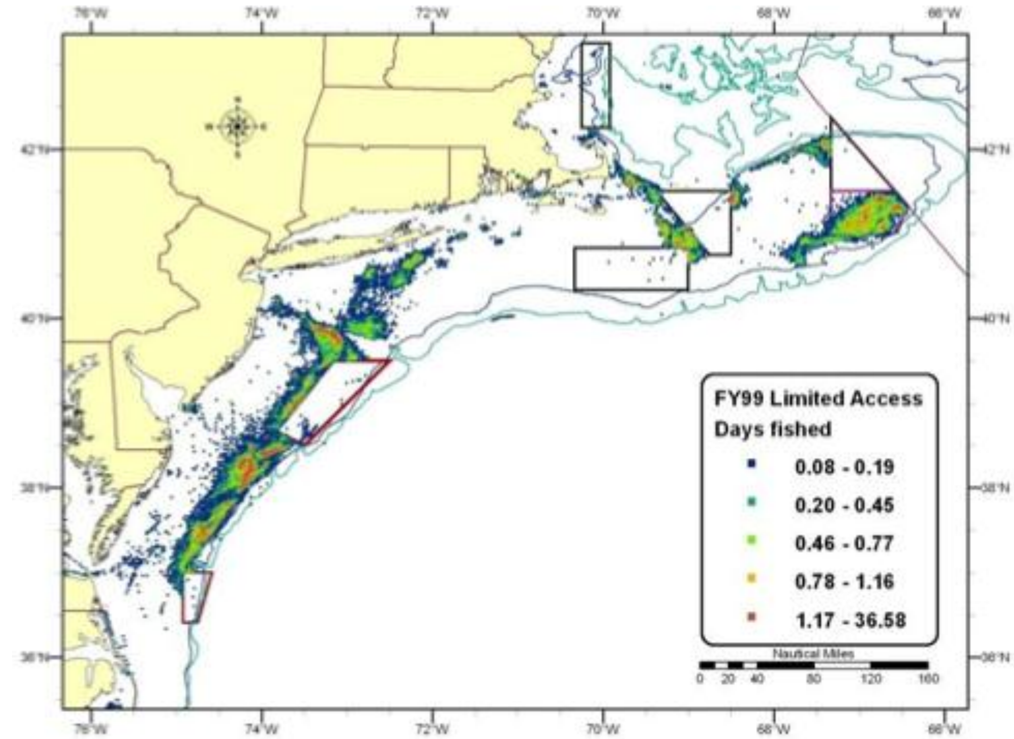
0.78 - 1.16
1.17 - 36.58
Nautical Miles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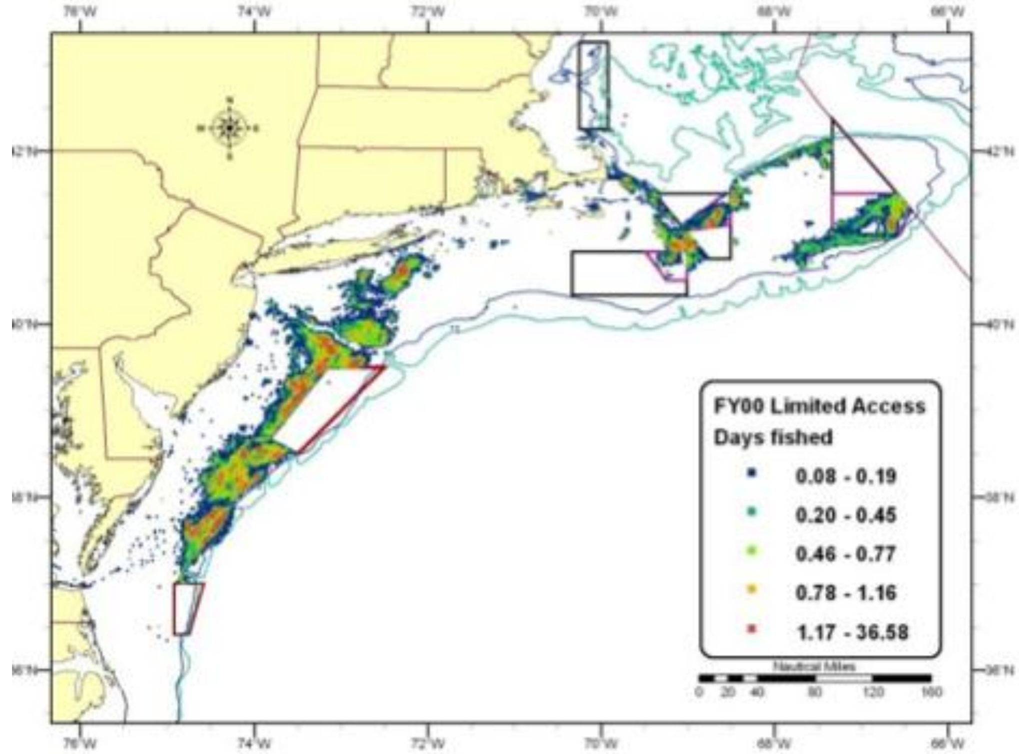
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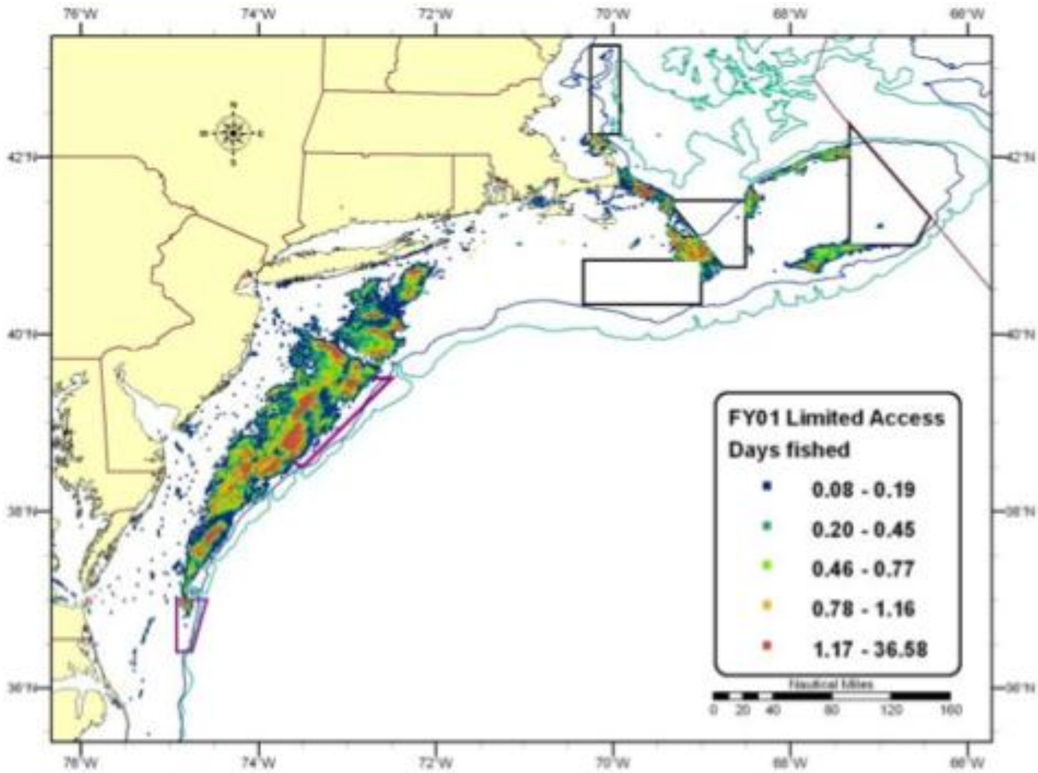
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0.78 - 1.16
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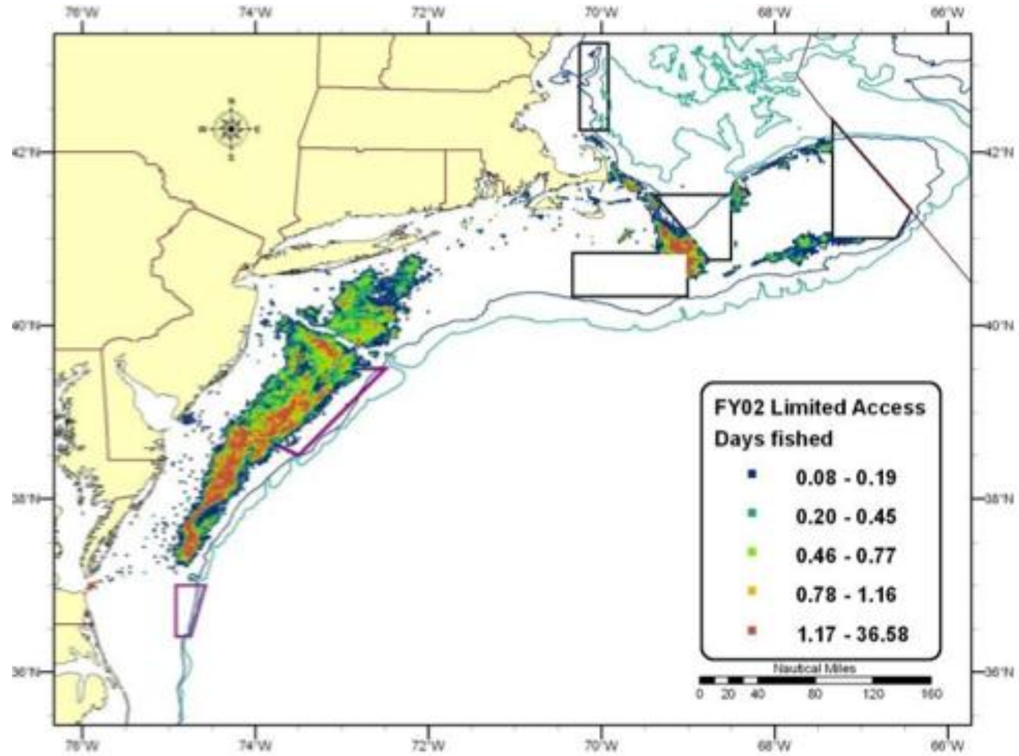
Nautical Miles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0.78 - 1.16
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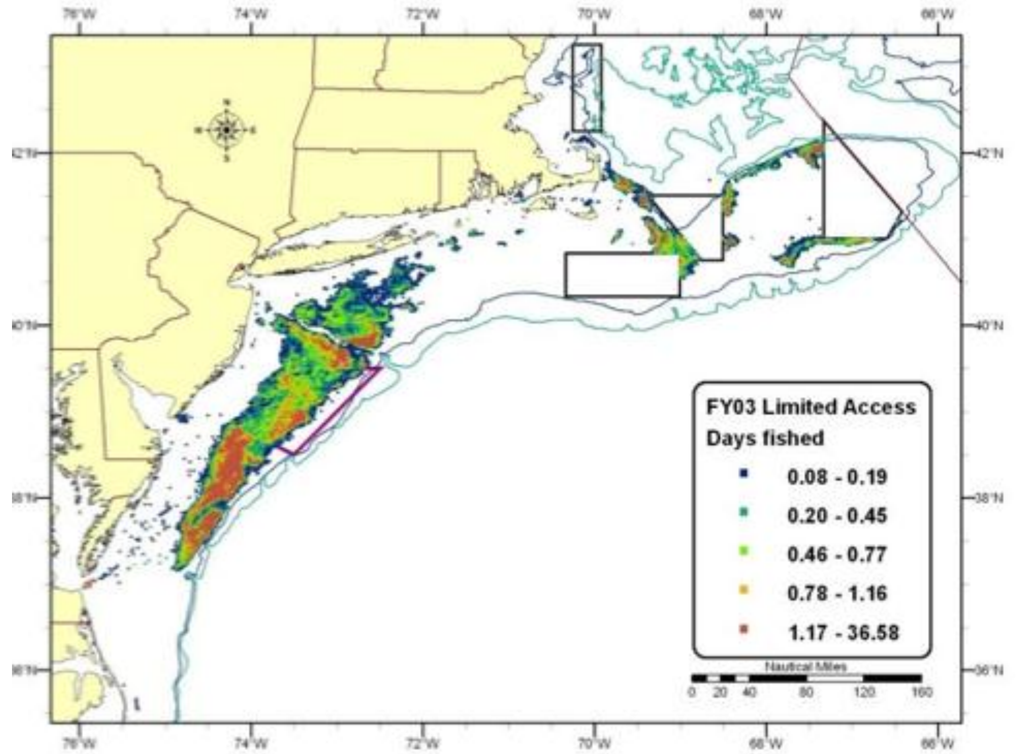
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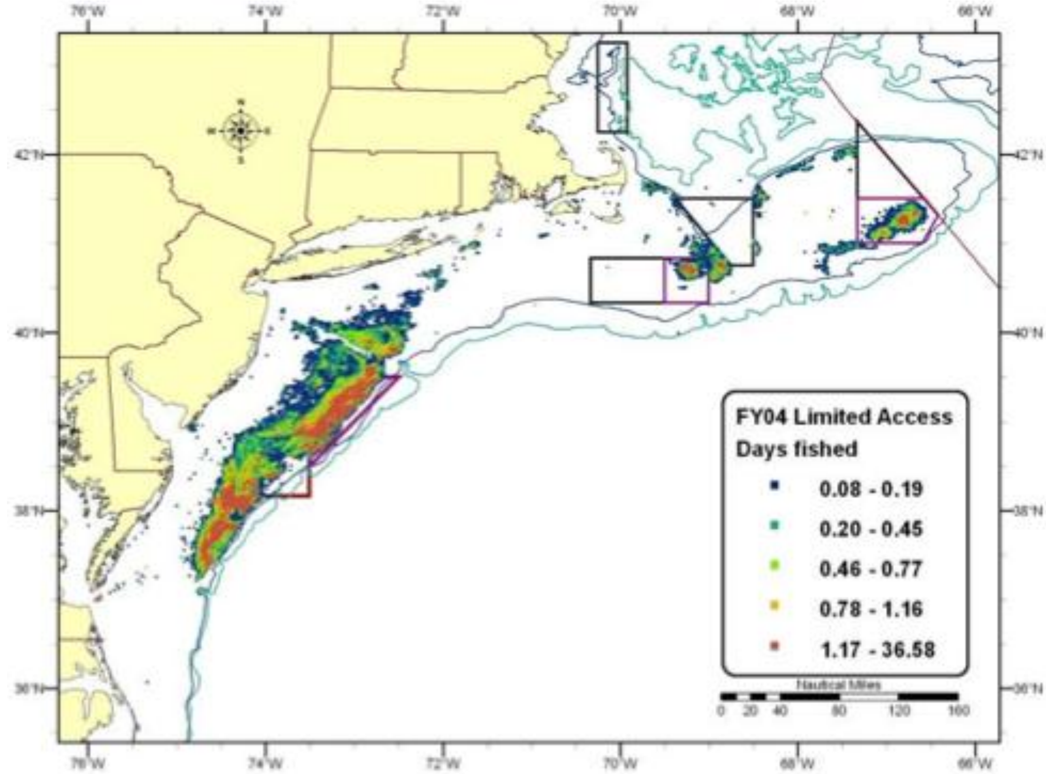
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0.20 - 0.45
0.46 - 0.77
0.78 - 1.16
1.17 - 36.58
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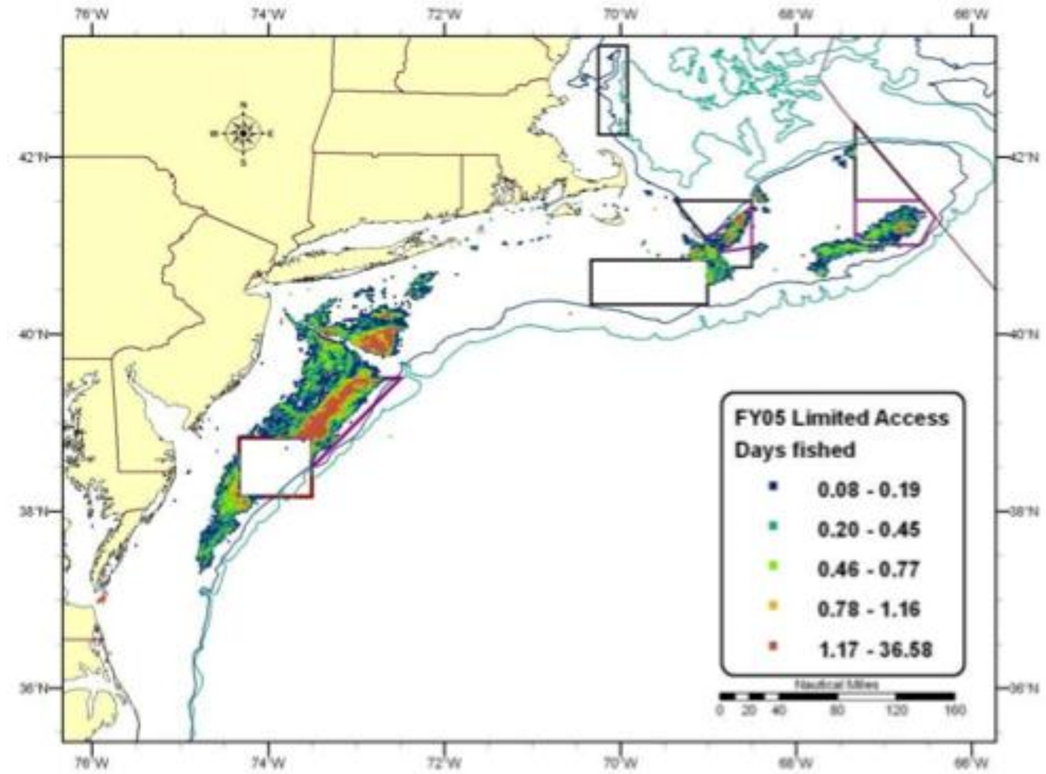
76°W 74°W 72°W 70°W 68°W 66°W
42°N 40°N 38°N 36°N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Nautical Miles
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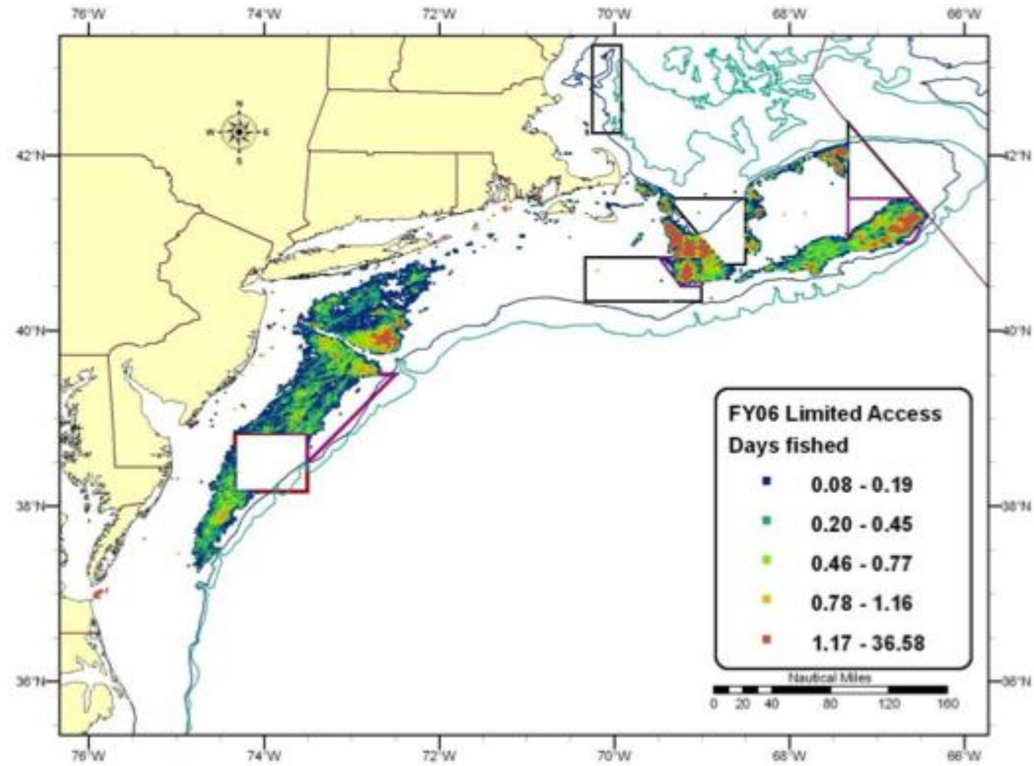
76°W 74°W 72°W 70°W 68°W 66°W
42°N 40°N 38°N 36°N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Days fished
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0.20 - 0.45
0.46 - 0.77
0.78 - 1.16
1.17 - 36.58
Nautical Miles
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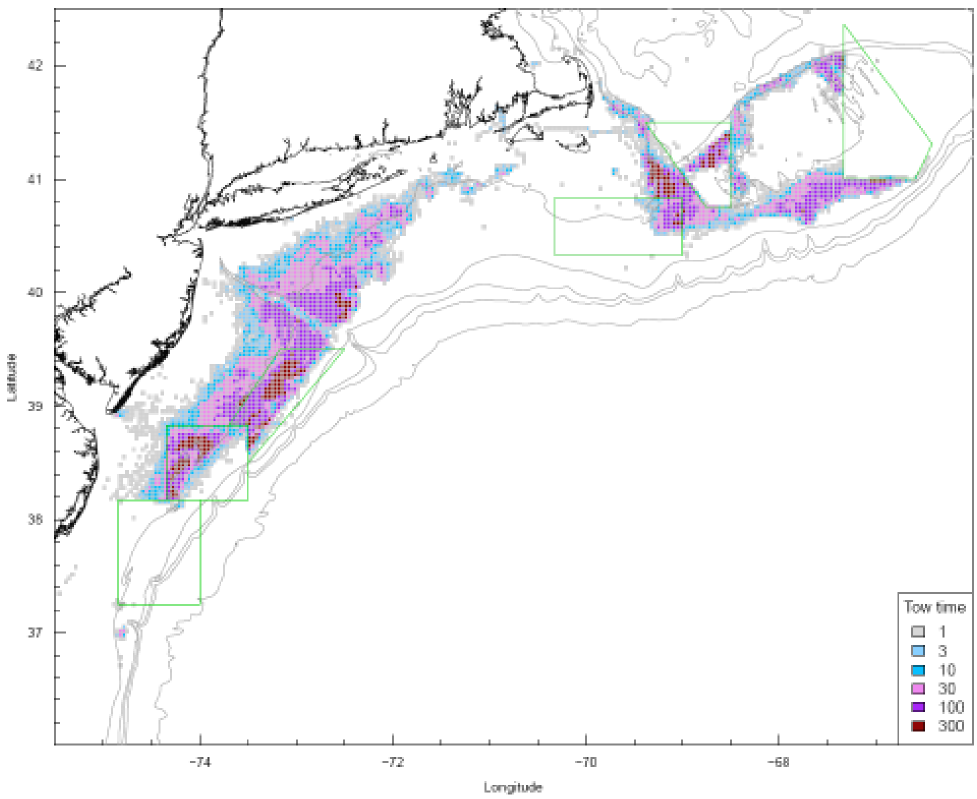
74°W
72°W
70°W
68°W
66°W
42°N
40°N
38°N
36°N

2007


Tow time
1
3
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100
300
Latitude
Longitude
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-72
-70
-68

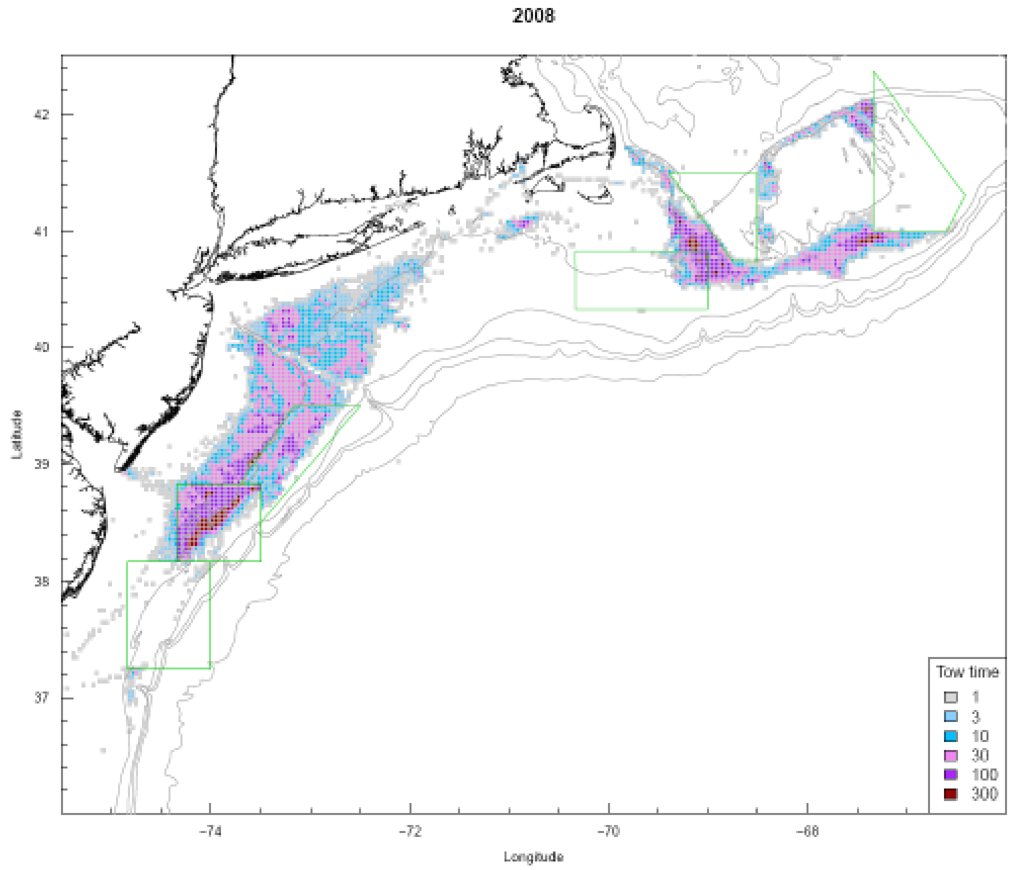

Figure 18: Footprint of the US limited access offshore scallop fleet as shown by Vessel Monitoring Scheme data from 1998-2008. In maps 1998-2006 the scale indicates the numbers of days at sea, the ranges are percentages of a day (e.g. 0.75 = 16 hours). In maps 2007 & 2008, the "Tow Time" refers to hours towed, per 2 minute square cell, per year. Maps provided by NOAA.

8 OTHER FISHERIES AFFECTING TARGET STOCK

Based on bycatch analyses and input from the PDT, there are no other fisheries that catch an appreciable amount of scallops as discards. Therefore, there are no scallop control measures in any other fisheries at this time.

9 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.

9.1 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. [7]**:**

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.

9.2 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.

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

[7] 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

the precautionary approach and considering the ability of the population to produce long-term potential yields.

9.3 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[8].

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.

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;

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

c) Providing for the recovery and rebuilding of depleted fish populations to specified levels within specified time frames; and
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.

10 BACKGROUND TO THE EVALUATION

10.1 Evaluation Team

Don Aldous: (Lead Assessor and Principle 3 Expert)

Don holds a Masters in Marine Management and is a fisheries consultant based in Nova Scotia providing fisheries management advice to clients in the fishing industry of Atlantic Canada and to fisheries organizations overseas since 1992. He worked for the Canadian Department of Fisheries and Oceans for 13 years on control of foreign fishing, pelagic and groundfish fisheries management plans. He has extensive experience in the South Pacific Islands as an advisor to island governments and regional organizations concerning tuna fisheries management planning issues. He has participated in MSC assessments for Moody since 2009 as project coordinator and document editor.

Andrew Brand (Principle 1 Expert)

Andy Brand holds a PhD and has worked for the University of Liverpool for 40 years on the academic staff of the Port Erin Marine Laboratory, Isle of Man, retiring in 2006 as Director of the Laboratory. During this time he developed large, well-funded, research programmes on the biology, ecology, aquaculture and fisheries of bivalve molluscs, especially scallops, and on the environmental impact of scallop dredging. He has had extensive fishery management and environmental assessment consultancy experience, including contracts with government departments and industry, and has been a member of ICES Working Groups on herring, scallops and ecosystem effects of fishing. In addition to work in the Irish Sea, he has advised on scallops and fisheries management in Alaska, Argentina, Australia, Bermuda, Chile, Ireland, France and the Philippines. He is now an Honorary Senior Fellow of the University of Liverpool and works as an independent consultant on shellfisheries. He has recent experience as an Assessor (5) and Independent Reviewer (4) for Marine Stewardship Council certifications for scallop, mussel and oyster fisheries in the Irish Sea, Faeroes, Denmark and Canada.

Jason Hall-Spencer (Principle 2 Expert)

Jason Hall-Spencer holds a PhD in Marine Biology from the University of London (1994) and is a Reader in Marine Biology at the University of Plymouth and an Honorary Research Fellow at the Marine Biological Association, Plymouth where he teaches graduate and postgraduate courses in fisheries, aquaculture, marine ecology and marine spatial management. Jason Hall-Spencer is a benthic ecologist with highly cited peer-reviewed papers on the effects of fishing equipment throughout Europe, including 10 papers on scallop fisheries in the Mediterranean and NE Atlantic. Jason is a member of the ICES working group on deep-water ecosystems, he also sits on the UK Government Scientific Advisory Panel on Marine Protected Areas and on the Norwegian Research Council marine science advisory panel. Jason was an International Observer on the Canadian Fishing Gear Impact investigation by the Ecology Action Centre (Halifax), Living Oceans Society (BC) and the US Marine Conservation Biology Institute and is now working for OSPAR and the United Nations Environment Programme (UNEP) drafting guidelines for the management fisheries in the High Seas.

10.2 Previous certification evaluations

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

10.3 Inspections of the Fishery

The team conducted an inspection of the fishery focussing on the practicalities of fishing operations, the mechanisms and effectiveness of management agencies and the scientific assessment of the fishery.

Meetings were held with industry, government and NGO stakeholders as follows. Some of the key issues discussed have been identified for each meeting.

Name	Affiliation	Date	Key Issues
Vessel inspection	ASA	Aug 9, 2010	gear operation, reporting, surveys
Oceana	NGO Stakeholder	Aug 9, 2010	Bycatch, habitat (see section xx)
ASA	Industry stakeholders	Aug 10, 2010	MSC scheme, fisheries information
Conservation Law Foundation	NGO Stakeholder	Aug 10, 2010	Bycatch, habitat impacts (see section xx)
New England Fisheries Management Council	Management body	Aug 11, 2010	Scallop assessment
NOAA staff	Management	Aug 11, 2010	Scallop management
SMAST	University	Aug 12, 2010	Industry- Science collaboration

11 STAKEHOLDER CONSULTATION

11.1 Stakeholder Consultation

A total of 20 stakeholders were identified and consulted specifically by Moody Marine. Information was also made publicly available at the following stages of the assessment:

Date	Purpose	Media
15 March 2010	Announcement of assessment	Direct E-mail/letter Notification on MSC website Advertisement in press
23 April 2010 Revised 25 May 2010	Notification of Assessment Team nominees	Direct E-mail Notification on MSC website
25 June 2010	Notification of intent to use MSC FAM Standard Assessment Tree	Direct E-mail Notification on MSC website
2 July 2010	Notification of assessment visit and call for meeting requests	Direct E-mail Notification on MSC website
9-12 August 2010	Assessment visit	Meetings
29 March 2012	Notification of Proposed Peer Reviewers	Direct E-mail Notification on MSC website
	Notification of Public Draft Report	Direct E-mail Notification on MSC website
	Notification of Final Report	Direct E-mail

Date	Purpose	Media
		Notification on MSC website

11.2 Stakeholder Issues

Two meetings were conducted by the team with the Conservation Law Foundation and the Oceana. The agreed records of the meetings are included in this report (Annex D).

The main issues of concern were: yellowtail and flounder bycatch reporting and analysis; the unacceptably high level of incidental kill and injury of sea turtles; and the lack of a habitat protection plan.

12 OBSERVATIONS AND SCORING

12.1 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 Performance Indicators, 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. As this represents a relatively crude level of scoring, average scores for each Principle are rounded to the nearest whole number.

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

13 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.

13.1 Traceability within the fishery

This certification refers to an entire stock and a geographic area where landings of scallops are made from Maine to Virginia. The chain of custody will include all scallop landings by the limited entry fleet of about 350 vessels and will be verified by the buyers who are all members of American Scallop Association, the client for this assessment. The sale of the scallops is tracked by mandatory government reports such as the trip report of the vessel and the scallop tally sheet. These may be compared to the industry bill of lading that accompanies any and all scallops landed from a vessel, through unloading facilities. These reports are compiled by ASA.

Twenty to thirty percent of scallop landings are sold through the Whaling City Seafood Display Auction located in New Bedford, Massachusetts. The auction does not buy scallops, but rather sells them on behalf of the seller, usually the boat representative. Any vessel that intends to engage the services of the auction must open a formal account registering all Federal Permit Data including landings and area harvested. Vessels that unload in New Jersey, Virginia and other Ports truck their scallops to the Auction in New Bedford. These vessels also have established record keeping and permit info on account. No transient vessel can come in and sell on 'zero notice' or without an established account. A vessel retains the right to remove a shipment of scallops from the auction and unload elsewhere. Title always stays with the boat until sale and the buyer pays the Auction a fee for the services of unloading, weighing and icing of the scallops. Under the MSC criteria, the use of the auction would likely be described as a subcontractor since ownership of the scallop transfers from boat to buyer. As such, the auction itself would need to comply with an agreement between the boat, as owner of scallops and the auction allowing access to the auction to inspect the traceability handling of certified scallops but the auction would not need a specific chain of custody certification itself.

13.2 At-sea processing

All scallops are shucked at sea and landed fresh. There are no at-sea transfers of scallops between vessels.

13.3 Points of landing

The largest numbers of permitted limited access scallop vessels currently are in the ports of New Bedford, MA and Cape May, NJ, which represent 37% and 19% of the total, respectively (Figure 14). Of the 348 permitted limited access vessels in 2009, 203 originate from New Bedford, MA and Cape May, NJ. Although New Bedford has always had the largest number of permitted limited access vessels, the port with the next greatest number of contributors shifted from Norfolk, VA (previous to 2000) to Cape May, NJ (after 2000).

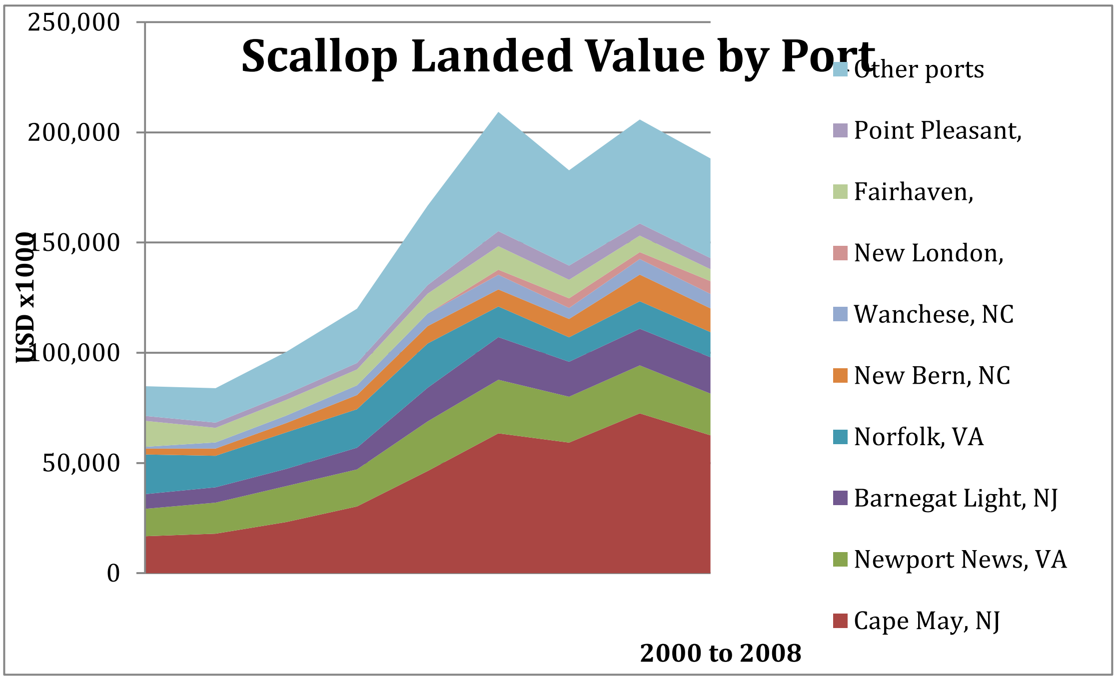

Figure 19: Landed value of scallops, linked to vessel homeport, for fishing year 2000-2008[9]

The landed value by port (Figure 19) confirms the importance of very few ports to this fishery.

13.4 Eligibility to enter chains of custody

The scope of this certification ends at the points of landing which are indicated in Figure 19. Thereafter, in order for scallop/scallop product to carry the MSC logo anyone that takes ownership of the scallop/scallop product must have a valid MSC chain of custody certificate.

13.5 Target Eligibility date

The target eligibility date is a maximum of 6 months prior to the date of publication of the public comment draft report. Processing facilities have to have successfully completed a Chain of Custody audit before the eligibility date and are retrospectively issued a certificate when the fishery is certified.

[9] Selected data from A15 DEIS Table 44

14 ASSESSMENT RESULTS

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

Component	PI No.	Performance Indicator (PI)	Score
Outcome	1.1.1	Stock status	100
	1.1.2	Reference points	100
	1.1.3	Stock rebuilding	N/A
Management	1.2.1	Harvest strategy	95
	1.2.2	Harvest control rules & tools	90
	1.2.3	Information & monitoring	90
	1.2.4	Assessment of stock status	95
Retained species	2.1.1	Outcome	80
	2.1.2	Management	95
	2.1.3	Information	85
Bycatch species	2.2.1	Outcome	80
	2.2.2	Management	90
	2.2.3	Information	75
ETP species	2.3.1	Outcome	90
	2.3.2	Management	90
	2.3.3	Information	80
Habitats	2.4.1	Outcome	60
	2.4.2	Management	70
	2.4.3	Information	90
Ecosystem	2.5.1	Outcome	60
	2.5.2	Management	80
	2.5.3	Information	95
Governance and policy	3.1.1	Legal & customary framework	95
	3.1.2	Consultation, roles & responsibilities	100
	3.1.3	Long term objectives	100
	3.1.4	Incentives for sustainable fishing	100
Fishery specific management system	3.2.1	Fishery specific objectives	90
	3.2.2	Decision making processes	100
	3.2.3	Compliance & enforcement	80
	3.2.4	Research plan	100
	3.2.5	Management performance evaluation	90

MSC Principle	Fishery Performance
Principle 1: Sustainability of Exploited Stock	Overall: 96.3
Principle 2: Maintenance of Ecosystem	Overall: 81.3
Principle 3: Effective Management System	Overall: 95.4

The fishery attained a score of 80 or more against each MSC Principles 1, 2 and 3 and there were no individual PI's with a score of less than 60. It is therefore recommended that the USA Sea Scallop Fishery be certified according to the MSC Principles and Criteria for Sustainable Fisheries.

14.1 Conditions

The fishery attained a score of between 60 and 80 against four Performance Indicators. The assessment team has therefore set conditions in accordance with MSC Certification Requirements v 1.3. The conditions are associated with 3 key areas of performance of the fishery and are set out below.

Discarded Species – Information & monitoring	
PI 2.2.3	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.
SG 60	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.
SG 80	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).
SG 100	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
Score	**75**
Scoring Rationale	The assessment is conducted on the basis that there is one main bycatch species (winter flounder) that, since they are in an overfished condition in Southern New England/Mid-Atlantic States, the stock is vulnerable to the fishery despite the fact that their catch is less than 5% of the total. There is sufficient information collected on bycatch species, including winter flounder through the Northeast Fisheries Observer Program to meet SG60 and the first scoring issue of the SG 80. The second SG80 scoring issue would be met if we knew the status of winter flounder in those areas fished by the scallop fishery. There remains considerable uncertainty regarding the status of winter flounder in the Gulf of Maine although present catch levels have been determined to be sustainable (52nd SAW). The second SG80 scoring issue is not met. The strategy for setting Annual Catch Limits (ACLs) for all managed species includes buffers for uncertainty with associated Accountability

	Measures to prevent ACLs from being exceeded and mitigation if overages occur, meeting the third SG80 scoring issue. Sufficient data continue to be collected to detect any increase in risk to main bycatch species, meeting the fourth SG80 scoring issue.
Condition	The client is required to ensure that by the third annual audit there is sufficient information collected on the main bycatch species to estimate outcome status with respect to biologically based limits, meeting the second scoring issue of SG80.
Milestones	The following milestones will be monitored during each surveillance audit: By the first annual audit the client will demonstrate that measures have been put in place to collect quantitative information concerning the main bycatch species in the scallop fishery. By the second annual audit the client will provide evidence of the quantitative information that has been collated for the main bycatch species in order to estimate their outcome status with respect to biologically based limits. By the third annual audit the client will provide evidence that there is sufficient information collected on main bycatch species to estimate outcome status with respect to biologically based limits. The above provides incremental steps in achieving the condition. Only when the final step is complete will the team be able to provide a revised score. By the third annual audit the required minimum score is 80.

Habitat Outcome	
PI 2.4.1	The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function.
SG 60	The fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
SG 80	The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
SG 100	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.
Score	**60**
Scoring Rationale	The SG60 scoring issue is met since, although the fishery causes significant alteration of habitat cover/mosaic that causes major change in the structure or diversity of the species assemblages, parts of some scallop grounds are permanently closed to scallop fishing and low habitat impacts have been noted on sand in the mid-Atlantic. The present score of this performance indicator is predicated on closed areas remaining closed. The higher degree of certainty required by the SG80 scoring issue is not met within the current management strategy. This could be met by constraining fishing effort to areas of shallow, unconsolidated coarse sediments that have relatively rapid recovery times. The SASI output needs to be used in concert with statistical approaches to identify clusters of vulnerable grid cells and the ecological interpretation of results and recommendations by the NEFMC Habitat Plan Development Team. The fishery should not access areas of hard substratum (e.g. boulders and cobble), especially those that have been closed and may soon be open for fixed gear fisheries as otherwise these areas will be subject to continuous chronic impacts from dredges.
Condition	The client is required to present evidence by the fourth annual audit that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
Milestones	The following milestones will be monitored during each surveillance audit: By the first annual audit the client will provide evidence of representation to the management authority to advocate for further analysis and strategic options regarding the impact of the fishery on marine habitat. By the second annual audit the client will provide evidence of work to document the benthic habitat impact and recovery rates within the area in which the US limited access scallop fishery operates. By the third annual audit the client will present a report of the habitat impacts of the fishery and the management measures being considered to meet the condition. By the fourth annual audit the client will provide evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm. The above provides incremental steps in achieving the condition. Only when the final step is complete will the team be able to provide a revised score. By the fourth annual audit the required minimum score is 80.

Habitat Strategy	
PI 2.4.2	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	**70**
Scoring Rationale	The fishery meets SG60 since there are measures in place that prevent habitat damage to scallop grounds in closed areas in the north-eastern part of the fishery and it is likely that such measures would work throughout the biogeographic regions of the fishery, meeting the second SG80 scoring issue. There is evidence that the measures are being implemented successfully in the Georges Bank and Gulf of Maine permanent closures, and this therefore comprises a partial strategy, meeting the third SG80 scoring issue. However, the first and second SG80 scoring issues are not met since without expansion of the strategy to other areas, the partial strategy is not expected to achieve the SG80 level of the Habitat Outcome PI 2.4.1 and the fishery remains likely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
Condition	The client is required to demonstrate by the fourth annual audit that: • There is a partial strategy in place that is expected to achieve the Habitat Outcome 80 level of performance of PI 2.4.1. • 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	The following milestones will be monitored during each surveillance audit: By the first annual audit the client will provide evidence of their representation to the management authority to advocate for further analysis and strategic options regarding the impact of the fishery on marine habitat. By the second annual audit the client will provide evidence of work to document the benthic habitat impact and recovery rates within the area in which the US limited access scallop fishery operates. By the third annual audit the client will present a report of the habitat impacts of

	the fishery and the management measures being considered to meet the condition. By the fourth annual audit, the client will demonstrate that: • There is a partial strategy in place that is expected to achieve the Habitat Outcome 80 level of performance of PI 2.4.1. • 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 above provides incremental steps in achieving the condition. Only when the final step is complete will the team be able to provide a revised score. By the fourth annual audit the required minimum score is 80.

Ecosystem Outcome	
PI 2.5.1	The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function.
SG 60	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.
SG 80	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.
SG 100	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
Score	**60**
Scoring Rationale	The US Atlantic scallop fishery is known to have widespread impacts on geological and biological components of the ecosystem, with recovery rates for some key features of ecological importance known to be very slow. The fishery meets the scoring guidepost 60 since there is evidence for ecosystem recovery in a permanently closed area on Georges Bank. The fishery, as it is currently conducted, does not meet the higher degree of certainty required for the SG80 scoring issue.
Condition	The client is required to present evidence by the fourth annual audit that the fishery is highly unlikely to disrupt benthic communities structure and function to a point where there would be a serious or irreversible harm.
Milestones	The following milestones will be monitored during each surveillance audit: By the first annual audit the client will provide evidence of their representation to the management authority to advocate for further analysis and strategic options regarding the impact of the fishery on marine habitat. By the second annual audit the client will provide evidence of work to document the benthic habitat impact and recovery rates within the area in which the US limited access scallop fishery operates. By the third annual audit the client uses the above information to evaluate the likely impacts of scallop dredge fishing on these key elements of the ecosystem. If unacceptable impacts are identified, by the fourth annual audit, the client implements new management strategies and measures to detect and manage ecosystem impacts of the fishery ensuring key elements are protected. The above provides incremental steps in achieving the condition. Only when the final step is complete will the team be able to provide a revised score. By the fourth annual audit the required minimum score is 80.

15 APPENDICES

15.1 Appendix A: Scoring Table

15.2 Appendix B: Draft Client Action Plan

15.3 Appendix C: Peer Review Reports

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

15.4 Appendix D: Stakeholder Comments

APPENDIX A

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	**SCORING GUIDEPOST**	**60**	**80**	**100**
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
This is a very large and complex fishery with a correspondingly large and complex assessment and management program. The stock is assessed with benchmark assessments every three years, which is reasonable given the size and complexity of the fishery, but large-scale abundance surveys are carried out annually. A dynamic, spatially explicit, size-based stock assessment model (CASA) is used to estimate biomass, abundance and fishing mortality for the Georges Bank and Mid-Atlantic components of the fishery and these are then combined to assess the stock as a whole. In previous sea scallop assessment the per-recruit reference points F_{MAX} and B_{MAX} were used as proxies for F_{MSY} and B_{MSY}. However, in 2010, direct estimates of F_{MSY} and B_{MSY} were made using the newly developed Stochastic Yield Model (SYM) and stock projections made using the Scallop Area Management Simulator (SAMS), which has been developed to deal with problems associated with rotational closed area management. CASA, SYM and SAMS are state-of-the-art models that incorporate information on uncertainty among the parameters. Apart from the estimates of discards, incidental mortality and natural mortality, which could be improved, the input data for the assessment models is of very good quality. In particular, there are two separate, fishery-independent, surveys of scallop abundance and biomass based on the NEFSC lined-dredge survey and the SMAST large-camera survey. Recent surveys and assessments show high stocks and above average recruitment on both Georges Bank and Mid-Atlantic grounds. No clear stock/recruitment relationship has been demonstrated and, as a high fecundity, broadcast spawning bivalve with a widespread distribution, the sea scallop is not, in any case, considered to be vulnerable to recruitment overfishing According to the Amendment 10 overfishing definition sea scallops are overfished when the survey biomass index for the whole stock falls below 1/2 B_{TARGET}. The target biomass estimated B_{TARGET} = 109,000 t on January 1, was calculated as the median recruitment in the survey time series times BPR_{MAX}, that is the biomass per recruit obtained when fishing at F_{MAX}. F_{MAX} was estimated at 0.29, which has been used since then as the overfishing threshold. The updated values for these in the 2010 assessment are F_{MAX} = 0.30 and B_{MAX} = 85,000 t (1st July biomass) and the proposed new stochastic MSY reference points are F_{MSY} = 0.38 and B_{MSY} = 125,358 t (1st July). Estimated whole-stock biomass for 1st January 2009 was 158,610 t meats, and 129,703 t for 1st July. These estimates are above the biomass target of 109,000 t meats as well as the new biomass targets (85,000 t meats 1st July using per recruit analysis; 125,358 t meats using the stochastic yield approach). Thus, the current estimated biomass is more than twice the

biomass threshold of 1/2 $B_{TARGET,}$ regardless of which reference point approach is used.

The estimated fishing mortality was 0.38 for the whole stock which is above the overfishing threshold of 0.29 and its updated value of 0.30, but equal to the proposed estimate of F_{MSY} = 0.38. Therefore, overfishing was not occurring in 2009, based on the new recommended overfishing definition. However, the current estimate of fishing mortality is only fractionally below F_{MSY} and the fishery is harvesting the stock at very close to MSY levels. This could be of concern if the current very high productivity of the Mid-Atlantic region is not maintained.

Score: 100

The biomass is estimated at twice the biomass threshold of ½ $B_{TARGET,}$ indicating that the stock is highly likely to be above the point where recruitment would be impaired, meeting the first SG100 scoring issue and that the stock has been above its target reference point over recent years, meeting the second SG100 scoring issue. The fishery meets all the SG100 requirements.

Audit Trace References

NEFMC 2003, NEFSC, 2007a; NEFSC, 2010; Hart, 2001, 2003; Hart & Rago, 2006; Bell, 2010.

	SCORING GUIDEPOST	60	80	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
In the assessments previous to 2010, F_{MAX} and B_{MAX} were used as proxies for F_{MSY} and B_{MSY} (NEFSC, 2007a; SARC-45). However, with the recent increase in selectivity in the fishery, yield per recruit curves have become increasingly flat making F_{MAX} more difficult to estimate and sensitive to small changes in parameters (NEFSC, 2007a). The 2010 assessment used the Stochastic Yield Model (SYM) to make direct estimates of F_{MSY} and B_{MSY}. This is a great improvement on previous assessments as SYM includes information on uncertainty among the parameters and incorporates stock-recruitment relationships. Under the Scallop FMP $B_{TARGET} = B_{MSY}$ and $B_{THRESHOLD} = ½ B_{TARGET}$, which is considered to be a precautionary level. For the 2010 assessment, the basis calculation of natural mortality (M) was re-examined and it was concluded that a value of M=0.12 was more appropriate for Georges Bank.
Score: 100
The biological reference points estimated for this fishery are based on reliable input data and are calculated with state-of-the-art models developed for this fishery, meeting the SG60 scoring issue and the first SG80 scoring issue. The limit reference point is set at ½ $B_{TARGET,}$ is considered to be precautionary and above the level at which there is appreciable risk of impairing reproductive capacity, meeting the second SG80 scoring issue and the first SG100 scoring issue. The target is set at a level consistent with B_{MSY} and takes into account biological and management uncertainties and ecological role of the stock, meeting the third SG80 scoring issue and the second SG100 scoring issue. Re-examination of (M) supports the application of a pre-cautionary approach as required by SG100. The fishery therefore meets all the SG100 requirements.
Audit Trace References
NEFSC, 2007a; NEFSC, 2010; Bell, 2010.

	SCORING GUIDEPOST	60	80	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
This stock is not depleted and so this Performance Indicator is not assessed.
Score: Not applicable
Audit Trace References

1.2	Harvest Strategy (management)

	SCORING GUIDEPOST	60	80	100
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 harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in the target and limit reference points. 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

The overall harvest strategy set out for all US fisheries in the Magnuson-Stevens Act is to maintain the stock within precautionary limits and prevent overfishing. Following the re-building of the sea scallop stocks after the 1993 collapse, the capacity of the fishery has greatly exceeded that necessary to exploit the available stocks. With an industry greatly opposed to reducing licenses, the management strategy has been to maintain profitability for a very large fleet by stringent effort controls. The success of rotational fishing of closed areas in restoring scallop stocks and delaying the exploitation of dense aggregations of juveniles has also been incorporated into the Scallop FMP strategy so that rotational closed areas and increases in dredge ring size act to target the fishery on larger scallops and increase yield per recruit. These different elements of the management strategy, together with a high level of stock monitoring, have come together to produce a robust and precautionary strategy. The process of Amendments and FW actions provides a robust, if rather cumbersome, system for the long-term development of the Scallop FMP, while the Interim Rules procedure enables more rapid action should the situation require it. On this basis, the harvest strategy can be considered to be responsive to the state of the stock and is designed to achieve stock management objectives reflected in the target and limit reference points. The Atlantic sea scallop stock was rebuilt (not overfished; B>Bmsy proxy) in 2003 and has maintained rebuilt status to present (NEFSC, 2004; NEFSC, 2010). Overfishing has not occurred since 2006 (NEFSC, 2007; NEFSC, 2010). Current management strategies include specifications for Annual Catch Limits to prevent overfishing from occurring (NEFMC, 2010).

Score: 95

The harvest strategy meets the first SG60 since the overall harvest strategy is to maintain the stock within precautionary limits and prevent overfishing using target and limit reference points. The harvest strategy has various measures including rotational closed areas and gear selectivity that encourages effort on larger scallops that work together to meet the management objectives, meeting the first SG80 scoring issue. The process of Amendments and FW actions and the Interim Rules procedure provide a responsive harvest strategy, meeting the first SG100 scoring issue

The high level of stock monitoring by surveying meets the third SG60 scoring issue and the sustained high level of biomass suggests the harvest strategy meets the second SG80 scoring issue. The harvest strategy is tested in stock assessment and the setting of annual catch limits, meeting the third SG100 scoring issue.

However, with the fishery assessment methods and management responses all continually evolving, as they have done in recent years, the long-term performance of the strategy has not been fully evaluated and a longer time period will be necessary to determine if it is clearly able to maintain stocks at target levels so it does meet the second SG100 scoring issue.

Audit Trace References
NEFMC, 2010; NEFSC, 2004; NEFSC 2007; NEFSC, 2010

	SCORING GUIDEPOST	60	80	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

A clear, well-defined, set of harvest control rules are in place for this fishery, for both restricted access and general category vessels and they are consistent with the harvest strategy. These include stringent effort controls such as the DAS and trip allocations; trip catch limits and restrictions on crew size (limiting processing power); gear restrictions on dredge ring size and twine top mesh size; and area closing and opening schedules. The annual catch target, based on the stock assessments that take account of biological and management uncertainties (See 1.1.2), are set in advance and agreed for each sector of the fishery. A strict enforcement policy ensures high compliance. Stock status provides evidence to suggest that the tools are appropriate and effective. Current management strategies include specifications for Annual Catch Limits to prevent overfishing from occurring (NEFMC, 2010).

Score: 90

The fishery includes well-defined harvest control rules such as effort controls, (DAS and trip allocations); trip catch limits and crew size limit; dredge ring and twine mesh restrictions; and rotational area closures. These are consistent with the harvest strategy and employed to ensure that the exploitation rate is set according to stock assessments that take account of biological uncertainties, meeting the first scoring issue of SG60, SG80 and SG100. The high level of stock status provides evidence that the tools are appropriate and effective, meeting the second SG60 scoring issue. However, while the tools in use appear to have been effective in achieving the exploitation levels required under the harvest control rules meeting the third SG80 scoring issue, the evidence for this is currently limited since they have been in place only for two seasons, so the fishery fails to meet the second scoring issue under the SG100.

Audit Trace References

NEFSC, 2007a; NEFSC, 2010; NEFMC, 2010

	SCORING GUIDEPOST	60	80	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
Through the work of NMFS, SMAST and other scientific, managerial and conservation bodies the US sea scallop fishery is one of the best documented and thoroughly researched scallop fisheries in the world and high quality data are available for stock assessments and to support the harvest strategy. Extensive, fishery-independent surveys of stock abundance are carried out annually (by dredges and by video) and the stocks are assessed every three years (see 1.1.1). The only serious deficiency in the assessment data is in the quality of information on discards, though there are also concerns about the estimates used for incidental mortality and natural mortality. All of these are known issues and are currently (or are scheduled) for investigation.
Score: 90
The high quality of information available from the research of NMFS and SMAST including stock structure, productivity and abundance suggests the fishery meets the first scoring issue of SG60 and SG80 and the range of information is very extensive so it also meets the first of the SG100 scoring issues. The extensive information from the fishery including catch, bycatch and catch per unit of effort provides evidence that the fishery meets the second SG60 and SG80 scoring issue as well as the third SG80 scoring issue. However, while there is certainly a very good understanding of the inherent uncertainties in most of the data, the lack of good discard data of all species and of more reliable estimates for incidental mortality and natural mortality mean that it fails to meet the second SG100 scoring issue.
Audit Trace References
NEFSC, 2007a, NEFSC, 2010; Hart, 2001, 2003; Hart & Chute, 2004; Hart & Rago, 2006; Naidu & Robert, 2006; Stokesbury *et al.,* 2007.

	SCORING GUIDEPOST	60	80	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 uncertainty. 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

A dynamic, spatially explicit, size-based stock assessment model (CASA) is used to estimate biomass, abundance and fishing mortality for the Georges Bank and Mid-Atlantic components of the fishery and these are then combined to assess the stock as a whole. These assessments are made every three years.

The input data used in the CASA model is generally of a high order, in terms of both the duration and quality of the datasets and it is a great strength that there are two excellent, very large-scale, fishery-independent surveys of scallop abundance and biomass based on the dredge and video surveys.

The use of Stochastic Yield Model (SYM) for estimating biological reference points in this fishery was examined by an external international peer review panel (NEFSC, 2010b) and fully endorsed. The new reference points calculated in the 2010 assessment using SYM are F_{MSY}=0.38 and B_{MSY}=125,353 t meats. The updated biological reference points are shown in Table 2 in comparison with those from the 2007 assessment.

Score: 95

With very good, extensive, input data, very few data deficiencies and state-of-the-art assessment models, the assessment of stock status is of a very high quality, meeting the first scoring issue of SG60, SG80 and SG100. The assessment techniques and procedures make a rigorous examination of both biological and management uncertainties and the stock status is evaluated in relation to reference points in a probabilistic way, meeting the second scoring issue of SG60, SG80 and SG100. The assessment process has very extensive internal review through the committee structures and public consultation and is subject also to a very rigorous independent international peer review process (the SARC review), meeting the third SG80 and the fourth SG100 scoring issues. Since the present assessment method is new it may not be said that it has been "tested and robust" as requirement by the third SG100 scoring issue.
Audit Trace References
NEFSC, 2007a. ; NEFSC, 2010a; NEFSC, 2010b.

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

	SCORING GUIDEPOST	60	80	100
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

Only yellowtail flounder is included as a retained non-target species. Yellowtail flounder are managed under the Northeast Multispecies Fisheries Management Plan. There are three managed yellowtail flounder stocks (Cadrin, 2010) with distributions overlapping the sea scallop stock. The Georges Bank and Southern New England/Mid-Atlantic stocks are directly considered in scallop management, while the Cape Cod/Gulf of Maine yellowtail flounder catch by the scallop fishery is minimal (NEFMC, 2010a). The Georges Bank yellowtail flounder stock is in a rebuilding plan as mandated by the Magnuson-Stevens Act; this has recently been revised so that the fishery now has a rebuilding target of 50% probability of successful by 2016 (Legault et al., 2010; NEFMC, 2011). The Southern New England/Mid-Atlantic yellowtail flounder stock is in a rebuilding plan with a target of 75% probability of success by 2014 (NEFMC, 2010b). Both of these stocks are currently managed within biologically based limits to rebuild within the ten year mandated period. While the biomass of all three stocks is still low, there has been some increase in recent years in all stocks and fishing mortality is decreasing (NEFMC, 2011).

The scallop fishery is allocated a sub-Annual Catch Limit of both the Georges Bank and Southern New England/Mid-Atlantic yellowtail flounder stocks. The catch limits are based on observed catch rates of yellowtail flounder in the scallop fishery with an allocation level set at 100% of projected catch in 2010 and 90% for 2011 and 2012 (NEFMC, 2010b; 2011a). The allocation of yellowtail flounder to the scallop fishery is a portion of the overall Annual Catch Limit of yellowtail flounder for US managed fisheries. All yellowtail flounder allocation to the scallop fishery is monitored by the Northeast Fisheries Observer Program, funded by the sea scallop fishery. Accountability Measures are now in operation that will close areas of the Mid-Atlantic and Georges Bank stock areas the year after an ACL is exceeded, for a period that will reduce the yellowtail catch by the same % as the previous overshoot. This provides an incentive for the scallop fishery to reduce yellowtail catches in order to maximise scallop yield. The scallop fishery does not hinder the recovery of yellowtail flounder as the fishery is now managed under the mandated Annual Catch Limits, and all yellowtail catches by the scallop fleet are fully

accounted for in the annual assessments In addition, the SMAST Yellowtail Flounder Bycatch Avoidance System is a voluntary program to exchange real-time, spatially-specific information on yellowtail flounder bycatch in the scallop rotational areas of Georges Bank. The system uses fishery-dependent data to identify and alert the fleet to bycatch hotspots. The system was implemented in 2010, and has been funded for implementation for future years.
Score: 80
The fishery meets the first scoring issue of SG60 and SG80 since the yellowtail stock is highly likely to be within biologically based limits as mandated by the Magnuson-Stevens Act. The status of the yellowtail stock is well known and subject to a rebuilding plan, meeting the second SG60 scoring issue. With the very slow recovery of the yellowtail stock and recent revision of the rebuilding plan, there is not the high degree of certainty that the stocks are within biologically based limits required to meet the first SG100 scoring issue, nor are the stocks sufficiently rebuilt to meet the second SG100 scoring issue.
Audit Trace References
Murawski *et al*. 2000; O'Keefe *et al*., 2010; Legault *et al*. (2010) Cadrin, 2010; NEFMC, 2010a; NEFMC, 2010b; NEFMC, 2011a.

	SCORING GUIDEPOST	60	80	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
There are measures in place that are intended to maintain yellowtail flounder within biologically based limits and to prevent the fishery from hindering their recovery and rebuilding. These measures include an Annual Catch Limit of the Georges Bank and Southern New England/Mid-Atlantic yellowtail flounder stocks in the scallop fishery (NEFMC, 2010a). The catch limits are based on observed catch rates of yellowtail in the scallop fishery and are managed within the biologically based overall Annual Catch Limits for the flounder stocks (NEFMC, 2010a; NEMFC, 2011), Accountability measures for yellowtail flounder in the scallop fishery include time/area closures in the subsequent fishing year combined with in-season closures of the rotational management areas (NEFMC, 2010a). These provide an incentive for the scallop fishery to reduce yellowtail bycatch. The limited access rotational scallop fisheries on Georges Bank overlap with both the Georges Bank and Southern New England yellowtail flounder stocks. The fishing areas were defined by the NEFMC Habitat Committee to include protection for juvenile finfish and with gear regulations to reduce groundfish and finfish bycatch (NEFMC, 1999). The regulated 10” mesh twine top and 4” dredge bag rings prevent most undersized yellowtail flounder from being retained in scallop dredge gear (Legault et al., 2010a). The scallop fishery is allocated 10% of the overall yellowtail flounder Annual Catch Limit for harvest in the rotational areas. In-season closures of scallop rotational areas occur when the projected estimate of yellowtail flounder allocation is reached (NEFMC, 2004). There is evidence that the strategy is being implemented successfully (Legault et al., 2010b). Yellowtail flounder are mandatory landings species (NEFMC, 2010b) with catch accounted for by the Northeast Fisheries Observer Program. In addition, the SMAST Yellowtail Flounder Bycatch Avoidance System is a voluntary program to exchange real-time, spatially-specific information on yellowtail flounder bycatch in the scallop rotational areas of Georges Bank. The system uses fishery-dependent data to provide advice that allows boats to avoid bycatch hotspots. The system was implemented in 2010 with 35% of limited access scallop vessels participating. The program has support from the scallop harvesting and processing sectors and has been funded for implementation for future years.
Score: 95

The measures in place meet all of the SG60 and 80 scoring issues. There is a strategy of annual Catch Limit of the Georges Bank and Southern New England/Mid-Atlantic yellowtail flounder stocks in place to ensure that the fishery does not hinder the recovery of yellowtail, meeting the first SG60, SG80 ad SG100 scoring issue. The accountability measures of time/area closure and rotational management areas provide clear evidence that the strategy is being implemented successfully and the intended changes are occurring, meeting the second scoring issues of SG60, SG80. The strategy is based on information directly about the fishery and the species involved and there is also evidence that the strategy is achieving its overall objective, meeting the second and fourth SG100 scoring issues. The rotational closures and bycatch avoidance system provide evidence that the partial strategy is working, meeting the third SG80 scoring issue. However, further testing is needed to provide confidence that the strategy will work in the long-term, therefore not meeting the third SG100 scoring issue.
Audit Trace References
Legault et al., 2010a; Legault et al., 2010b; NEFMC, 1999; NEFMC, 2004; NEFMC, 2010a; NEFMC, 2010b; NEFMC, 2011.

	SCORING GUIDEPOST	60	80	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
Both quantitative and qualitative information are available on the amount of yellowtail flounder taken by the fishery, based on landings data and onboard observer data. The Standardized Bycatch Reporting Methodology (SBRM) Omnibus Amendment (NEFMC, 2007) established a performance standard for bycatch monitoring that is applied to all managed fisheries in the Mid-Atlantic and the Northeast, including scallops. The amendment is intended to ensure that the data collected under the Northeast Region SBRM are sufficient to produce a coefficient of variation (CV) of the discard estimate of no more than 30 percent, in order to ensure that the effectiveness of the Northeast Region SBRM can be measured, tracked, and utilized to effectively allocate the appropriate number of observer sea days. The Northeast Fisheries Observer Program (NEFOP) protocols for extrapolation of observed trips include all information without exclusion of outliers. The (NEFOP) has conducted analyses to examine effects of observer presence and yellowtail flounder bycatch on fishing behavior and found no significant differences in bycatch rate related to trip length (Letter from N. Thompson to P. Howard, April 6, 2009). Observer data on yellowtail flounder discards in the scallop fishery are summarized annually and included in the annual stock assessment of the Georges Bank yellowtail flounder stock (Legault et al., 2010) and the benchmark stock assessments for the Southern New England/Mid-Atlantic yellowtail flounder stock (Alade et al., 2008). Information is adequate to qualitatively assess outcome status with respect to biologically based limits for yellowtail flounder, although quantitative data are lacking on 1) how habitat alteration by the scallop dredging fleet affects yellowtail flounder spawning and juvenile production, 2) numbers of yellowtail flounder that are injured and killed but not retained in scallop dredges. Information is adequate to support comprehensive strategies (Annual Catch Limits, in-season closures of the rotational access areas and Accountability measures including

temporal and spatial closures) to manage yellowtail flounder stocks and has been used to detect risk to yellowtail flounder stocks (NEFMC, 2010). The SMAST Yellowtail Flounder Bycatch Avoidance System is a voluntary program to exchange real-time, spatially-specific information on yellowtail flounder bycatch in the scallop rotational areas of Georges Bank. The system uses fishery-dependent data to provide advice on bycatch hotspots. The system was implemented in 2010 with 35% of limited access scallop vessels participating. The system was successful in the Nantucket Lightship access area in 2010, allowing full harvest of the scallop target while catching only 32% of the yellowtail TAC. The scallop fleet used only 29.5% of its yellowtail by-catch allocation in 2011. The program has support from the scallop harvesting and processing sectors and has been funded for implementation for future years.
Score: 90
The first scoring issues of SG60 and SG80 and the second SG60 scoring issue are met since there is adequate quantitative and qualitative information available to support The implementation of a partial strategy . There is sufficient information collected from catch limits, in-season closures and accountability measures to be able to estimate outcome status with respect to biologically based limits, and sufficient information continues to be collected to detect any increase in risk level, meeting the second SG60 and SG80 scoring issues. The first and second SG100 scoring issues are met through the SBRM protocols to ensure a high degree of certainty in the discard estimates obtained from the at-sea observer program. However, the information available and monitoring of on-going mortalities is not sufficiently comprehensive to meet the third and fourth SG100 scoring issues.
Audit Trace References
Alade and Cadrin, 2008; Legault et al., 2010; NEFMC, 2007; NEFMC, 2010; Thompson, 2009.

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

	SCORING GUIDEPOST	60	80	100
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 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

There are no bycatch species with a catch of >5% of the total catch by weight. An assessment of the effect of the fishery on bycatch is complex as potentially many species are involved.

The status of most of the invertebrates is poorly known but there is no evidence to suggest that the fishery is causing the invertebrate bycatch to be outside biologically based limits. Sedentary bottom dwelling fish (e.g. skates, monkfish, winter flounder, summer flounder) can be injured or killed as they pass through or under the gear and larger individuals are caught and selectively removed from populations. Some skates have late ages of maturity (e.g. barn door skate 8 years and thorny skate 7 years). Summer flounder stocks were declared completely rebuilt in 2011 by the NMFS-NOAA. Winter flounder stocks (Gulf of Maine, Georges Bank and Southern New England) are no longer subject to overfishing. However, the Southern New England/Mid-Atlantic winter flounder stock is at an all-time low and the status of the Gulf of Maine stock is uncertain (Status of Stocks 2011). One species of skate (thorny) is below B_{msy}, however thorny skates are primarily distributed in the Gulf of Maine and do not greatly overlap the scallop fishing grounds of Georges Bank.

Southern winter flounder is outside biologically based limits and, as a result of their present vulnerability, these species meet the MSC definition of a main bycatch species (MSC GCB 3.8.2).

There are few experimental examples of bottom dwelling fish mortality from New Bedford scallop dredges. Regulations for 4” rings in scallop dredge bags and 10” mesh twine tops were designed to minimize bycatch of invertebrate and finfish bycatch (NEFMC, 2004). Legault et al. (2010) report that yellowtail flounder under 35cm are not selected in the commercial scallop dredge. This selectivity can be assumed for other flatfish species. No impact of scallop dredging on finfish abundance was found in a

Before-After-Control-Impact study on Georges Bank (Stokesbury and Harris, 2006). The skate complex has been assessed with an absolute estimate within the scallop fishery footprint (MacDonald et al., 2010). Annual Catch Limits for finfish bycatch species are based on the total US catch, including catch in the scallop fishery. Given the marginal contribution of the scallop fishery to mortality of these species, it does not hinder recovery and rebuilding of these species.
Score: 80
Although the winter flounder in Southern New England/Mid-Atlantic States is not within biologically based limits, the scallop fishery makes only a small contribution to the mortality of these species, meeting the two SG60 scoring issues. The current management strategy is therefore considered to include demonstrably effective mitigation measures such that the fishery does not hinder recovery and rebuilding, thus, meeting the SG80 scoring issue. The higher degree of certainty of the SG100 scoring issue is not met due to uncertainty regarding the status of the Gulf of Maine winter flounder stock.
Audit Trace References
Legault et al., 2010; MacDonald et al., 2010; NEFMC, 2004; NEFSC, 2008; Packer et al., 2003; Stokesbury and Harris, 2006; Thompson, 2011.

	SCORING GUIDEPOST	60	80	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
The main bycatch species (winter flounder in Southern New England/Mid-Atlantic States) is vulnerable to the fishery despite the fact that their catch is less than 5% of the total catch by weight. Regulations for 4” rings in scallop dredge bags and large mesh twine tops were designed to minimize bycatch of invertebrate and finfish bycatch (NEFMC, 2004). A rotational area management plan was implemented to concentrate fishing effort in areas of high catch-per-unit-effort, effectively reducing the area swept of the fishery on an annual basis (NEFMC, 2004). Effort reductions to manage scallops and yellowtail flounder have reduced the number of days at sea to approximately 50-55 days per year (NEFMC, 2010). This effort reduction has reduced the impact of the fishery on bycatch species. Annual Catch Limits for finfish bycatch species are based on the total US catch, including catch in the scallop fishery.
Score: 90
There are direct and indirect measures, minimum ring and mesh size, closed areas, days at sea restrictions, that result in a strategy to minimize bycatch, therefore meeting the first scoring issue of SG60, SG80 and SG100. Annual Catch Limits for finfish species are based on total US catch, including scallop catch. The strategy for setting ACLs includes buffers for uncertainty with associated Accountability Measures to prevent ACLs from being exceeded and mitigation if overages occur. Therefore, the fishery meets the second scoring issue of SG60, SG80 and SG100. The strategy was implemented in 2010 and evidence is not yet available, that the third SG100 scoring issue is met with respect to the affected winter flounder stock.
Audit Trace References
NEFMC, 2004; NEFMC, 2010.

	SCORING GUIDEPOST	60	80	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
The only main bycatch species is winter flounder due to its current low stock status in Southern New England/Mid-Atlantic States. Both quantitative and qualitative information are available on the amount of bycatch taken by the fishery, based on landings data and onboard observer data. There are observers on approximately 15% of the scallop fleet providing qualitative and quantitative information on the amount of main bycatch species affected by the fishery. No information is gathered on the unseen impacts of scallop dredging on bycatch species that may pass through or under the dredges, nor on the ecological effects of scallop dredging on bycatch species populations, for example through habitat alteration, changes in biodiversity and altered productivity. The Standardized Bycatch Reporting Methodology (SBRM) Omnibus Amendment (NEFMC, 2007) established a performance standard for bycatch monitoring that is applied to all managed fisheries in the Mid-Atlantic and the Northeast, including scallops. The amendment is intended to ensure that the data collected under the Northeast Region SBRM are sufficient to produce a coefficient of variation (CV) of the discard estimate of no more than 30 percent, in order to ensure that the effectiveness of the Northeast Region SBRM can be measured, tracked, and utilized to effectively allocate the appropriate number of observer sea days. The SMAST video survey has collected information on the abundance and distribution of over 60 taxa for 10 years (Stokesbury et al., 2002; 2004; Harris and Stokesbury, 2010a; Stokesbury and Harris, 2006; Harris and Stokesbury, 2010b). The quantitative information from this continental shelf-wide survey documents changes in the benthic environment. The information available is adequate to broadly understand the outcome status of the fishery with respect to the biologically based limits of bycatch species and this information is adequate to support a partial strategy to manage the main bycatch species.
Score: 75

The assessment is conducted on the basis that there is one main bycatch species (winter flounder) that, since they are in an overfished condition in Southern New England/Mid-Atlantic States, the stock is vulnerable to the fishery despite the fact that their catch is less than 5% of the total.

There is sufficient information collected on bycatch species, including winter flounder through the Northeast Fisheries Observer Program to meet SG60 and the first scoring issue of the SG 80. The second SG80 scoring issue would be met if we knew the status of winter flounder in those areas fished by the scallop fishery. There remains considerable uncertainty regarding the status of winter flounder in the Gulf of Maine although present catch levels have been determined to be sustainable (52nd SAW). The second SG80 scoring issue is not met.

The strategy for setting Annual Catch Limits (ACLs) for all managed species includes buffers for uncertainty with associated Accountability Measures to prevent ACLs from being exceeded and mitigation if overages occur, meeting the third SG80 scoring issue.

Sufficient data continue to be collected to detect any increase in risk to main bycatch species, meeting the fourth SG80 scoring issue.

Audit Trace References
Harris and Stokesbury, 2010a; Harris and Stokesbury, 2010b; NEFMC, 2007; Stokesbury, 2002; Stokesbury, 2004; Stokesbury and Harris, 2006.

2.3	Endangered, Threatened and Protected (ETP) species

	SCORING GUIDEPOST	60	80	100
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

NMFS described loggerhead turtles as likely to decline in the foreseeable future and that they are currently at risk of extinction throughout their range (Conant *et al*., 2009). However, Merrick & Haas (2008) conceded that the scallop fishery is not the cause of this risk of extinction whilst Murray (2011) reports that impact of the sea scallop dredge fishery on loggerheads in U.S. waters of the Northwest Atlantic remains a serious concern. Major improvements in dredge gear, seasonal closures, and effort shifts away from turtle areas have resulted in a marked decline in potentially harmful interactions (Murray, 2011). However, there remain hot-spots where interactions between scallop fishing gear and turtles remain high (Warden, 2011). The fishery is operating under a comprehensive Biological Opinion (NOAA, 2012) with numerous conservative pro-active protective measures in place that are updated with each FW adjustment to the Fishery Management Plan. In view of limited observer coverage and rarity of observable interactions, a very precautionary program using swept area is used to access the degree of turtle interactions. A recent compilation report by the Northeast and Southeast Fisheries Science Centers documented a preliminary population estimate of loggerhead turtles between 588,000 – 801,000 individuals (NEFSC & SEFSC, 2010). This is the first estimate of the loggerhead turtle population ever documented. The tagging research to calibrate the NMFS aerial surveys that enabled this estimate was made possible in part by funds from the scallop Research Set Aside program and in cooperation with the commercial scallop industry.

The fishery would score more highly if there was greater observer coverage on the vessels fishing in the Mid-Atlantic region, to obtain better data on bycatch landings, and if scallop fishing ceased in the Mid-Atlantic region throughout the turtle season, rather than parts of it.

Score: 90

This fishery meets the scoring issues of SG60 and 80 since 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 unlikely to create unacceptable impacts to the ETP species but the indirect effects have not been considered to the same extent but are thought to be likely to create acceptable impacts. The fishery therefore meets the first SG100 scoring issue but does not meet the portion of the

second scoring issue related to indirect effects.
Audit Trace References
Conant et al., 2009; Merrick and Haas, 2008; Murray, 2011; NEFSC & SEFSC, 2010; NOAA, 2008. Warden 2011

	SCORING GUIDEPOST	60	80	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, that 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
Given that interactions between sea turtles and sea scallop dredges is an important conservation issue the industry has recently worked closely with managers and scientists in attempts to reduce turtle bycatch through time-area management and gear modifications. Time-area restrictions involve rotational closed access areas off Virginia where scallop dredging is limited during the turtle season (NEFMC, 2010 FW 22 prepared by the New England Fishery Management Council, in consultation with the National Marine Fisheries Service and the Mid-Atlantic Fisheries Management Council). Murray (2011) has shown that turtle chains and effort shifting measures have been very effective in reducing takes, although the damage caused to turtles that remain on the seabed is unknown. Sea turtle injuries resulting from interactions with scallop dredges are also being mitigated through modifications to fishing gear. Since 2006, vessels fishing south of 41º 10' latitude are required to fit chains to exclude turtles. Turtle chains are intended to reduce the potential for injury and mortality (Haas et al., 2008; Murray, 2010). There is still some concern that turtles can get run-over by a dredge on the seafloor. To address this issue, Smolowitz et al. (2010) describe further modifications to the standard New Bedford dredge designed to avoid turtles becoming trapped and crushed as they pass between the dredge frame and sea floor. Field tests using turtle carcasses have shown the new dredge to be 100% effective in preventing run-overs with minimal damage to the interacting carcasses. The NEFMC has requested that the Scallop PDT develop a process to certify the CFarm Turtle Excluder Dredge for use in a regulatory framework (FW 23 to the Sea Scallop FMP) to minimize sea turtle injury and mortality.

Score: 90
The sea scallop fishery's interactions with sea turtles are managed under a comprehensive strategy defined by the Biological Opinion that ensures precautionary measures are put into place either through the Fishery Management Plan (FMP) or directly under the Endangered Species Act. Multiple measures are in place to reduce mortality of sea turtles caused by the fishery. This is sufficient to meet the first scoring issue under the SG60, SG80 and SG100. There is clear evidence that the strategy is being implemented successfully, and intended changes are occurring using direct data from the fishery (Murray, 2011; Smolowitz et al, 2010), meeting the third scoring issues of SG80 and SG100. Although there is an objective basis for some confidence regarding the implementation of the strategy, meeting the second SG80 scoring issue, there remain areas where turtle-scallop fishery interactions remain high (Warden, 2011). The fishery does not meet the higher degree of confidence required by the second SG100 scoring issue.
Audit Trace References
Haas et al., 2008; Murray, 2010; NEFMC, 2010; Smolowitz et al., 2010, Warden 2011

	SCORING GUIDEPOST	60	80	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
Information is adequate to broadly understand the impact of the fishery on turtles, with observer coverage on 15% of vessels providing detailed information on bycatch showing the main turtle species affected, the numbers caught and the injuries sustained. Information is lacking, and impractical to obtain, on the effects of scallop dredging on turtles that are not caught by the gear and on the overall effects of the scallop fishing industry on turtle populations, although genetic studies indicate that populations from southern Florida are the most affected by this fishery, these nesting sites are carefully monitored and confirm the endangered status of loggerheads.
Score: 80
The 15% observer coverage is sufficient to determine whether the fishery may be a threat to protection and recovery of the ETP species supporting a full strategy to manage impacts, meeting the first SG80 scoring issue, and sufficient data is available to estimate mortality, meeting the second SG80 scoring issue. There is insufficient information concerning injury to meet the requirements of the second and third SG100 scoring issues. Also the higher degree of certainty required of the first SG100 scoring issue is not met.
Audit Trace References
Conant *et al*. (2009), Merrick & Haas (2008), Smolowitz *et al*. (2010)

2.4	Strategies have been developed within the fisheries management system to address and restrain any significant negative impacts of the fishery on the ecosystem

	SCORING GUIDEPOST	60	80	100
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

International research shows that scallop dredging (including by New Bedford style dredges in US waters) causes long-term reductions in habitat structure of shelf areas (Caddy, 1973; Collie et al., 1997, 2000a, 2000b, 2005; Fogarty & Murawski, 1998; Kaiser & de Groot 2000). Mobile demersal fishing gear reduces seafloor habitat complexity by homogenising the sediment, smoothing sedimentary bedforms (which can provide habitat for fish, e.g. Auster et al. 2003), rolling boulders, erasing tubes, pits and burrows and killing structure-building fauna (reviewed by NEFMC. 2011b). Water movements also alter seabed habitats such that storms and shifting currents can mask the effects of towed demersal fishing gear (Stokesbury & Harris 2006). Nevertheless, the mechanical impact of the leading edge and underbelly of a scallop dredge differs from that exerted by water currents as it smashes the larger, longer-lived, more fragile members of the benthos (reviewed by NEFMC. 2011b).

When different fishing gears are compared, scallop dredges have amongst the highest adverse impacts on benthic habitats due to the power of the vessels and the weight of the gear (Chuenpagdee et al. 2003; Kaiser et al., 2006, Collie et al. 2000a). New Bedford dredges drag sweep chains and chained bags along the surface of sediments (Bourne 1964; Caddy 1989, Stokesbury & Harris 2006) causing similar effects to those of European toothed dredges (Hall-Spencer et al. 1999; Hall-Spencer & Moore 2000a; Jenkins et al. 2001; Bradshaw et al. 2003) in that biogenic habitats are damaged and sediments are homogenised (Caddy, 1973; Collie et al., 1997, 2000a, 2000b, 2005; Watling et al., 2001).

Given that this fishing gear is considered by experts to reduce geological and biological habitat structure in dredged areas (NEFMC, 2011b), it is important to assess the footprint of the fishery to determine the impact of the fishery on habitat structure. If a small fraction of the available scallop grounds were fished it would be highly unlikely that this fishery could reduce habitat structure and function to a point where there would be serious or irreversible harm. The footprint of the fishery includes not only the amount of fishing effort but also the distribution and intensity of that fishing on a regional or bioregional basis. To score this PI, we referred both to an analysis of the fishery footprint from NOAA using the satellite-based vessel monitoring scheme (VMS) and a model that has been developed for assessing the effects of scallop dredging on essential fish habitat off the Atlantic coast of the USA (NEFMC, 2011b).

Figure 18 in the main body of our assessment shows speed-filtered VMS data from NOAA for 1998-2008 and demonstrates that despite successful strategies to reduce fishery effort (see 2.4.2) the area of available scallop ground swept by the fishery remains extensive on a regional and bioregional basis. The VMS data show that the areas that are the most intensively fished rotate as areas that were previously closed to the fishery are opened up on a rotational basis. Certain biological habitat features (such as long-lived molluscs) do not recover from impacts for >5 years (Collie 1997, 2005; NEFMC, 2011b). There are three types of closed area that exclude scallop fishing: groundfish closed areas (established in 1994) plus essential fish habitat (EFH) closed areas and the Habitat of Particular Concern (HAPC), which were developed from the groundfish closures.

In the northern part of the fishery, there are currently seven closed areas (shown on Fig 2 of our main report), viz. Western Gulf of Main Habitat, Cashes Ledge Closed Area, Jeffrey's Bank Habitat, Closed Area I north, Closed Area I south, Nantucket Lightship Closed Area and Closed Area II northern portion. All these areas contained portions of historic fishing ground and the areas on Georges Bank and Nantucket Lightship Closed Area have been closed for 17 years (Stokesbury 2002, Stokesbury et al., 2010; Harris & Stokesbury 2010). The areas in the Gulf of Maine are essential fish habitat closed areas and cover 3213 km2 and overlap with traditional scallop grounds (Stokesbury et al. 2010). The areas that have remained closed on Georges Bank include parts of Closed Area I (3252 km2), a part of Closed Area II (3046 km2) and a part of Nantucket Lightship Closed Area (6263 km2); SMAST surveys reveal that some of the areas that are permanently closed contain commercially harvestable densities of scallops (Stokesbury 2002; Stokesbury & Harris 2006; Stokesbury et al. 2004, 2010.). No such permanently closed areas remain in other biogeographic regions of the fishery, such as off Southern New England and the Mid Atlantic States. NEFMC (2011) augments our assessment of the footprint of the scallop dredging fishery based on VMS, by addressing the impact and intensity of this fishery. Maps in NEFMC (2011b) collate their model output and show that significant areas of vulnerable seabed habitat occur in areas that are currently impacted by the present day scallop-dredge fishery, and that the scallop fishery has widespread adverse effects on seabed habitats on scallop grounds throughout the region from Cape Hatteras to the border with Canada.

The MSA requires fishery management plans to minimize, to the extent practicable, the adverse effects of fishing on fish habitats. The development of the Swept Area Seabed Impact (SASI) model enables managers to better understand: (1) the nature of fishing gear impacts on benthic habitats, (2) the spatial distribution of benthic habitat vulnerability to particular fishing gears, and (3) the spatial and temporal distribution of realized adverse effects from fishing activities on benthic habitats (NEFMC 2011b).

The impact of scallop fishing on essential fish habitat has been modelled using the geological and biological components of the SASI analysis and indicates areas of impact to key elements of ecosystem structure and function, such as impacts to cobble and boulder habitats lasting >5 years and long-term (>5 year) damage to molluscs and epifaunal bivalves on mud, sand, granule/pebble, cobble and boulder habitats (NEFMC, 2011b).

Score: 60

The SG60 scoring issue is met since, although the fishery causes significant alteration of habitat cover/mosaic that causes major change in the structure or diversity of the species assemblages, parts of some scallop grounds are permanently closed to scallop fishing and low habitat impacts have been noted on sand in the mid-Atlantic. The present score of this performance indicator is predicated on closed areas remaining closed. The higher degree of certainty required by the SG80 scoring issue is not met within the current management strategy.

This could be met by constraining fishing effort to areas of shallow, unconsolidated coarse sediments that have relatively rapid recovery times. The SASI output needs to be used in concert with statistical approaches to identify clusters of vulnerable grid cells and the ecological interpretation of results and recommendations by the NEFMC Habitat Plan Development Team. The fishery should not access areas of hard substratum (e.g. boulders and cobble), especially those that have been closed and may soon be open for fixed gear fisheries as otherwise these areas will be subject to continuous chronic impacts from dredges.

Audit Trace References
Auster *et al*. 2003; Backus, 1987; Bradshaw et al., 2003; Butman, 1987; Caddy, 1973; Chuenpagdee *et al*. 2003; Collie et al., 1997, 2005; Curry & Parry, 1999; Eleftheriou & Robertson, 1992; Hall-Spencer & Atkinson, 1999; Hall-Spencer et al., 1999, 2000a,b, 2009; Harris, 2011; Harris & Stokesbury, 2010; Henry & Kenchington, 2004; Jenkins et al. 2001; Kaiser & de Groot 2000; Kaiser *et al*., 2000, 2006; Kenchington et al. 2007; Lindholm et al. 2001, 2004; Link et al., 2005; Malik & Mayer, 2007; Morsan 2009; Muraswki et al., 2000; NEFMC, 1998; 2003, 2011; Spencer & Collie 1997; Stokesbury et al., 2004, 2010; Stokesbury & Harris 2006; Twichell, 1983; Theroux and Grosslein, 1987; Uchupi et al., 1996; Watling et al., 2002; Watling & Norse 1998.

	SCORING GUIDEPOST	60	80	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

Cumulative detrimental effects of towed demersal fishing gear on habitats off Atlantic coasts of the USA led to calls for an ecosystem-based management approach (Fogarty & Murawski, 1998). In the 1990s large areas of the US continental shelf were made off-limits to towed demersal gear, including scallop dredging, in emergency efforts to protect groundfish spawning grounds and juvenile production to recover groundfish stocks (Murawski *et al*. 2000). For example, in late 1994, substantial portions of Georges Bank (see Figs. 1-2) were closed to towed demersal gear to help rebuild stocks of haddock (*Melanogrammus aeglefinus*) to twice the level previously recorded, and yellowtail flounder (*Limanda ferrugineus*). Collie *et al*. (2005) demonstrated that seabed habitats began to recover from the impacts of heavy towed demersal gear in these closed areas, such that large animals increased in abundance along with an increase in those fragile species (e.g. shrimps, polychaetes, and brittle stars) that characterise the complex habitat structure provided by colonial epifauna (e.g. sponges, bryozoans, anemones, hydroids, colonial tube worms). These studies led the New England Fishery Management Council to designate a Habitat Area of Particular Concern for juvenile Atlantic cod *Gadus morhua* in Closed Area II (Collie *et al*., 2009).

The Swept Area Seabed Impact (SASI) model has been developed by the New England Fisheries Management Council and provides a framework to quantify and visualize temporally and spatially the effects of various types of fishing effort on fishing habitat (NEFMC, 2011). Used in combination with scientific evidence about the impacts of scallop dredging from peer-reviewed literature, SASI enables managers to better understand: 1) the nature of fishing gear impacts on benthic habitats, 2) the spatial distribution of benthic habitat vulnerability to particular fishing gears, and 3) the spatial and temporal distribution of realized adverse effects from fishing activities on benthic habitats. The SASI model may be used in conjunction with other data to identify areas with bottom types that will take longer to recover from the effects of fishing effort.

Score: 70

The fishery meets SG60 since there is a measure in place that prevents habitat damage to scallop grounds in closed areas in the north-eastern part of the fishery and it is likely that such measures would work throughout the biogeographic regions of the fishery, meeting the second SG80 scoring issue. There is evidence that the measure is being implemented successfully in the Georges Bank and Gulf of Maine permanent closures, and therefore comprises a partial strategy, meeting the third SG80 scoring issue. However, the first and second SG80 scoring issues are not met since without expansion of the strategy to other areas, the partial strategy is not expected to achieve the SG80 level of the Habitat Outcome PI 2.4.1 and the fishery remains likely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
Audit Trace References
Bradshaw et al., 2003; Collie et al., 2000b, 2005, 2009; Fogarty and Murawski, 1998; Morsan, 2009; Murawski et al., 2000; NEFMC, 2011; Stokesbury and Harris, 2006; Stokesbury et al., 2004; Stokesbury et al., 2007; Stokesbury et al., 2011.

	SCORING GUIDEPOST	60	80	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
Information is adequate to determine the risk posed to habitat types by the fishery (see 2.4.1) and the effectiveness of the strategy to manage impacts on habitat types (see 2.4.2). The US offshore scallop dredging industry has formed close collaborative ties with scientists that have yielded highly detailed and in-depth data on the nature, distribution and vulnerability of the main habitat types in the fishery area (Stokesbury *et al*., 2004; Stokesbury & Harris 2006). The way the habitats are monitored (mainly drop-down video with no infaunal studies or acoustic surveys) means that the area impacted by scallop dredge tracks is not monitored, and the effects of scallop dredges on infauna are poorly known. In other scallop fisheries, long-lived infauna are known to be important for habitat structure and are resilient to the effects of storms that shift sediment (e.g. Hall-Spencer & Atkinson, 1999). There is very little information on the effects of the US sea scallop fishery on deep-burrowing organisms. However, "Changes in habitat distributions over time" have been measured (Stokesbury *et al*., 2004; Stokesbury & Harris 2006) and the "physical impacts of scallop dredges on the habitat types" found on the US shelf have been quantified in detail (Collie *et al*. 1997, 2005; Spencer & Collie 1997; Watling *et al*. 2001; Henry & Kenchington 2004; Kenchington *et al*. 2007; Malik & Mayer, 2007). The Vessel Monitoring System (VMS) allows for large-scale assessments of the footprint of the fishery and the SASI model illustrates where seabed habitats are impacted by this fishery (NEFMC, 2011).
Score: 90
The Swept Area Seabed Impact (SASI) model as part of the Habitat Omnibus has been peer reviewed and accepted (14 February 2011; NEFMC, 2010). This provides

a distribution of habitat types over their range, with particular attention to the occurrence of vulnerable habitat types. The information is sufficient to meet the first scoring issue of SG60, SG80 and SG100. The information is adequate to broadly understand the main impacts of gear use on the main habitats, including spatial extent of interaction, meeting the second scoring issue of SG60. The second scoring issue of SG80 is met since, in addition to the SASI information concerning impacts of the fishery on habitat types, the VMS data provides reliable information on the spatial extent, timing and location of use of the fishing gear. The third SG80 scoring issue is met since sufficient data continue to be collected through the SMAST program to detect any increase in risk to habitat. The second and third SG100 scoring issues would be met with regular visual monitoring of seabed structure and functioning was augmented with faunal sampling and acoustic survey techniques.
Audit Trace References
Stokesbury *et al*., 2004; Stokesbury & Harris 2006; Collie *et al*. 1997, 2005; Spencer & Collie 1997; Watling *et al*. 2001; Henry & Kenchington 2004; Kenchington *et al*. 2007; Malik & Mayer, 2007; NEFMC, 2011.

2.5	Ecosystem

	SCORING GUIDEPOST	60	80	100
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

This PI is based on an assessment of the wider ecosystem effects of the fishery such as disruption to food-webs and whether the fishery causes major changes in species evenness and dominance caused by direct (e.g. gear impact) and indirect effects (e.g. discards). No studies were found concerning the effects of this fishery on genetic diversity of species caused by selective fishing and resulting in genetically determined changes in demographic parameters (e.g. growth, reproductive output) so such effects could not be ruled out but were not included in this scoring.

The MSC Guidance to the Certification Requirements (GCR) states that 'irreversible harm' includes very slowly reversible harm (normally one or two decades) that is effectively irreversible on time-scales of natural ecological processes (e.g. natural perturbation, recovery and generation times in the absence of fishing). Examples of 'serious or irreversible harm' include habitat loss on scales that have widespread detrimental consequences for the ecosystem services provided by the habitat (e.g. gross change in species composition of dependent species), loss of resilience resulting in trophic cascades and fishery mediated regime shifts.

The sea scallop is a filter feeding invertebrate and therefore low down in the food-web. The GCR highlights concerns that harvesting low trophic level species poses a greater inherent risk to ecosystems than harvesting mid and high trophic level species, but in this fishery sea scallop stocks are maintained at levels higher than B_{MSY} and therefore the ecosystem effects of removing the scallops themselves is not considered likely to cause serious or irreversible disruption to foodwebs.

However, scallop fisheries also affect the wider ecosystem through alterations in invertebrate community structure. There can be benefits to certain scavenging species (e.g. Hall-Spencer & Moore 2000b) but the US scallop fishery has detrimental effects on other organisms, particularly invertebrates as identified in section 7.2.3 (Collie et al.1997, 2000a, 2000b; NEFMC, 2011b).

The New Bedford dredge reduces seafloor habitat complexity by homogenising the sediment, rolling boulders, erasing tubes, pits and burrows and killing long-lived fauna (see comments for PI 2.4.1). Worldwide scallop dredges have amongst the highest adverse impacts on benthic ecosystems (Chuenpagdee et al. 2003; Kaiser et al., 2006), including New Bedford style dredges (Collie et al. 2000a). New Bedford dredges drag sweep chains and steel-ringed bags along the surface of sediments (Bourne 1964; Caddy 1989, Stokesbury & Harris 2006) causing similar effects to those of European toothed dredges (Hall-Spencer et al. 1999; Hall-Spencer & Moore 2000a, Jenkins et al. 2001; Bradshaw et al. 2003) in that biogenic habitats are damaged and sediments are homogenised (Caddy, 1973; Collie et al., 1997, 2000a, 2000b, 2005; Watling et al., 2001). The New Bedford dredges, together with other heavy towed demersal fishing gear, have altered a range of habitats on the US shelf

area and their ongoing use maintains the benthos in an altered ecological state (Collie et al. 2005). Cessation of mobile demersal fishing in large closed areas on the US continental shelf resulted in marked increases in benthic megafaunal production (Hermsen et al. 2003) with species such as skates (*Raja* spp.), haddock *Melanogrammus aeglefinus*, and flounders (Pleuronectiformes) shown to be generally larger inside than outside the closed areas although no differences were detected in the size of 11 other species (Link et al. 2005). Some of these closures, more completely described in the assessment of PI 2.4.1, remain off limits to the scallop fishery and there is evidence that ecosystem recovery is slowly underway in areas that have been closed (Collie et al. 2000b, 2005, 2009)
Score: 60
The US Atlantic scallop fishery is known to have widespread impacts on geological and biological components of the ecosystem, with recovery rates for some key features of ecological importance known to be very slow. The fishery meets the scoring guidepost 60 since there is evidence for ecosystem recovery in a permanently closed area on Georges Bank. The fishery, as it is currently conducted, does not meet the higher degree of certainty required for the SG80 scoring issue.
Audit Trace References
Auster et al. 2003; Backus, 1987; Bradshaw et al., 2003; Butman, 1987; Caddy, 1973; Chuenpagdee et al. 2003; Collie et al., 1997, 2005; Curry & Parry, 1999; Eleftheriou & Robertson, 1992; Hall-Spencer & Atkinson, 1999; Hall-Spencer et al., 1999, 2000a,b, 2009; Harris, 2011; Harris & Stokesbury, 2010; Henry & Kenchington, 2004; Jenkins et al. 2001; Hermsen et al., 2003Kaiser & de Groot 2000; Kaiser et al., 2000, 2006; Kenchington et al. 2007; Lindholm et al. 2001, 2004; Link et al., 2005; Malik & Mayer, 2007; Morsan 2009; Muraswki et al., 2000; NEFMC, 1998; 2003, 2011; Spencer & Collie 1997; Stokesbury et al., 2004, 2010;Stokesbury & Harris 2006; Twichell, 1983; Theroux and Grosslein, 1987; Uchupi et al., 1996; Watling et al., 2002; Watling & Norse 1998.

	SCORING GUIDEPOST	60	80	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
There is an extensive Environmental Assessment (EA) or Environmental Impact Statement (EIS) at each FW Adjustment and Amendment to the Scallop Fishery Management Plan. The EA and EIS assess the environmental consequences of all considered management alternatives, including the scallop resource, essential fish habitat, protected resources, economic and social impacts, impacts on non-target species, and cumulative ecosystem impacts (see FW 21, NEFMC, 2010 as an example). The Swept Area Seabed Impact (SASI) model has been developed by the New England Fisheries Management Council and provides a framework to quantify and visualize temporally and spatially the effects of scallop dredging on fishing habitat. This enables managers to better understand: 1) the nature of fishing gear impacts on benthic habitats, 2) the spatial distribution of benthic habitat vulnerability to particular fishing gears, and 3) the spatial and temporal distribution of realized adverse effects from fishing activities on benthic habitats. This model has been reviewed and accepted. Further by-catch and habitat impacts are considered in each sea scallop fisheries management plan.

Score: 80
The fishery meets the SG60 and SG80 scoring issues since there is a strategy in place that prevents harm to ecosystem structure and function in some permanently closed area in the north-eastern part of the fishery and it is likely that such measures would work throughout the biogeographic regions of the fishery. The Swept Area Seabed Impact (SASI) model draws on ample published information about the ecosystem effects of the scallop fishery and highlights ecosystem impacts to essential fish habitats for future management in other parts of the fishery. However, the SASI is new and has not been implemented in full. There is strong evidence that the strategy is being implemented successfully in the permanently closed areas (meeting the third SG80 scoring issue). The management of this fishery has a partial strategy in place (permanently closed areas) to address the impacts of this fishery on the ecosystem that is considered likely to work based on comparison with similar ecosystems and there is evidence that the measures are being implemented successfully, meeting the third SG80 scoring issue. With habitat impacts being a regular and important part of each Amendment and FW Adjustment to the scallop fishery management plan, and the SASI model now accepted, the management strategy complies with all the SG60 and 80 scoring issues. The present strategy cannot be considered to be a plan in the context of the first two SG100 scoring issues without a more complete application of ecosystem protection through an assessment of impacts and implementing a set of fishery responses, including closed areas. SASI is a new tool and has not yet been fully implemented or tested so the third and fourth scoring issues of the SG100 are not attained.
Audit Trace References
Hermsen *et al*. (2008); Stokesbury & Harris (2006); Malik & Meyer (2007) Sarro & Stokesbury (2009) See section 7.3 for a full list; NEFMC, 2010; NEFMC, 2011.

	SCORING GUIDEPOST	60	80	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
The main impacts of the scallop dredge fishery on key ecosystem elements (e.g. habitat structure, macrobenthic invertebrate populations and groundfish populations) can be inferred from existing information. The main functions of the filter feeding scallops, the main retained and bycatch species, the turtles and the scallop ground habitats are known. There is sufficient information on the impacts of scallop dredging on scallops, retained and bycatch species, turtles and seabed habitats to infer that the fishery degrades the ecosystem. The VMS scheme combined with landings and onboard observer data provides sufficient information to detect decreases or increases in the risk that the scallop fishery poses to the US continental shelf ecosystem.
Score: 95
Information is adequate to broadly understand the key elements of the ecosystem and the impacts of the fishing gear may be inferred from existing information, meeting the first scoring issue of SG60, SG80 and SG100. The main functions of the ecosystem components are known and the main impacts of the fishery may be

inferred from the available research, meeting the second scoring issue of SG60 and SG80 and the third scoring issue of SG100. There is also sufficient data collected through monitoring through the SMAST program to detect increases in risk levels, meeting the fifth SG80 scoring issue.

The SASI model provides sufficient information to determine the main functions of the ecosystem and, meeting the third SG80 scoring issue; and to determine the impact of the fishery on these components, meeting the fourth SG80 scoring issue.

The fishery does not meet the second SG100 scoring issue since not all the main interactions, particularly the lack of inter-faunal studies, have been investigated off the mid-Atlantic coast and the deeper offshore grounds.

Audit Trace References
Stokesbury *et al*., 2004; Stokesbury & Harris 2006; Watling *et al.*2001. (http://www.nefmc.org/scallops/planamen/a11/Part4_FSEIS_0709_Submission_v1.pdf).

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			
	SCORING GUIDEPOST	60	80	100
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
The Magnuson-Stevens Fishery Conservation and Management Act (MSA, reauthorized and amended in 2007) established requirements to end and prevent overfishing, including annual catch limits and accountability measures. The MSA also provides a process for identifying and evaluating environmental issues associated with Federal actions and for considering a reasonable range of alternatives to avoid or minimize adverse impacts to the extent practicable. The NEFMC provides for the identification and protection of Essential Fish Habitat through its extensive scientific advisory and public consultation process.
Score: 95
The management system as defined by the MSA is consistent with MSC criteria in Principles 1 and 2 aimed at achieving sustainable fisheries. These Principles are being implemented by the National Marine Fisheries Service in cooperation with the Regional Councils, meeting the first SG60 scoring issue. The New England Council receives its mandate from the MSA for preparing fishery management plans including a robust public process for resolving disputes, including those of people dependent on fishing for food or livelihood, though public meetings and the courts, consistent with the second, third and fourth scoring issues of SG60. The management system provides, by the legal authority of the MSA, for extensive transparent consultation and timely decisions through the Council public hearings and through the courts, consistent with scoring issues one and two of SG80. The system is tested through its public responses to stakeholders and actions are revised as a result of lawsuits, when needed, but Council works proactively to avoid court action by first addressing issues at public hearings, meeting the first two scoring issues of SG100. A suitable framework exists within the NEFMC to address the legal rights that might be established by custom of people dependent on fishing for food or livelihood, meeting the third scoring issue of SG80. However there is little evidence that 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. Therefore the fishery does not meet the third scoring issue at the SG100 level.
Audit Trace References
The Magnuson-Stevens Fishery Conservation and Management Act Amendment 15 DEIS Guidelines on implementing national standards.

	SCORING GUIDEPOST	60	80	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 preparation of fisheries management plans, FWs and amendments involve considerable opportunity for transparency since all the meetings are public and for public comment, which is built into each public meeting. The schedule of meetings is posted on the NEFMC website along with meeting materials. Through the consultation processes, fisheries managers obtain information from a wide range of sources, including local knowledge, for input into a broad range of decisions, policies and practices within the management system. Comments are heard and responses are documented in the planning process. All comments and responses are posted for the public.
Score: 100
Organisations and individuals involved in the management process and their roles and responsibilities are clearly identified in the MSA and at the NEFMC website (nefmc.org). Functions, roles and responsibilities are explicitly defined and well understood for all areas of responsibility and interaction. The website includes a statement of organization practices and procedures, a full list of Council Membership, a NEFMC member financial disclosure form, the structure and function of committees and all committee deliberations, assessment of options and decisions taken by the committee, meeting the first scoring issue of SG60, SG80 and SG100. The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge, e.g. public meetings regarding and for the development of management plans. The management system demonstrates consideration of the information and explains how it is used or not used through the

publication of the assessment of options considered and an explanation of decisions taken, all available on the NEFMC website, meeting the second scoring issue of SG60, SG80 and SG100. The consultation process provides opportunity and encouragement for all interested and affected parties to be involved in public hearings, and facilitates their effective engagement through setting aside time at Council meetings for public input. This input is assessed and responses are published as part of decisions taken by Council. Therefore the fishery meets the third SG100 scoring issue.
Audit Trace References
NEFMC.org MSA

	SCORING GUIDEPOST	60	80	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
Magnuson-Stevens Reauthorization Act of 2007 (MSA) requires that "*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.*" Overfishing and overfished are defined by the MSRA as "*a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce the maximum sustainable yield on a continuing basis.*" The MSA also provides a mechanism for identifying and evaluating environmental issues associated with Federal actions and for considering a reasonable range of alternatives to avoid or minimize adverse impacts to the extent practicable. For implementing this mandate, the NEFMC includes a committee to deal with maintaining Essential Fish Habitat (EFH) and Habitat of Particular Concern. The NEFMC has also developed and adopted the use of the Swept Area Seabed Impact (SASI) Model for identification of vulnerable habitat and to minimize the adverse effects of fishing. The SASI Model will be used to evaluate the habitat impacts of management measures in the preparation of fishery management plans (nefmc.org). The objectives of fisheries management are explicitly described in the MSA and are in line with MSC Principle 1 and 2. These are fully described and available for public view at nefmc.org.
Score: 100
The objectives of sustainability are clearly defined in the Magnuson-Stevens Act consistent with the precautionary approach measures of the MSC Principles 1 and 2. There is an explicit legal requirement for planners of NMFS and the Council to produce plans with specific objectives consistent with the MSA. These objectives include sustainability of fish resources though preparation of fishery management plans consistent with MSC principle 1 and objectives to minimize the adverse effects of fishing on EFH, consistent with MSC Principle 2. The fishery meets the SG100 scoring issue.
Audit Trace References
MSA, nefmc.org

	SCORING GUIDEPOST	60	80	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
The use of individual quotas in this fishery provides fishers with security of their portion of the total catch and stability to their businesses. The close relationship between fishers and scientists of SMAST, Virginia Institute of Marine Science, Coonamesset Farm Foundation, Woods Hole Oceanographic Institute, and others promotes understanding on both sides in a complex fishery. The SMAST and VIMS projects support the stock assessments of scallops as well as attempts to respond to management problems in the fishery such as bycatch of yellowtail flounder. Fishers have been involved in the strategic management of yellowtail bycatch quotas in closed areas, as well as research to reduce sea turtle bycatch with gear modifications. The management consultations are open, documented and available publically and conducted in accordance with legislation.
Score: 100
Fishers have a sense of ownership as a result of the individual allocations of DAS and a sense of contribution to science through SMAST, Virginia Institute of Marine Science, Coonamesset Farm Foundation, WHOI, and others. The penalty for fishing infractions is very high providing a strong disincentive for illegal action and there are no known incentives that contribute to unsustainable fishing. Therefore, the management system provides incentives supporting MSC Principles 1 and 2, meeting the SG80 scoring issue. Statutory management planning by the Council gives certainty about the rules and goals of management in accordance with principles of sustainability. Planning Development Team (PDT) of Council conducts a regular review of the management plan to determine if objectives are being met. Action is taken through amendments to the Scallop Fishery Management Plan and the FW process and incentives for sustainable fishing are explicitly considered through Accountability Measures, which are implemented for fishing year 2011 and beyond. Accountability Measures for the scallop fishery include an Annual Catch Target set below the legal Annual Catch Limit as a proactive measure to ensure sustainable harvest levels, as well as reductions in fishing effort in subsequent years if the Annual Catch Limit is exceeded, meeting the requirements of the SG100 scoring issue.
Audit Trace References
MSA, Amendment 15 DSEIS

3.2	Fishery- specific management system

	SCORING GUIDEPOST	60	80	100
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 fisheries 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 fisheries 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 fisheries management system.

Scoring Comments

The overall objective of the original scallop management plan (1982) are to maximize over time the joint social and economic benefits from the harvesting and use of the seas scallop resource. In support of this objective, the Council adopted sub-objectives of: Restoration of the adult stocks in terms of their abundance and age distribution; Enhancement of the yield per recruit for each stock; Evaluation and impact of the plan provisions on research, Plan development and enforcement costs; and Minimization of adverse environmental impacts on stock levels and utilization. Since introduction in 1982, the Scallop FMP has been enhanced through 23 FW adjustments, 15 amendments dealing with the conduct of the fishery, and an Omnibus amendment dealing with protection of essential fish habitat in all fisheries management plans under the mandate of the NEFMC., consistent with MSC principle 2.

The amendment process to the plan also includes clear short objectives of each amendment. There are three goals of Amendment 15: 1) bring the Scallop FMP in compliance with new requirements of the re-authorized MSA, including those involving the protection of EFH; 2) address excess capacity in the limited access (LA) scallop fishery; and 3) consider measures to adjust several aspects of the overall program to make the scallop management plan more effective.

PDT is tasked to develop recommendations for Acceptable Biological Catch (ABC) for the scallop stock based on mortality objectives (F_{max}, $F_{threshold}$, F_{target}), consistent with MSC Principle 1.

Score: 90

Long-term objectives of the original Scallop Management Plan are consistent with MSC Principles 1 and 2 meeting the SG80. The short and long objectives of management are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and some of Principle 2 and are explicitly expressed in the FW and amendment process. While the plan included explicit objectives for bycatch and ETP species meeting some of the requirements of the SG100 scoring issue, the score would have been higher if the broader issues of habitat and ecosystem considerations were included as explicit objectives of the plan.

Audit Trace References

Scallop Management plan (1982); Amendment 15 DEIS

	SCORING GUIDEPOST	60	80	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 process in management of the scallop fishery follows the terms of the Magnuson-Stevens Act (2007), which requires managers to follow a process of assessment every two years of scientific information, evaluation of alternatives, public consultation, public documentation and decision according to a prescribed schedule. Decisions are guided by a precautionary approach including F_{max} and F_{target} and application of objectives to protect essential fish habitat and habitat of particular concern, consistent with MSC Principles 1 and 2. The Council website provides formal reporting to all stakeholders of all meetings, background planning documents, analysis of alternatives, public comments and responses and decisions. In addition to the process conducted every two years, if the Secretary of NMFS finds that an emergency or overfishing exists or that interim measures are needed to

reduce overfishing for any fishery, he may promulgate emergency regulations or interim measures necessary to address the emergency or overfishing. Proposed emergency regulations are subject to a public comment period upon being published in the Federal Register.
Score: 100
There is a well-established decision-making process prescribed by legislation that follows specific objectives of F_{max} and F_{target} guided by the precautionary approach, meeting the first scoring issues of SG60 and SG80. The publication of Amendment 15 to the Scallop Fishery Management Plan (nefmc.org) provides evidence of a decision making process that responds 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, meeting the first scoring issue of SG100. The process of evaluation of options in Amendment 15 and the record of all input, discussion and analysis indicates a system that responds to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity, meeting the second scoring issue of SG100.
Audit Trace References
Amendment 15 DEIS Magnuson Stevens Act (2007)

	SCORING GUIDEPOST	60	80	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
Scallop catch is monitored throughout the year. Vessels are required to report landings after each trip, and dealers are required to report landings each week. Penalties under the Magnuson Stevens Act may amount to $100,000 per offense and every day a violation occurs is considered a new offense. Vessels are equipped with Vessel Monitoring Systems, which are constantly monitored by NMFS for violations of closed area restrictions. Observers were deployed to 725 trips in 2008 and 462 trips in 2009 on both limited access and general category vessels. Most of these observer trips were funded through the industry-led set-aside program and some were funded by federal funds. (See **Error! Reference source not found.**). Fishers participate in voluntary programs providing bycatch information on a real time basis when fishing in closed areas under bycatch restriction. There is a sense that the fishers recognize they are part of a profitable fishery and they have little interest in jeopardizing the opportunity. The penalties and the close scrutiny of NMFS to VMS provide a strong deterrent.[10]

[10] Personal communication with Ross Passche.

There is a lack of consistency in the monitoring of bycatch since it is well monitored in closed areas but not so well monitored in open areas.

Score: 80

It is clear that NOAA officers have demonstrated an ability to enforce relevant management measures of an effective fisheries monitoring control and surveillance system including catch monitoring, observers, VMS and enforcement officers, meeting the first scoring issue of SG60 and SG80. There is a lack of sufficient evidence to determine there is a demonstrated consistent ability to enforce bycatch measures in open areas. Consequently the first SG100 scoring issue is not entirely met.

Sanctions are thought to provide a strong deterrent to non-compliance and there is some evidence that fishers cooperate in providing information for the effective management of this fishery, meeting the second scoring issue of SG80. The fishery does not meet the higher degree of confidence of the second SG100 scoring issue without a demonstration of effective deterrence.

Fishermen are involved in managing bycatch limitations and supporting observer coverage demonstrating their support for the management system and providing information for effective management, meeting the third scoring issue of SG80. Although there is evidence that fishers comply with management measure in closed areas, it cannot be said that the same level of confidence for compliance exists in open areas. Consequently the fishery does not meet the third scoring issue of SG100.

With the high level of observer coverage, there is no evidence of systematic non-compliance in this fishery, meeting the fourth scoring issue of SG80.

Audit Trace References

Section 308 MSA (2007)
Amendment 15 DEIS

	SCORING GUIDEPOST	60	80	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

There is a comprehensive ecosystem objective to the research plan through the SMAST video survey. This survey documents the distribution and abundance of over 60 vertebrate and invertebrate benthic species. The data from the video survey have been supplied to the NMFS and the NEFMC Habitat Committee and are the major source of data for analyses related to the Habitat Omnibus Amendment and SASI models. The Coonamesset Farm Foundation research on loggerhead turtles funded through the scallop Research Set Aside program has supported the first ever assessment of the loggerhead population on the continental shelf of the Northwest Atlantic.

A comprehensive research plan is prepared and implemented by the Scientific and Statistical Committee of (SSC) of the NEFMC and is available at nefmc.org. The reports of the SSC are publically available in a timely manner on line and include issues dealing with scallop stock status and habitat impacts, consistent with MSC principles 1 and 2.

Score: 100

There is a comprehensive research plan with a coherent and strategic approach addressing P1and P2 elements, meeting the first scoring issues of SG60, SG80 and SG100. All research plans, committee meetings and results are publically available at nefmc.org, meeting the second scoring issue of SG60, SG80 and SG100.

Audit Trace References

NEFMC.org
Amendment 15 DEIS
NEFMC, 2010

	SCORING GUIDEPOST	60	80	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
Every two years, the Planning development Team of Council (PDT) evaluates whether management measures need to be revised in order to meet mortality objectives. The PDT is required to submit suggested measures to the Council and, if revisions are necessary, the Council will then consider adjustments over the course of two Council meetings. Because the meetings and decisions of Council are public, their actions are subject to occasional external review by NGO's and the courts. The Science and Statistical Committee of the NEFMC was established to assist it in the development, collection, evaluation, and peer review of such statistical, biological, economic, social, and other scientific information. The SSC provides the Council ongoing scientific advice for fishery management decisions, including recommendations for acceptable biological catch, preventing overfishing, maximum sustainable yield, and achieving rebuilding targets, and reports on stock status and health, bycatch, habitat status, social and economic impacts of management measures, and sustainability of fishing practices. Council is now considering options for an external review of the Council decision making process.
Score: 90
The fishery meets the SG60 and SG80 scoring issue since the PDT conducts a biennial review of performance of the fishery against the objectives of the fishery management plan and recommends adjustments where necessary. Also, occasional external review may be conducted by the courts as a result of legal action. It cannot be said however that a mechanism exists for "regular external review" of management decisions therefore the SG100 scoring issue is only partially met.
Audit Trace References
NEFMC.org US DOC, 2007

APPENDIX B

Draft Client Action Plan

Discarded Species – Information & monitoring	
PI 2.2.3	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.
SG 60	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.
SG 80	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).
SG 100	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
Score	**75**
Scoring Rationale	The assessment is conducted on the basis that there is one main bycatch species (winter flounder) that, since they are in an overfished condition in Southern New England/Mid-Atlantic States, the stock is vulnerable to the fishery despite the fact that their catch is less than 5% of the total. There is sufficient information collected on bycatch species, including winter flounder through the Northeast Fisheries Observer Program to meet SG60 and the first scoring issue of the SG 80. The second SG80 scoring

	issue would be met if we knew the status of winter flounder in those areas fished by the scallop fishery. There remains considerable uncertainty regarding the status of winter flounder in the Gulf of Maine although present catch levels have been determined to be sustainable (52nd SAW). The second SG80 scoring issue is not met. The strategy for setting Annual Catch Limits (ACLs) for all managed species includes buffers for uncertainty with associated Accountability Measures to prevent ACLs from being exceeded and mitigation if overages occur, meeting the third SG80 scoring issue. Sufficient data continue to be collected to detect any increase in risk to main bycatch species, meeting the fourth SG80 scoring issue.
Condition	The client is required to ensure that by the third annual audit there is sufficient information collected on main bycatch species to estimate outcome status with respect to biologically based limits, meeting the second scoring issue of SG80.
Milestones	The following milestones will be monitored during each surveillance audit: By the first annual audit the client will demonstrate that measures have been put in place to collect quantitative information concerning the main bycatch species in the scallop fishery. By the second annual audit the client will provide evidence of the quantitative information that has been collated for the main bycatch species in order to estimate their outcome status with respect to biologically based limits. By the third annual audit the client will provide evidence that there is sufficient information collected on main bycatch species to estimate outcome status with respect to biologically based limits. The above provides incremental steps in achieving the condition. Only when the final step is complete will the team be able to provide a revised score. By the third annual audit the required minimum score is 80.
Client Action Plan	By the first annual audit: The client will advocate, by writing to NEFMC and attend/participate in NEFMC meetings, to promote/encourage federal fishery managers to implement procedures to collect quantitative information concerning the main bycatch species of the fishery in order to estimate outcome status with respect to biologically based limits. At the first annual audit the client will provide evidence of this advocacy and the response/action that has been achieved. By the second annual audit: The client will have collated quantitative information concerning the main bycatch species of the fishery to estimate outcome status with respect to biologically based limits. The client will provide a written report on the information that has been collated. By the third annual audit: The client will present evidence that there is sufficient information collected on the main bycatch species to estimate outcome status with respect to biologically based limits, thereby meeting the second scoring issue of SG80.
Consultation on condition	Since the client intends to do this work by advocating to the fisheries managers to collect this information there is no need for prior consultation.

Habitat Outcome	
PI 2.4.1	The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function.
SG 60	The fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
SG 80	The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
SG 100	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.
Score	**60**
Scoring Rationale	The SG60 scoring issue is met since, although the fishery causes significant alteration of habitat cover/mosaic that causes major change in the structure or diversity of the species assemblages, parts of some scallop grounds are permanently closed to scallop fishing and low habitat impacts have been noted on sand in the mid-Atlantic. The present score of this performance indicator is predicated on closed areas remaining closed. The higher degree of certainty required by the SG80 scoring issue is not met within the current management strategy. This could be met by constraining fishing effort to areas of shallow, unconsolidated coarse sediments that have relatively rapid recovery times. The SASI output needs to be used in concert with statistical approaches to identify clusters of vulnerable grid cells and the ecological interpretation of results and recommendations by the NEFMC Habitat Plan Development Team. The fishery should not access areas of hard substratum (e.g. boulders and cobble), especially those that have been closed and may soon be open for fixed gear fisheries as otherwise these areas will be subject to continuous chronic impacts from dredges.
Condition	The client is required to present evidence by the fourth annual audit that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
Milestones	The following milestones will be monitored during each surveillance audit: By the first annual audit the client will provide evidence of representation to the management authority to advocate for further analysis and strategic options regarding the impact of the fishery on marine habitat. By the second annual audit the client will provide evidence of work to document the benthic habitat impact and recovery rates within the area in which the US limited access scallop fishery operates. By the third annual audit the client will present a report of the habitat impacts of the fishery and the management measures being considered to meet the condition. By the fourth annual audit the client will provide evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm. The above provides incremental steps in achieving the condition. Only when the final step is complete will the team be able to provide a revised score. By the fourth annual audit the required minimum score is 80.

Client Action Plan	By the first annual audit: The client will advocate, by writing to NEFMC and attend/participate in NEFMC meetings, to promote/encourage federal fishery managers to use the Swept Area Seabed Impact model (SASI) to assess fishing effort impact on Essential Fish Habitat (EFH) in the scallop grounds. At the first annual audit the client will provide evidence of this advocacy and the response/action that has been achieved. By the second annual audit: the client will have reviewed the results of the SASI / fishing impact assessment and will have begun to compile a report to document the benthic habitat impact and recovery rates within the area in which the US limited access scallop fishery operates. By the third annual audit: the client will provide a complete written report of the SASI / fishing impact on EFH assessment. If the EFH assessment concludes the fishery is highly likely to reduce habitat structure and function to a point where there would be serious or irreversible harm, the client will show that management measures are being considered to avoid this. By the fourth annual audit: the client will provide written evidence to show that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm based on the expected results of the SASI assessment.
Consultation on condition	The client has consulted with the NEFMC as the management authority and they have expressed their agreement with the actions stated. (Reference: letter from NEFMC attached)

Habitat Strategy	
PI 2.4.2	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	**70**
Scoring Rationale	The fishery meets SG60 since there is a measure in place that prevents habitat damage to scallop grounds in closed areas in the north-eastern part of the fishery and it is likely that such measures would work throughout the biogeographic regions of the fishery, meeting the second SG80 scoring issue. There is evidence that the measure is being implemented successfully in the Georges Bank and Gulf of Maine permanent closures, and therefore comprises a partial strategy, meeting the third SG80 scoring issue. However, the first and second SG80 scoring issues are not met since without expansion of the strategy to other areas, the partial strategy is not expected to achieve the SG80 level of the Habitat Outcome PI 2.4.1 and the fishery remains likely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
Condition	The client is required to demonstrate by the fourth annual audit that: • There is a partial strategy in place that is expected to achieve the Habitat Outcome 80 level of performance of PI 2.4.1. • 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	The following milestones will be monitored during each surveillance audit: By the first annual audit the client will provide evidence of their representation to the management authority to advocate for further analysis and strategic options regarding the impact of the fishery on marine habitat. By the second annual audit the client will provide evidence of work to

	document the benthic habitat impact and recovery rates within the area in which the US limited access scallop fishery operates. By the third annual audit the client will present a report of the habitat impacts of the fishery and the management measures being considered to meet the condition. By the fourth annual audit, the client will demonstrate by the fourth annual audit that: • There is a partial strategy in place that is expected to achieve the Habitat Outcome 80 level of performance of PI 2.4.1. • 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 above provides incremental steps in achieving the condition. Only when the final step is complete will the team be able to provide a revised score. By the fourth annual audit the required minimum score is 80.
Client Action Plan	By the first annual audit: The client will advocate, by writing to NEFMC and attend/participate in NEFMC meetings, to promote/encourage federal fishery managers to use the Swept Area Seabed Impact model (SASI) to assess fishing effort impact on Essential Fish Habitat (EFH) in the scallop grounds. At the first annual audit the client will provide evidence of this advocacy and the response/action that has been achieved. By the second annual audit: The client will have reviewed the results of the SASI / fishing impact assessment and will have begun to compile a report to document the benthic habitat impact and recovery rates within the area in which the US limited access scallop fishery operates. By the third annual audit: The client will provide a complete written report of the SASI / fishing impact on EFH assessment. If the EFH assessment concludes the fishery is highly likely to reduce habitat structure and function to a point where there would be serious or irreversible harm, the client will show that management measures are being considered to avoid this. By the fourth annual audit: The client will provide written evidence to show: • There is a partial strategy in place that is expected to achieve the Habitat Outcome 80 level of performance of PI 2.4.1. • 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.
Consultation on condition	The client has consulted with the NEFMC as the management authority and they have expressed their agreement with the actions stated. (Reference: letter from NEFMC attached)

Ecosystem Outcome	
PI 2.5.1	The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function.
SG 60	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.
SG 80	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.
SG 100	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
Score	**60**
Scoring Rationale	The US Atlantic scallop fishery is known to have widespread impacts on geological and biological components of the ecosystem, with recovery rates for some key features of ecological importance known to be very slow. The fishery meets the scoring guidepost 60 since there is evidence for ecosystem recovery in a permanently closed area on Georges Bank. The fishery, as it is currently conducted, does not meet the higher degree of certainty required for the SG80 scoring issue.
Condition	The client is required to present evidence by the fourth annual audit that the fishery is highly unlikely to disrupt benthic communities structure and function to a point where there would be a serious or irreversible harm.
Milestones	The following milestones will be monitored during each surveillance audit: By the first annual audit the client will provide evidence of their representation to the management authority to advocate for further analysis and strategic options regarding the impact of the fishery on marine habitat. By the second annual audit the client will provide evidence of work to document the benthic habitat impact and recovery rates within the area in which the US limited access scallop fishery operates By the third annual audit, the client uses the above information to evaluate the likely impacts of scallop dredge fishing on these key elements of the ecosystem. If unacceptable impacts are identified, by the fourth annual audit, the client implements new management strategies and measures to detect and manage ecosystem impacts of the fishery ensuring key elements are protected. The above provides incremental steps in achieving the condition. Only when the final step is complete will the team be able to provide a revised score. By the fourth annual audit the required minimum score is 80.
Client Action Plan	By the first annual audit: The client will advocate, by writing to NEFMC and attend/participate in NEFMC meetings, to promote/encourage federal fishery managers to use the Swept Area Seabed Impact model (SASI) to assess fishing effort impact on Essential Fish Habitat (EFH) in the scallop grounds. At the first annual audit the client will provide evidence of this advocacy and the response/action that has been achieved. By the second annual audit: the client will have reviewed the results of the

	SASI / fishing impact assessment and will have begun to compile a report to document the benthic habitat impact and recovery rates within the area in which the US limited access scallop fishery operates. By the third annual audit: the client will provide a complete written report of the SASI / fishing impact on EFH assessment. If the EFH assessment concludes the fishery is highly likely to reduce benthic communities structure and function to a point where there would be serious or irreversible harm, the client will show that management measures are being considered to avoid this. By the fourth annual audit: the client will provide written evidence to show that the fishery is highly unlikely to reduce benthic communities structure and function to a point where there would be serious or irreversible harm based on the expected results of the SASI assessment.
Consultation on condition	The client has consulted with the NEFMC as the management authority and they have expressed their agreement with the actions stated. (Reference: letter from NEFMC attached)

New England Fishery Management Council
50 WATER STREET | NEWBURYPORT, MASSACHUSETTS 01950 | PHONE 978 465 0492 | FAX 978 465 3116
C.M. Rip Cunningham, Jr., *Chairman* | Thomas A. Nies, *Executive Director*

March 27, 2013

John F. Whiteside, Jr.
General Counsel
American Scallop Association, Inc.
30 Cornell Street
New Bedford, MA 02740

Dear John:

The American Scallop Association (ASA) contacted me about confirming how the New England Fishery Management Council (NEFMC) plans to use a model for assessing the effects of fishing on Essential Fish Habitat (EFH). The NEFMC has been developing an action for several years that is reviewing the network of habitat closed areas in this region. The Swept Area Seabed Impact (SASI) model is the primary tool that was developed to estimate both the potential and realized adverse effects of fishing on EFH. It is a quantitative, spatially-referenced model that overlays fishing activities on habitat through time and has been peer reviewed. The NEFMC has invested substantial time and resources into development of this model and I suspect it will remain the primary tool for assessing the adverse effects of fishing on EFH in the future.

On behalf of the NEFMC, I confirm the following two statements are correct:

1. The NEFMC has agreed in principle to continue using the Swept Area Seabed Impact (SASI) model approach to assess the adverse effects of fishing on Essential Fish Habitat (EFH) in the scallop grounds for the coming year.

2. The NEFMC is open to future discussions with the ASA regarding the continued use of the SASI model approach to assess the adverse effects of fishing on EFH in the scallop grounds.

If you have any further questions, please contact me.

Sincerely,

Thomas A. Nies
Executive Director

APPENDIX C

Peer Review Reports

Biography
John F. Caddy BSc Hons, Marine Biology, Queen Mary College, University of London, U.K 1962; PhD, QMC, University of London, England, 1966.

Dr John Caddy is an international fisheries expert recently associated with the UN Food and Agriculture Organization. John has a long experience of marine resource and environmental research management issues nationally in his appointment with Fisheries and Oceans Canada, and globally during 20 years of work with the FAO, (including his former post as Chief of Marine Resources in the Fisheries Department). This included more than 10 years as the expert in FAO Rome on Caribbean fishery issues. He has an extensive applied experience in fisheries biology, population dynamics and fish stock assessment is reported in some 80+ primary publications and books on fishery-related issues, which are available on request. During his period at the FAO, he was involved in national policy issues, designed fishery research programs, and drafted government fishery management plans and cooperative projects. A broad experience with marine issues has led to demands for his services in evaluating the performance of fishery institutions, such as the work of the International Center for Living Aquatic Resources Management (ICLARM), the USAID stock assessment program (CRISP), the UBC Fishery Center, Vancouver, and the UK Marine Mammal program of Dunstaffnage Laboratory, Scotland.

Biography
Sandra (Sandy) Shumway; BS (Long Island); PhD (Wales) DSc (Wales)
Sandra (Sandy) Shumway received her B.S. from Long Island University in 1974, studied as a Marshall Scholar at the University of Wales, where she received her Ph.D. in 1976 and was later awarded a D.Sc. in 1992. She has worked in the field of shellfish biology for 35 years, and published over 150 papers, including co-authorship of the NOAA Essential Fish Habitat Source Document: Sea Scallop, *Placopecten magellanicus*, Life History and Habitat Characteristics. She has edited several books, including Scallops: Biology, Ecology and Aquaculture (2nd Edition, 2006), and currently serves as Editor-in-Chief of the Journal of Shellfish Research (25 years), Journal of Experimental Marine Biology and Ecology (11 years), Harmful Algae (8 years) and most recently, Reviews in Fisheries Science. She served twice as President of the National Shellfisheries Association and has been honored with their two highest awards, Honored Life Member and Wallace Award for contributions to the shellfish industry. While she continues her work on feeding physiology and the impacts of harmful algal blooms on bivalve molluscs and shellfish aquaculture, she regularly collaborates with and advises industry members globally, has been a member of the steering committee for the WWF Molluscan Dialogue, and writes for the popular literature. She has edited and co-authored a book, Shellfish Aquaculture and the Environment, published by Wiley-Blackwell in 2010.

Peer Reviewer 1
Overall Opinion

Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report? ***i.e. to recommend the fishery is certified with the conditions outline on pages 68-75 of the report***	**Yes/No** **Yes**	**Conformity Assessment Body Response**
The staged response laid out will certainly focus the attention of the industry on a weak point of their operation from an ecosystem point of view. It is to be hoped that the substantial time allowed for reducing ecosystem impacts will be used to arrive at a solution to this problem that allows an 80 score to be granted.		The team members recognize that habitat impact is an issue that needs to be addressed, to meet the desired outcome, i.e. meeting the 80 scoring guidepost for PI 2.4.1. The client in their action plan proposes how it will do this.

Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe?	**Yes/No** **Yes**	**Conformity Assessment Body Response**
Justification: *The conditions laid out allow sufficient time to tackle this problem as long as efforts are not postponed to the last year – the point should be born in mind that this is the weak point of the evaluation and deserves careful consideration and appropriate actions.*		The team agrees.

If included:

Do you think the client action plan is sufficient to close the conditions raised?	**Yes/No** **Yes**	**Conformity Assessment Body Response**
Justification: I note that as specified, the plan allows full discretion, without calling for any specific type of action. To reduce damage to epifauna and incidental species could probably be achieved by a relatively modest investment in cost and time for gear modifications. If there are permanently closed areas of adequate size, that will remain closed, the reasoning here is correct. It would not be correct if you are relying solely on rotational closures since some species may take more than 4-6 yrs to recover. Nonetheless, I agree with the scoring.		Note the team's response to the first comment in this peer review section regarding the requirement to allow for other options to meet the terms of the scoring issue of PI 2.4.1. The team do not believe that any substantial reduction in environmental impact is likely to come through gear modifications. Accordingly, we have inserted text indicating that we believe that dredge design is unlikely to change drastically any time soon, and there is little likelihood that it could be modified in a way that would make it 'acceptable' and still catch scallops efficiently. We agree completely that our assessment is contingent upon permanently closed areas remaining closed, otherwise the whole fishery would need to be reassessed – a point also made by the other peer reviewer.

General Comments on the Assessment Report (optional)

Evidently the fishery is being managed much better than when I was involved in the Canadian scallop assessments in the 1970's-80's. There is now more data, and more precautionary measures being adopted, than previously.

Nonetheless, if the productivity of scallop populations is spasmodic, we are currently at a high point, and this may not be entirely due to recent restoration measures (though these were impressive). The question arises whether the production plan in place will be successful, and abided to, once scallop production and biomass falls to (say) 50% of current levels due to natural year-to-year fluctuations in recruitment which, as the report documents, seem to follow a close-to-decadal frequency? Will the conservation measures now adopted help fishermen then to resist the temptation to 'open up' areas now closed permanently, or to shorten closures of areas under rotational harvesting? One hopes not. The legal or civic criteria for opening a closed area to fishing also needs specifying. Keeping a small proportion of areas where recruitment always occurs permanently closed (both to scalloping and trawling!), especially in areas where recruitment is more regular judging from age composition, would be a measure aimed at promoting annual recruitment and would focus useful field research to determine the speed of ecological processes, and could also be useful for finfish research.

When the next 'pulse' of recruitment occurs, new recruits will be captured and mostly lost through the belly of the dredge (see my 1971 ICES paper), and incidental mortalities will be higher for several years. (Checking the number and size of 'shock marks' on the shells would be a useful indicator of incidental mortalities due to fishing). Some measures ensuring that areas of small scallops will be actively avoided would also seem important. In the Canadian fishery these areas are marked on the chart and avoided for a year or two.

It was not evident that any measures will be taken to reduce the impact of heavy gear on associated epifauna. At present there is little that can be done to improve this other than by closures. Such measures could either involve more selectivity in fishing locations, and/or less damaging gear.

IMM comment: The team members are fully in agreement with these comments and share the concerns of the peer reviewer.

Three types of measures are suggested in the review I have been reading as conditional on MSC certification by the evaluating team, as follows:

- Taking measures to reduce the significant alteration of habitat cover/mosaic that causes major change in the structure or diversity of the species assemblages. This could be addressed by ensuring that permanently closed areas remain closed and expanding areas where no scallop fishing takes place, particularly in the mid-Atlantic area. (PI 2.4.1)

- Preparing a strategy to ensure the fishery does not cause significant alteration of habitat cover/mosaic that results in major change in the structure or diversity of the species assemblages. (PI 2.4.2)

- Taking measures to ensure it is highly unlikely that the scallop fishery disrupts the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. (PI 2.5.1)

Although I would agree with all three proposals, it will be advisable to specify the strategies required if these are really conditions for certification.

IMM Response: As specified by MSC Certification Requirements the team has clearly set out the outcomes required for the conditions but are not allowed (MSC GCR G27.11.7) to be too proscriptive in specifying how these are achieved.

Performance Indicator Review

Please complete the table below for each Performance Indicator which are listed in the Conformity Assessment Body's Public Certification Draft Report.

Performance Indicator	**Has all the relevant information available been used to score this Indicator? (Yes/No)**	**Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)**	**Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)**	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	**Conformity Assessment Body Response**
1.1.1	Yes	Yes	NA	The fishery meets all requirements under this criterion now. How it will do so when and if 'spasmodic'	Comment noted and agreed.
1.1.2	Yes	Yes	NA	The reference points used related to MSY seem clear. This reference point is supported by the UNLOS, but subsequent Int'l agreements suggest a somewhat lower level of fishing would be precautionary.	Agreed but MSC use MSY in its criteria.
1.1.3	yes	Yes	NA	The question being asked here is how the fishery will react under the management criteria specified, when stock biomass is substantially lower.	This stock is not depleted so the PI was not assessed.

Performance Indicator	**Has all the relevant information available been used to score this Indicator? (Yes/No)**	**Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)**	**Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)**	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	**Conformity Assessment Body Response**
1.2.1	Yes	Yes	NA	Here the issue is whether effort control per se will be effective and precautionary if biomass falls below some B(LIM) to be defined, (B(LIM) = the biomass at which a rebuilding strategy comes into place).	Agreed and noted, no response required
1.2.2	Yes	Yes	N/A	See above the comment on the desirability of a stock recovery plan and how the Industry would accept this.	Agreed and noted, no response required
1.2.3	Yes	Yes	N/A	The score here could even be higher	With the lack of good discard data and more reliable estimates of incidental mortality and natural mortality the second SG100 issue is not met so the score of 90 awarded is appropriate.
1.2.4	Yes	Yes	N/A	Ditto above comment for 1.2.3	We do not consider that the new assessment method can be considered to be "tested and robust" so the 3rd SG100 scoring issue is not met and no higher score can be awarded

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.1.1	Yes	Yes	NA	The problem here is whether the slow recovery of the yellowtail stocks is in some way related to the scallop fishery. It would be desirable to know if there are stages of yellowtail aggregation (e.g. for spawning) that make this species especially vulnerable to dredge disturbance at some times of year?	Yellowtail stock status is being monitored and managed by a programme that includes the scallop catches.
2.1.2	Yes	Yes	NA	The measures to reduce yellowtail bycatch by avoiding fish concentrations are good, but more information is needed to be clear that the strategy 'is efficiently achieving its objective' as stated.	Agreed.
2.1.3	Yes	Yes	NA	Here we are again focusing exclusively on yellowtail flounder. The criterion for judgment reads: "Monitoring of retained species is conducted in sufficient detail to assess ongoing mortalities to all retained species".	Data on all bycatch species is available based on landings and onboard observer data and the scallop fishery is subject to the SBRM performance standard for bycatch monitoring.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.2.1	Yes	Yes	NA	It seems that little information is collected on associated invertebrate catches and their trends with scallop effort, hence the question cannot be fully answered. The effect of the fishery on species already at risk such as skates, is not evident. Hence the score seems a little too high on this item.	There are no main bycatch species, so the fishery will score 80 on this PI. Other species are dealt with under the SG100 scoring issue and the criteria for this issue are not met.
2.2.2	Yes	Yes	N/A	Certainly an effort is being made. The point about the positive effect of rotational harvesting in reducing damaging effects on fish juveniles, now restricted in area and time, seems positive, and deserves to be studied further.	Comment agreed and noted.
2.2.3	Yes	Yes	N/A	More attention to documenting bycatch caught will be needed here.	There are no main bycatch species and the team is only concerned here about the status of winter flounder as a minor species.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.3.1	Yes	Yes	NA	This problem is one that is in need of further information – and hopefully observers can collect more info on this?	The team agrees it would be preferable to have more information but we find that information available is sufficient to score 90.
2.3.2	Yes	Yes	N/A	The gear modification measures proposed to reduce turtle catch could be extended in the area at risk.	The team agrees is would be preferable to have more information but we find that strategy is sufficient to score 90.
2.3.3	Yes	Yes	N/A		

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.4.1	Yes	Yes	Yes	This is the weakest criterion of the assessment, and the answer seems to be that …'Well, at least there are some permanent closures unaffected by scalloping'. The industry might tackle the problem directly with some gear redesign efforts? (By for example, raising the belly slightly off bottom to avoid some damage to epifauna and invertebrates, flounders etc)..	The team members agree with the reviewer that this is a weak area of the fishery and concluded that the fishery could only score the minimum pass mark for the reasons set out in the scoring table on pages 101-2 in the report. As a result the team set a condition intended to bring the score up to at least 80. The condtion is set out on page 70-71 of the report. MSC require the condition to be written so it follows the narrative of the performance indicator and 80 scoring guidepost. Tackling the issue is strategy to be dealt with in PI 2.4.2. On the basis of published literature, we are of the opinion that closures (not gear modification) are the best way to lessen the environmental impact of this fishery.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.4.2	Yes	Yes	Yes	This criterion is also weak. As noted, there is ample evidence that the fishery causes serious harm to some benthic species, which however may not be irreversible, since the fauna has adapted to high sedimentary dynamics, and because some areas are closed permanently. In the rotational closed areas, short-lived species will presumably recover, but there will be a simplification of the ecosystem that affects long-lived and delicate associated species. What specific rotational period has been adopted in this fishery is important – or is this flexible depending on fishermen's preference, which would be less effective? (Longer periods of rotation would of course be better for epifaunal survival).	The team agrees to strengthen the condition to include the maintenance of permanent closures.

Performance Indicator	**Has all the relevant information available been used to score this Indicator? (Yes/No)**	**Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)**	**Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)**	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	**Conformity Assessment Body Response**
2.4.3	Yes	Yes	NA	It is stated that 'physical impacts have been quantified in detail', but it is not clear whether the impacts are supportable or not. I may note that one of the criteria that supported approval of the Canadian assessment (which naturally had the same problems), was the installation of sophisticated bottom sediment mapping sonar equipment on larger commercial vessels so that particular sediment types with low probability of scallop densities coud be avoided.	The team agree that the use of modern bottom sediment discriminating technologies to target areas of high scallop density and avoid areas with a low probability of scallop densities is one method that could be very beneficial in reducing the effective footprint of the fishery
2.5.1	Yes	Yes	Yes	The response here is similar to that given to the previous 2 questions. Well-documented studies you cite show a long term decline in some longer-lived fauna, and the question is 'saved' by the existence of permanent closure areas. It would be desirable if permanent closures were distributed widely over the species area.	The team agrees and the text has been modified to reflect this view.
2.5.2	Yes	Yes	NA	The 'partial strategy in place' to address impacts of the fishery on the ecosystem, implies that certification of the fishery will be conditional on extension of this strategy to other areas?	The team has adjusted the score here from 90 to 80 to reflect that although there is a partial strategy in place, the strategy needs to be fully implemented and tested to meet a higher score.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.5.3	Yes	Yes	NA	It has been admitted that studies on interractions of dredging on fauna and their interractions at the species/community level are still not available, and that a degradation of community complexity is a result. This is not a fully satisfactory situation.	The team would agree but it is not from a lack of information, which is being scored here.
3.1.1	Yes	Yes	N/A	The current situation is satisfactory.	
3.1.2	Yes	Yes	N/A	The documentation provided seems to support your conclusion.	
3.1.3	Yes	Yes	N/A	Ditto	
3.1.4	Yes	Yes	N/A	Ditto	
3.2.1	Yes	Yes	N/A	As noted, inclusion of specific ecosystem objectives in the plan would be important – since this is its weak point.	
3.2.2	Yes	Yes	N/A		

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
3.2.3	Yes	Yes	N/A	This depends on whether voluntary reporting is positive.If the skipper concerned is in favour of the regulatory framework, OK, but it may be less reliable for scientific purposes – it would be simple however to install some automatic video monitoring framework on deck?	While placing video monitors may be possible, it is not required by MSC criteria.
3.2.4	Yes	Yes	N/A	Monitoring species distribution is useful, but other issues are not mentioned, such as indirect mortalities of scallops and fish, the distribution of scallop spat, predators erc	Nevertheless, the team supports the view that the fishery meets the MSC criteria for this PI.
3.2.5	Yes	Yes	N/A	A regular scheduling of program reviews would be very desirable.	The Plannng Development Team meets regularly to review performance and constitutes an internal review. The fishery could benefit from a regular external review.

Any Other Comments

Comments	Conformity Assessment Body Response
- On the background document, 5.2.8 a value of M=1.2 is given: could it be 0.12? - A maximum age of 29 yrs (Naidu and Robert 2006) is given – this is for an unexploited stock near its Northern limit – on Georges Bank the maximum age would be much lower?	- Thank you, the value of M has been corrected to 0.12 - The text has been modified to clarify the maximum age of the species. - Principle predator has been corrected. - The text in 6.2.1 explains very clearly what Fig 8 shows

4.2 Principal predator Fig 8 not clear what it signifies	

Peer Reviewer 2:
Overall Opinion

Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?	Yes/No **YES, but see comments in general discussion; some further discussion and assessment needed**	**Conformity Assessment Body Response** The assessment team thanks the reviewer for a very comprehensive review of our findings. We have carefully considered the points raised and made adjustments to the report text, scoring table and the score as a result.
Justification: **The report is generally well prepared, but there does need to be further assessment of gear impacts and published literature, and discussion of the SASI model and its limitations and application.**		The team notes this concern and has strengthened the report in the areas suggested.

Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe?	Yes/No **YES**	**Conformity Assessment Body Response**
Justification: **There may be some additional conditions needed based on reviews**		Comment noted. Some changes have been made to the wording of the conditions to respond to the reviewers concerns.

If included:

Do you think the client action plan is sufficient to close the conditions raised?	Yes/No **YES**	**Conformity Assessment Body Response**
Justification: **The condition under PI 2.4.1 might be altered (eased) based upon a more comprehensive assessment of the available literature (see general comments) and it should be clear that if any 'closed' area is opened for fishing, the entire assessment would need to be revisited.** **Overall, the client action plan appears to be detailed and manageable.**		Having thoroughly assessed the available literature on the impacts of New Bedford dredges we take on board the reviewer's comments and have added the following text to condition 2.4.1 "The use of the dredge should be constrained to shallow, unconsolidated coarse sediments such that the fishery is carried out in regions that have relatively rapid recovery times. The fishery should not access areas of hard substratum (e.g. boulders and cobble), especially those that have been closed and may soon be open for fixed gear fisheries as otherwise these areas will be subject to continuous chronic impacts from dredges. Some areas may be permanently closed to dredging as a condition of certification."

General Comments on the Assessment Report (optional)

- I would like to see a more detailed description of the dredge impacts and perhaps a more 'focused' statement pointing out that the dredge design is unlikely to change drastically any time soon, and that there is little likelihood that it could be modified in a way that would make it 'acceptable' and still catch scallops efficiently. This is just reality. The use of the dredge could be constrained to shallow, unconsolidated coarse sediments such that the fishery is carried out in regions that have relatively rapid recovery times. This would meet the condition that impacts are temporary and have no long-term impacts to the community in which scallops reside. Further, a condition that the fishery not access areas of hard substratum, especially those that have been closed and may soon be open for fixed gear fisheries, would eliminate the severe effects of dredging on these communities that have decade-plus times for recovery. Given this type of ecological impact, any such area would never recover once opened and set in motion a continuous state of chronic impacts from dredges. Rotation on the scale of 20-years would need to make the assumption that communities recover in a successional manner and I don't believe this is currently known for these areas.

IMM Response: We agree with the reviewer and have included a more 'focused' statement about dredge design in the text and have expanded the wording of condition 2.4.1 to incorporate and clarify these concerns.

- I would also suggest a bit more general discussion on the known impacts of fishing gear on habitat and a balanced discussion of the published assessments (see below for more detail). There is a vast and controversial literature on the topic. Two references that could be considered as a starting point:

Dayton, P.K., S.F. Thrush, M.T. Agardy and R.J. Hofman. 1995. Environmental effects of marine fishing. Aquatic Conservation: Marine and Freshwater Ecosystems, 5: 205-232.

Thrush and Dayton 2002. Disturbance to Marine Benthic Habitats by Trawling and Dredging: Implications for Marine Biodiversitiy. Annual Reviews Ecological Systems 33:449-473.

IMM Response: The team consider that section 8.4 already contains an appropriately detailed discussion of the known impacts of fishing gear and would not benefit from a wider discussion based on the earlier papers by Dayton et al. 1995 and Thrush ad Dayton 2002. We prefer to keep the discussion focused on the known impacts of scallop dredges on habitat.

SASI *I preface this paragraph by saying that I am not a modeler and have limited knowledge/understanding of such models, and hence sought explanation from two colleagues who are familiar with the system. I have scanned the ESSENTIAL FISH HABITAT (EFH) OMNIBUS AMENDMENT "THE SWEPT AREA SEABED IMPACT (SASI) MODEL: A TOOL FOR ANALYZING THE EFFECTS OF FISHING ON ESSENTIAL FISH HABITAT" from the New England Fisheries Management Council Parts I and II. I put the information below out for consideration and acknowledge that I may be incorrect in my understanding of the process, and I do not see this as a deterrent to conditional approval; however, given the fact that impacts on habitat are critical to the assessment, I do believe it needs to be considered and the specific usefulness and applicability of SASI clearly addressed.*

The action plan states that use of the SASI model will produce the required analysis and results to produce an unambiguous assessment of fishery impacts to habitat. From my readings and discussions regarding the application of SASI, this seems to be a broad oversimplification of how the model works and the utility of the results. SASI by itself does not produce the ultimate assessment of fishing impacts to EFH. Yes, the SASI model has been through multiple reviews, and it is an outstanding framework for linking disturbance by bottom contact fishing gear, habitat (sediment) type, estimated vulnerability based on depth, and estimated potential for recovery. From my discussions re: SASI, the most problematic issues regarding implementation of the model are: (1) the density and quality of data used to produce the underlying geologic framework, (2) the global patterns of vulnerability and recovery rate used to parameterize impacts to habitats across the spatial domain, and (3) the lack of a time step component of the model to address recovery versus impact relationships. Most important, the data sets used in the scallop analyses were biased towards fine grain sediments as the US Seabed database is based primarily on grab and core samples - thereby undersampling hard bottom habitats (cobbles, boulders). While image data were used (from SMAST) these are not of high spatial resolution when compared to continuous coverage multibeam data. There was no attempt to link multibeam and other integrative map products where they exists so a degree of interpretation of model output is needed to use all of the best available data. That is, and the review panels for SASI state explicitly, that SASI is a good guide to areas where attention should be directed to conserve EFH but it should not, by itself, produce the final word in where vulnerable habitats occur in the management region. In the context of this scallop fishery assessment, it seems that the action plan needs to include the SASI output in concert with both statistical approaches to identify clusters of vulnerable grid cells and the ecological interpretation of results and recommendations by the Habitat Plan Development Team. This later part links the ecological understanding of limited parts of the OCS with the results of the regional scale model to produce recommendations for conservation of EFH. The current action plan does not include this level of detail and hence lacks clarity in the process required and use of the results. At a minimum, there should be a description of SASI including a clear discussion of limitations.

IMM Response: The team agree that there are limitations to the use of the SASI model for determining the impact of the scallop fishery on habitat and have expanded the text in section 8.4.1 to clarify and incorporate the peer reviewer's concerns. We agree that to meet the condition other sources of information will need to be taken into account, in addition to SASI, to achieve the SG80 scoring level.

I think careful attention should also be given to Table 24 in that document. I could only find one species with a recovery rate of great than 5 years (the horse mussel, *Modiolus modiolus*). This species, to the best of my knowledge, does not usually occur with the sea scallops (personal knowledge based on trying to obtain mussels from scallop draggers!). Consideration should be given to increasing the score for PI 2.4.1.

IMM Response: The lack of any long-recovery rate species, other than *Modiolus* which has very little overlap with the grounds fished for scallops, is clearly a limitation of Table 24 and SASI. However, we do not consider this is sufficient reason for raising the score for PI 2.4.1

BACKGROUND

I believe there are a number of problems in the interpretation of some of the cited literature, and I only looked at some of it - as well as lack of a thorough review of existing literature as it relates to the analyses at hand. Specific examples are given below.

<u>In section 7.2.3:</u>

1. "There are no baseline data on invertebrate bycatch community composition that predate the fishery so we do not know whether some forms have been extirpated or are beyond biologically based limits ..."

There is a recent peer reviewed report (Claesson et al. 2010) that includes an analysis of historic invertebrate data collected in the late 19th century by the Steamer Fishhawk. This could be compared to the Theroux and Wigley (1998) study and publicly available data sets to assess change. This said, **any changes cannot be attributed solely to the scallop fishery,** but there is in fact a data set to make such a comparison.

Claesson, S., A.A. Rosenberg, K. Alexander, A. Cooper, J. Cournane, E. Klein, W. Leavenworth and K. Magness, 2010. *Stellwagen Bank Marine Historical Ecology.* Marine Sanctuaries Conservation Series ONMS-10-04. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries, Silver Spring, MD. 218 pp.

2. "... but there is no evidence of the extensive fishing damage to coral and sponge communities that have been reported elsewhere in US waters (Reed et al., 2005; Heifetz et al., 2009)."

A paper by Watling and Auster (2005) states:

"The benthic fauna of the Northeast Peak of Georges Bank was characterized as having two octocorals, *Primnoa resedaeformis* and *Paragorgia arborea*, as common components based on dredge sampling (Theroux and Grosslein 1987). Wigley (1968) described *Paragorgia* as a common component of the gravel fauna of the Gulf of Maine and stated that representative gravel faunas occurred on "Cashes Ledge, parts of Great South Channel, the northeastern part of Georges Bank, western Browns Bank, Jeffreys Ledge, and numerous other smaller banks in the Gulf of Maine region."

The paper goes on to say that there now remain only remnant areas in the Gulf of Maine overall that support coral populations, and that such a contraction in distribution can be assumed, at least in part, to the widespread use of mobile bottom contact fishing gear. Again, while this effect cannot be solely attributed to the scallop fishery, there are data and analyses that can be used to discuss this issue within the context of the current assessment, and they should be included in the report and assessment.

Watling, L. and P. Auster. 2005. Distribution of deep-water *Alcyonacea* off the northeast coast of the United States. Pages 259-264 in Freiwald A, Roberts JM (eds.), Cold-water corals and ecosystems. Springer-Verlag Berlin, Heidelberg

IMM Response: Thank you. The text has been amended to include the additional information and these two references.

3. "It is reasonable to argue, however, that the ongoing use of New Bedford dredges maintains the benthos in an altered state such that robust animals (e.g. scallops and some starfish) or fast-growing organisms (e.g. some sponges and tunicates) are favoured (Marino II *et al*., 2007) whereas long-lived fragile fauna are selectively removed from the ecosystem unless hard grounds provide refuges that allow delicate organisms to persist (Hinz et al., 2011)."

If this is true overall, then how can the scallop fishery as currently practiced ever be considered sustainable? I'm surprised the assessment team made such a statement as it flies in the face of their overall conclusion and, in fact, the issue is much more nuanced. The document then goes on to state:

IMM Response: We agree that this statement is too sweeping and have modified the text by adding "on some seabed types".

4. "Studies of closed areas have shown that scallop dredging over much of the available US scallop grounds hinders the recovery and rebuilding of bycatch invertebrates that re-colonise when scallop dredging is ceased (Collie *et al*. 1997, 2005; Spencer & Collie 1997; Watling & Norse 1998; Watling *et al*. 2001; Henry & Kenchington 2004; Lindholm *et al*. 2004; Kenchington *et al*. 2007; Malik & Mayer 2007)."

There is a good deal of confusion here. The work by Collie and colleagues (and there is a more recent and useful paper by Asch and Collie in Fishery Bulletin of the US) shows a severe and longterm effect of dredging on hard bottom communities, but the studies by Lindholm et al.and Link et al.(cited later) show that scallop impacts on fine grained sediments (across a range of sand particle sizes) are within the range of natural variation of benthic communities and impacts are minor and hard to detect (at least at the level of fishing effort at the times of these studies). Other work by Watling and colleagues also show that mud habitats have detectable impacts. Such disparities in the results of impact studies suggests that fishing in some sedimentary habitats could be very sustainable while fishing on others less so. It would be useful to explore this further and then propose a fishing plan that incorporates these ecological realities.

IMM Response: We agree. The text has been modified to clarify and stress the different responses of benthic communities on different seabed types.

<u>In section 8.3:</u>
5. " With respect to MSC assessments ETP (endangered, threatened or protected) species are those

that are recognised by national legislation and/or binding international agreements (e.g. CITES) to which the jurisdictions controlling the fishery under assessment are party."

The assessment should also address species of concern as listed by the Protected Resources Branch of NMFS. While not actually listed as threatened or endangered, these species should be explicitly considered in an analysis focused on sustainability and potentially leading to 'green labeling'. There should be an explicit determination that the fishery will not drive a Species Of Concern to an ESA listing.

IMM Response: We agree with the comment although this will not affect the scores.

<u>In section 8.4:</u>
6. "The New Bedford dredges, together with other heavy towed demersal fishing gear, have affected a range of habitats on the US shelf area and their ongoing use maintains the benthic communities in an altered state (Collie et al. 1997, 2005; Spencer & Collie 1997; Watling & Norse, 1998; Lindholm et al., 2001; Watling et al. 2001; Henry & Kenchington 2004; Kenchington et al. 2007; Malik & Mayer, 2007)." There needs to be a better assessment of these papers and results – it is not as cut and dry as the report makes it out to be.

As in the previous section. There are differences across sediment types that are not articulated here and are important for analysis of sustainability.

IMM Response: The text has been modified to indicate the variability with sediment type.

7. "Off New England, Link et al. (2005) found that more complex habitats had increased vulnerability to bottom tending fishing gear than high-energy sand habitat."

No

IMM Response: Sentence deleted

8. "However, a similar study by Lindholm et al. (2004) showed that even on sand patches of shell fragment and sponge, microhabitats were significantly more abundant within recently closed areas than on adjacent fished areas."

This statement is confusing and does not reflect important details in the results, but does point to the lack of detailed assessment of these papers and their findings – it is a complex situation and needs to be clearly portrayed as such.

IMM Response: The text has been amended to indicate the complexity of the situation.

9. "Video surveys by Stokesbury & Harris (2006) revealed that a short-term sea scallop fishery in an area recently closed to demersal fishing gear visually altered an epibenthic community less than the shifts in sediment that occurred between surveys. However, Malik & Meyer (2007) suggest that such visual surveys can fail to detect the long-term changes in seabed habitats that are caused by New Bedford dredges. Their acoustic surveys revealed linear furrows up to several kilometres long that were not detectable using drop-down video on Jeffreys Ledge (Gulf of Maine) but were caused by scallop dredging gear or the dragging of boulders."

And the implications of the these furrows are ...? Issues around flow and settlement of suspension feeding species (like scallops and a diversity of attached fauna) should be discussed. Also, such long-term changes fly in the face of the definition of impact in the EFH final rule. An impact is one that is more than minimal and not temporary in nature. Whether or not NOAA determines that mitigating effects is not "practicable" in terms of requirements under the Magnuson Act, how are impacts as described throughout this assessment considered in regards to a label that implies sustainability?

IMM Response: The text has been modified to clarify the significance of the furrows.

10. "The benthic impact of scallop dredges may be assessed, in part by determining the density and distribution of fishing activity, or footprint of the fishery. VMS data were used to prepare Figure 18 and show that throughout 1998-2008 the area of available scallop ground swept by the fishery was high and that the footprint of the fishery had not been reduced in recent years. Closer examination shows that the areas of highest habitat impact (areas that are fished most heavily) rotate from year to year as areas that were previously closed to the scallop fishery have been opened sequentially thereby, causing cumulative effects year on year."

There should be some degree of analysis regarding the footprint of the fishery and the sedimentary habitats in which it is prosecuted. *The entire discussion of this issue in the report is much too superficial to come to any conclusion about effects on vulnerable hard and mud bottom habitats.* How much area can be impacted and still be "sustainable" based on the understanding of the range of impacts and times for recovery, especially in the rotational harvest scheme. This has real potential to make this fishery sustainable if properly matched to sediment type and predicted recovery rates (information on sediment type - although imperfect - and assumptions about recovery rates based on depth and sediment type are embedded in the SASI model and articulated in a document describing the foundation of assumptions). This is especially important as the assessment acknowledges that ".... The footprint of the fishery periodically extends into many of the areas that had previously been closed to demersal towed gear."

IMM Response: This is a very important point and is a concern that is shared by the assessment team. This is the basis of the conditions that require a more specific application of the SASI model as it applies to scallop dredging to be sensitive to particular bottom types in order to fully meet the MSC criteria.

SCORING

The scoring section has a number of logic issues in regards to the foundational literature, in part due to issues of interpretation and limited use of a larger literature on fishing effects, as described above. Also, there are some issues on dependence of the Fishery Management Council process to meet the conditions for certification.

IMM Response: The team have reconsidered the scores awarded in the light of both reviewers comments and we have re-scored one PI 2.5.2 from 90 to 80.

FIGURES

Many of the figures are not sharp and difficult to read. Font on labeling is much too small.

- The entire assessment is predicated on closed areas remaining closed and I think this needs to be a bit more prominent in the presentation. As noted in early comments from the Conservation Law Foundation, this fishery has very strong political clout and if quotas are increased or if any of the closed areas are opened, a reassessment would be needed to maintain certification (if awarded).

IMM Response: We agree with this conclusion and appreciate the peer reviewer’s view regarding the importance of maintaining permanently closed areas permanently closed.

Performance Indicator Review

Please complete the table below for each Performance Indicator which are listed in the Conformity Assessment Body's Public Certification Draft Report.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.1.1	yes	Yes	NA	Nothing to add	
1.1.2	yes	Yes	NA	Nothing to add	
1.1.3	NA	NA	NA		
1.2.1	yes	Yes	NA	Nothing to add	
1.2.2	yes	Yes	NA	Nothing to add	
1.2.3	yes	Yes	NA	A focused effort on collection of more discard data will enhance the score	
1.2.4	yes	Yes	NA	Nothing to add	

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.1.1	yes	Yes	NA	The yellowtail fishery is carefully managed under the Northeast Multispecies Fisheries Management Plan. This coupled with the volunteer SMAST Yellowtail Flounder Bycatch Avoidance System will continue to aid recovery of the yellowtail stock. I believe this score could be increased.	The SG100 level scoring issue refers to all bycatch species, not just the main ones. The team is not sure about stock status of all species so determined the fishery does not meet the 100 score.
2.1.2	yes	Yes	NA	Nothing to add	
2.1.3	yes	yes	NA	Nothing to add	
2.2.1	yes	yes	NA	While the minimum conditions are met for the SG score of 80, there is still a lot of room for improved assessment of impacts on bycatch and such studies should be encouraged.	Agreed.
2.2.2	yes	yes	NA	Successful implementation and application of the strategy set in 2010 for ACL will undoubtedly lead to meeting the third SG100 issue. Is there an update available on implementation of the 2010 effort?	

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.2.3	yes	yes		As with other points, the bycatch issue and lack of a strong database is hindering higher scores. It appears that obtaining data for the winter flounder status and level of bycatch in the scallop areas would be extremely beneficial.	Agreed, and Condition 2.2.3 is designed to ensure that this information becames available
2.3.1	yes	yes	NA	The impacts of scallop fishing on endangered turtles is one of the most directly and comprehensively addressed issues and implemented strategies are reasonably successful. Ongoing studies and continued efforts will only continue to reduce impacts on turtles.	Comment noted and agreed.
2.3.2	yes	yes	NA	Nothing to add	
2.3.3	yes	no	NA	Given that the broad impact of the fishery on turtles is understood and that efforts continue to improve turtle exclusion, and that there are strategies in place to manage impacts, I would have scored this a bit higher, at 90.	While there is iincreasing information available on the broad im pacts of the fishery on turtles and efforts to reduce turtle mortality are improving the team do not consider that the fishery currently meets any of the SG100 requirements.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.4.1	no	yes	Not sure	I believe that the the scoring, milestones and action plan are too superficial to understand the likelihood that habitat issues will be resolved in a way that insures sustainable fishing practices. The SG 80 is entirely dependent upon the area being fished and as long as closed areas remain closed (see discussion under General Comments) the scoring for certification could hold – but if any fishing occurs in closed areas, the entire assessment will need to be revisited. SEE GENERAL COMMENTS I also wonder if the milestones are not too tightly linked to time lines of the Council process, i.e., is this realistic? If the Council is diverted by other priorities (they seem frequently to be crisis driven), the timeline for the milestones falls away and the fishery risks loss of certification (assuming a conditional one is granted). What about voluntary actions in the absence of Council action if the certification has value to participants in the fishery overall?	We have altered the document to clarify that the impacts of New Bedford dredges and substratum-specific with relatively rapid recovery times documented on sand but long-lasting adverse effects on mud and gravel/cobble habitats. We have made the case for permanently closed areas stronger.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.4.2	yes	yes		The overall score of 60 requires that "the fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm" (and similarly for 2.4.2 below). Based on the background analysis, one could (should?) conclude that there is a high degree of impact across a large area and that 'serious or irreversible harm' is likely in a precautionary framework, or unknown given the current state of knowledge. I don't see how one could conclude that serious harm is 'unlikely' because there is no analysis based on direct empirical evidence, or inferential logic that leads to this conclusion. This said, the comments about impacts in the sections above suggest that such a conclusion could be supported based on an analysis that parses impacts and patterns of recovery to particular sediment types. There seems to be a disconnect in this scoring, given the very low impacts on the sand habitats in the mid-Atlantic. See also general comments.	Given that there are areas of vulnerable habitat that are closed to New Bedford scallop gear, and that sand habitats exhibit relatively rapid recovery times (and are prevalend in the mid-Atlantic protion of the fishery) we are confident in our score of 60 despite the fact that there is a high degree of impact across a large area and that 'serious or irreversible harm' is likely in some areas.

Performance Indicator	**Has all the relevant information available been used to score this Indicator? (Yes/No)**	**Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)**	**Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)**	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	**Conformity Assessment Body Response**
2.4.3	no	yes		I am not a modeller, but my understanding (limited) of SASI is that it is not an end-based model, it is a start. I have expanded on this point in the general discussion after reading the SASI study and discussions with two modellers to get a better understanding of the system.	Shortcomings of the SASI model are now incorporated into the report.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.5.1				The assessment does not take into account current actions by the scallop industry to influence strongly the EFH Omnibus Ammendment 2 process to open existing closed areas that hold scallops regardless of habitat type. The northern part of Closed Area 2 on the Northeast Peak of Georges Bank is composed of a gravel pavement with a seafloor community that is highly vulnerable to scallop dredge impacts and has a recovery period of probably more than a decade. Despite this vulnerability, industry representatives regularly advocate for opening closed areas (currently this one) because of the significant numbers of scallops contained within, based on public records of Council proceedings. This seems to be a double edged approach to management (i.e., get the Council to open vulnerable areas and then advocate for certification as sustainable). (See my statement above regarding opening of closed areas). This score should be decreased.	The team supports their view that the fishery meets the scoring criteria at SG60 since the footprint of the fishery does not cover all areas. Our findings , however, now include the condition to maintain permanent closures in areas of vulernable boottom types.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.5.2	no	no		See comments in GENERAL COMMENTS – If my understanding of SASI is correct, I believe this section needs further explanation and perhaps a lower score	The assessment team agrees with this comment and considers the ecosystem strategy to be partially implemented meeting the scoring guide issues at the 80 level.
2.5.3	yes	yes		See general comments	
3.1.1	yes	yes		Nothing to add	
3.1.2	yes	yes		Nothing to add	
3.1.3	yes	yes		Nothing to add	
3.1.4	yes	yes		Seems worth a mention here that the cooperation between so many fishers and scientists is to be commended!	
3.2.1	yes	yes		See general comments regarding habitat and ecosystem considerations.	
3.2.2	Yes	yes		Nothing to add	

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
3.2.3	Yes	yes		Nothing to add	
3.2.4	Yes	yes		Nothing to add	
3.2.5	Yes	yes		Nothing to add	

Any Other Comments

Comments	Conformity Assessment Body Response

APPENDIX D

STAKEHOLDER COMMENTS

MSC Interview Record
US Sea Scallop Fishery

MML Attendees
Lead Auditor/Coordinator: Don Aldous
Team Members: Jason Hall-Spencer, Andrew Brand

Stakeholders:

Affiliation	**Representatives**
1. Oceana	Gib Brogen

Location: Fairfield Marriott, New Bedford in Massachusetts

Date: 9 August 2010

1. Introduction. MML Lead Auditor to introduce MSC assessment to Stakeholders, including

Don Aldous reviewed:

- The Fishery Unit of Certification (and client)
- Assessment Team
- Moody Marine as independent CB accredited to carry out MSC assessments
- Purpose of meeting – information collection and identification of issues relevant to fishery assessment
- MSC Principles & Criteria and Assessment Process being followed; FAM Assessment Tree
- That stakeholder comments may be non-attributable if required

Comments: Gib responded with his comments could be attributed to him and Oceana.

2. Status
What is the nature of the Oceana's interest in the fishery?

Oceana: Scallop fishery has changes in progress but not yet implemented. In 2011 there will be new regulations, new changes in place including accountability, but these changes will not be in place until by June 2011. How will this assessment take the evolving nature of the management of this fishery into account?
Moody: There is no specific deadline for the assessment and until the report is posted it is subject to updating with new information. This could be within 12 months.

Oceana: There is a process in the works to identify impacts on habitat and to produce management measures. The process is incomplete since it has not been implemented. How would this score?
Moody: The fact that the analysis exists might contribute to the score and the implementation might not score since it would remain unproven.

Oceana: Oceana has been working in New England for a decade. G. Brogen works on habitat and bycatch issues and has worked in groundfish, herring fisheries and tunas. Oceana is naturally critical, particularly on habitat and bycatch issues and has been in court to resolve some issues.

NEFMC is made up of state rep, public representatives, lobbyists, recreational and commercial fishers made by political appointment. Oceana expressed some specific concern regarding the process of appointment tends to provide a Council that is heavily influenced by industry.

3. MML Questions
Assessment team questions for stakeholder response

Moody: What is the footprint of the fishery? How is the frequency and intensity of fishery determined?
Oceana: Since VMS data is not available for management, the voluntary catch reports are the basis for analysis and these are unreliable. Government keeps fishing location data secret. From the analysis conducted, the Scallop fishery is conducted in areas of complex gravel bottom, with extensive impacts. Oceana's objective is to reduce scallop fishery impacts away from ecological sensitive areas.

Moody: Do you have information to support finding of habitat effects?
Oceana: NEMFC plus NMFS (Michelle Bachman) developed a model with data showing where scallop gear has effects. Management has not responded as yet. (Reference: SASI model) SASI indicates for all fishing gears the areas that need management measures for habitat protection. (PI 2.4.1)

Moody: Did SASI not look at irreversible impacts?
Oceana: No

Moody: Are corals an issue?
Oceana: Corals areas are not found in areas fished. Corals not an issue now as not on coral/boulder habitat, but may have been present before demersal fishing started.

Moody: Do you have comments on the use of rotating closed areas?
Oceana: Some closed areas were closed for various reasons, not intended for scallop management. Rotational management should not include fishing in sensitive areas.
Oceana will send more specific comments.

4. Stakeholder Key Issues
What, if any, specific substantive issues or concerns are identified regarding the fishery? (P1 – P2 – P3)
What information is available to allow us to determine the status of the fishery in relation to each issue?

Principle 1
Managers set fishing level for 2010 with Framework 21 set a F=0.24 instead of F=0.20, resulting in a 25% effort increase in the swept areas in the fishery and a 42% increase in cod habitat area the New Bedford area. Concentration of effort would lead to local overfishing in some areas.

Harvest strategy is not effective in implementing P1 and P2. The TAC is a target TAC, not a hard TAC using assumptions about efficiency in the days at sea formulae. Realized TAC (catch) goes over the target when the assumptions are wrong.

Principle 2
Habitat: Scallop fishery has large impacts on habitat, heavy dredges, 1 or 2 New Bedford dredges per boat. Oceana is concerned how habitat has been managed.

(PI 243) SASI model maps habitat types but is a work in progress. Mapping vulnerable habitat types has been done but not implemented. The process includes a susceptibility and recovery score of fishing in certain areas. (Reference: copy of SASI). Model does not capture impacts beyond 10 years.

Chains are a modification of the boulder exclusion gear used in the south channel area near New Bedford which is an area they are fighting over as some want it protected as complex bottom habitat for fish.

Bycatch: Bycatch management is possible through dynamic management for the yellowtail hotspots in the fishery. Observer coverage is about ~15% coverage, good compared with other NE fisheries. In response to bycatch issues raised by Oceana lawsuit, there is industry-funded program of standardized bycatch reporting methodology. Oceana indicated that after 2011 the scallop fishery will be regulated by yellowtail bycatch – it won't be limited by scallop landings but by the yellowtail landings. He also mentioned that voluntary dynamic management is in place in the state of Mass so that scallop fishers are able to avoid yellowtail flounder bycatch and thereby continue fishing scallop. There are observers on around 15% of scallop boats and Oceana has offered to send the team landings data for retained non-target species.

Highgrading is an issue across the board: taking the most valuable sized scallops and discarding the small ones. This is anecdotal information with no data.

Retained species: There are significant numbers of these species retained in the scallop fishery. The percentages may be less than 5% but are significant to the stocks of yellowtail, monkfish, skates, winter flounder and summer flounder. There is a Recreational fishery for flukes (summer flounder?) in Mid-Atlantic. (Reference: Standardized bycatch-reporting table). Managers have provided data but not conducted an assessment of bycatch data. This is an item was not resolved by the Oceana lawsuit.

A four-inch ring still catches small scallops once the mesh is packed. Depending on length of tows and bottom type. Scallops die on hot deck before discarding.

Non-retained catches: Sponges. Corals are over the break, not on the shelf and not a concern in this fishery.

ETP: Loggerhead turtles are a listed species and are being considered to move from threatened to endangered. (Reference to follow). Scallop fishery has impacts and has done as little as possible to reduce impacts on loggerhead turtles as required under the Endangered Species Act. Turtle chains are not the answer since turtles are being hit and swept underneath the dredge. This impact while fishing is difficult to quantify but NMFS has video. The gear needs further testing. Kemp's Ridley turtle are caught but only rarely.

Turtle problem exists on the Mid-Atlantic States area where time area management closed areas exist off Virginia and Maryland. Scallopers fish their effort allocations of days at sea and in these closed areas. Problem: the closure areas are a small part of turtle migration areas so only provide minimal protection. More could be done using time area closures.

Principle 3
Omnibus fisheries management for New England is in the works for implementing the SASI. Oceana supports the process, concerned about implementation may not be possible due to politically based influences. National legislation (Magnuson Act) includes practical based results. Some Councils make extraordinary decisions including closed areas to fishing. New England Fisheries Management Council uses the least possible intervention such as closing commercially unimportant areas without regard to habitat concerns.

PI 3.1.4: Incentives not there to improve habitat and bycatch, implement P1 and P2 measures. Most attention is given to the target catch.

PI 3.2.5: There is no external review of the fishery. NEFMC is looking for a way for an external audit of the fisheries management plan but not implemented. Council has applied for federal money.

Oceana is concerned that VMS data is not available for management of the fishery.

5. Other issues
(e.g. any other stakeholders we should contact, any written submissions to follow?)

Other might include The Cape Community Commercial Hook Fisheries Association (general category) small-boat fishers, who are allocated a portion of the ICQ. Oceana will provide a written submission of comments on this assessment.

6. Closing
MML Lead Auditor:

- Summary of key points – stakeholder to confirm in writing (sign if hard copy)
- Are comments to be attributed?
- Timescale for completion, including further opportunities for stakeholder input

Confirmed

MML Lead Auditor Stakeholders

Don Aldous
Moody Marine

MSC Interview Record
US Sea Scallop Fishery

MML Attendees
Lead Auditor/Coordinator: Don Aldous
Team Members: Jason Hall Spenser, Andrew Brand

Stakeholders:

Affiliation	**Representatives**
1. Conservation Law Foundation	Priscilla Brooks, Peter Shelley

Location: Fairfield Marriott, New Bedford, MA

Date: 10 August 2010

1. Introduction. MML Lead Auditor to introduce MSC assessment to Stakeholders, including

- Fishery Unit of Certification (and client)
- Assessment Team
- Moody Marine as independent CB accredited to carry out MSC assessments
- Purpose of meeting – information collection and identification of issues relevant to fishery assessment
- MSC Principles & Criteria and Assessment Process being followed; FAM Assessment Tree
- That stakeholder comments may be non-attributable if required

Comments:
Conservation Law Foundation has a 40+-year record as an environmental organization in New England. CLF is New England focused and based in Boston. Peter is an attorney and has 21 years experience of marine issues. Priscilla Brooks has a PHd in marine resource economics and 20 years of marine resources experience.
CLF was launched in response to a variety of land conservation issues and filed its first federal litigation to block marine oil exploration in 1978. Since the 1980's, CLF has tracked fish issues in New England. In 1991 CLF filed the first lawsuit in the country on overfishing, which resulted in comprehensive management planning.

2. Status
What is the nature of the organisations interest in the fishery (e.g. client / science / management / industry / eNGO etc)

CLF concerns are focused on sustainable fisheries management, diversified fishing community structure and marine habitat protection. NEMFC has the mandate and responsibility to minimize impacts to the extent practicable. CLF is concerned that biodiversity protection is not within the mandate or expertise of the NEFMC.

3. MML Questions
Assessment team questions for stakeholder response

Moody: What is your view of SASI model?
CLF: It seems conceptually sound, and we agree with the process but the SASI model has not yet been implemented for management and habitat protection purposes. The vulnerable habitats have been identified by CLF and others, but it is uncertain at this point what will be implemented by the NEFMC. (Reference to follow)

4. Stakeholder Key Issues
What, if any, specific substantive issues or concerns are identified regarding the fishery? (P1 – P2 –

P3)
What information is available to allow us to determine the status of the fishery in relation to each issue?

P2 Habitat issues: CLF is concerned about the impact of scallop dredge gear on the marine habitat. Spatial fishery planning (e.g., rotating closed areas) is good for management of the stock but does not do much for habitat protection, particularly for complex vulnerable, slow-growing habitats. Historic fishery closures not introduced based on a scientific investigation. We suggest setting aside some complex bottom areas as areas of no fishing. The team should talk to Brad Harris at SMAST for the SASI inputs.

P2 Bycatch issues: There is a significant bycatch of yellowtail flounders and monkfish, both of which are the focus of directed fisheries. Because there is a limited quota of yellowtail flounder available, bycatch in the scallop fishery reduces the landings potential of the groundfish permit holders. Efforts should require continued R&D on gear modifications or yellowtail flounder area avoidance to reduce flounder and monkfish bycatch.

P2 ETP issues: The CLF supports Oceana comments on turtles.

Environmental: The scallop fleet has among the largest HP boats in the regional fishery. As an environmental organization, CLF is concerned about fuel consumption and greenhouse gas emissions from diesel engines. CLF suggests more effort towards maximizing catch per unit effort, which reduces the environmental impact of the fishery.

P3 Management: Observer coverage should be increased to verify catch and bycatch.
The team should talk to SMAST, Peter Oster and UComm (Avery Point), Les Kaufman, lesk@bu.edu

P3 Management: The scallop fishery is a politically powerful group with the ear of politicians and has demonstrated its power to increase quotas and get into closed areas through political pressure. In our view, an MSC-certified product should come from an industry that properly engages in the standard fishery management processes and does not use political leverage and pressure to accomplish its management objectives.

5. Other issues
(e.g. any other stakeholders we should contact, any written submissions to follow?)

CLF will provide written input to follow. Hard copy of Gulf of Maine habitat report will be mailed.

6. Closing
MML Lead Auditor:

- Summary of key points – stakeholder to confirm in writing (sign if hard copy)
- Are comments to be attributed?
- Timescale for completion, including further opportunities for stakeholder input

Confirmed

MML Lead Auditor | Stakeholders

Don Aldous
Moody Marine