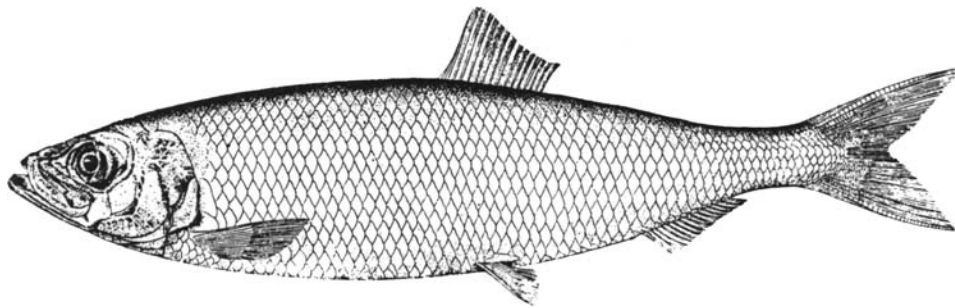


**2002 REVIEW OF THE FISHERY MANAGEMENT PLAN FOR
ATLANTIC SEA HERRING
(*Clupea harengus harengus*)**



Prepared by:

The Atlantic Sea Herring Plan Review Team:

Megan Gamble, Chair, Atlantic States Marine Fisheries Commission
David Libby, Maine Department of Marine Resources
Clare McBane, New Hampshire Fish & Game
William Overholtz, Ph.D. National Marine Fisheries Service

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2002 REVIEW OF THE FISHERY MANAGEMENT PLAN FOR ATLANTIC SEA HERRING (*Clupea harengus harengus*)

I. Status of Fishery Management Plan

<u>Date of FMP Approval:</u>	November 1993
<u>Amendments:</u>	Amendment I (February 1999)
<u>Addenda:</u>	Addendum I (July 2000) Technical Addendum #1a (October 2001) Addendum II (February 2002)
<u>Management Unit:</u>	US waters of the northwest Atlantic ocean from the shoreline to the seaward boundary of the EEZ, and from US/Canadian border to the southern end of the species range (Cape Hatteras, NC).
<u>States With Declared Interest:</u>	Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, and New Jersey
<u>Active Boards/Committees:</u>	Atlantic Herring Section, Advisory Panel, Technical Committee, Stock Assessment Subcommittee, Plan Review Team

The Atlantic States Marine Fisheries Commission's (ASMFC) Amendment 1 to the Atlantic Herring Fishery Management Plan (FMP) was approved in 1998 and established three management goals and eleven management objectives for the U. S. Atlantic herring (*Clupea h. harengus*) resource. Amendment 1 was developed in conjunction with the development of an FMP for federal waters by the New England Fishery Management Council (NEFMC). The goals and objectives can only be reached through the successful implementation of both the Commission's and Council's FMPs. Management measures in both plans are designed to complement each other in order to minimize regulatory differences in fisheries conducted in state and federal waters. The management scheme relies on an overall total allowable catch (TAC) with effort control measures to avoid overfishing the resource. The TACs were developed for specific management areas to reflect the current state of knowledge concerning migratory behavior and mixing rates of the various sub-components of Atlantic herring. Effort controls include specific days out of the fishery in order to slow catch rates and extend the fishing season.

Amendment 1 defines overfishing and biological reference points based on an estimate of maximum sustainable yield (MSY) for the entire stock complex. In order to maintain consistency between Amendment 1 and the Council's FMP, the Commission's Atlantic Herring Section decided to adopt the same overfishing definition and biological reference points as the Council has under guidelines stipulated in the revised Magnuson-Stevens Fishery Conservation and Management Act. Both FMPs provide a process for determining annual specifications for the fishery and by the different management areas. Both plans also contain institutional frameworks for developing and implementing future management action involving the Commission, the New England and Mid-Atlantic Councils, and (possibly) Canada, state and federal spawning closures/restrictions, and recommend a measures intended to prevent damage to herring spawning habitat and egg beds.

In July 2000, the Section approved Addendum I to re-address the spawning closure measures in Amendment I and changed the due date for annual state compliance reports to February 1st. The spawning closures for Management Area 1A (inshore Gulf of Maine) were disapproved by the National Marine Fisheries Service, so Addendum I redefined the spawning areas originally in Amendment I. Addendum I also includes measures designed to reduce the exploitation and disruption of herring spawning aggregations by imposing a landing restriction in state ports for herring caught in the spawning areas, except that some states allow a 20% tolerance for spawn herring.

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The purpose of Technical Addendum #1a (2001) is to change the delineation of the Eastern Maine spawning boundary contained in Addendum I because the spawning aggregations were not adequately protected in 2000.

Addendum II was developed in conjunction with the Council's Framework Adjustment 1 to allocate the Management Area 1A Total Allowable Catch (TAC) on a seasonal basis. Addendum II also specifies the procedures to be followed for allocating the annual Internal Waters Processing (IWP) quota.

II. Status of the Stock

The U.S. Atlantic herring coastal stock complex includes two distinct spawning stocks which occupy discrete areas in the Gulf of Maine and on Georges Bank/Nantucket Shoals in the summer and fall. Fish belonging to these two components, and to smaller spawning populations within each component, migrate to continental shelf waters south of Cape Cod after spawning, then move northward in the spring to summer feeding grounds north and east of the Cape before eventually returning to their natal spawning grounds. Herring deposit eggs on gravel bottom in relatively shallow, tidally-mixed coastal waters and offshore banks.

The coastal stock complex which occupies the management area covered by Amendment 1 (Cape Hatteras, NC to New Brunswick, Canada) has grown rapidly since the mid 1980's, according to the NMFS winter, summer and autumn trawl surveys. Total stock biomass at the beginning of 1997 was estimated to be about 2.9 million metric tons (mt). This increase is due largely to the recovery of the Georges Bank/Nantucket Shoals components of the stock complex, which supported a large foreign fishery during the 1960's and early 1970's, but collapsed in the mid-70's as a result of over-exploitation. Current trends in biomass generally indicate an increasing trend since 1999. The offshore hydroacoustic surveys, conducted by NMFS, have shown an increasing biomass from 1999-2001. The 2002 estimate is significantly lower than the previous three years because the survey encountered "spent" Atlantic herring, indicating that spawning occurred earlier than the previous years. There is also a complimentary inshore hydroacoustic survey conducted by Maine DMR and the Gulf of Maine Aquarium. The inshore also indicated an increasing trend from 1999-2001, but experienced a drop in 2002. The timing of the spawning also impacted the 2002 biomass estimates for the inshore survey. The increasing biomass over the last several years is attributed to two large year classes, 1994 and 1998.

There is limited information currently on the relative size of the two principal spawning stocks that make up the stock complex. Historical assessment information indicates, however, that the Gulf of Maine stock was much smaller than the Georges Bank/Nantucket Shoals stock during the 1960's and 1970's. With the recovery of the Georges Bank/Nantucket stock in recent years, the same situation is believed to prevail today. Analysis of NMFS fall trawl survey data gives some indication as to the relative size of each component. An examination of the fall trawl survey data by the 27th SAW (NEFSC 1998) resulted in estimates of minimum population size for each of the three areas for the time periods 1988-97 and 1993-97. Coastal Maine accounted for 27% of the population during 1988-97, and 26% in the more recent time period. Nantucket Shoals accounted for 63% of the population from 1988-97 and 57% during 1993-97. Georges Bank accounted for 10% of the biomass in 1988-97 and 17% in the recent period, a reflection of the increased amount of spawning on Georges Bank during the last five years. These data indicate that the Gulf of Maine spawning stock accounts for about 25% of the total spawning stock biomass and the Georges Bank-Nantucket Shoals stock for the remaining 75%.

Currently, the stock complex is large and underutilized. It may increase in size even further in the near future under current exploitation and recruitment patterns.

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III. Status of the Fishery

The preliminary catch data reports 91,026 metric tons (mt) of Atlantic herring caught during the 2002 fishing year (Table 1). This amount is about 27,000 mt less than the previous year. Management Area 1A accounted for approximately 64% (58,754 mt) of the overall landings, which is an increase in harvest levels compared to the previous years. Area 3 had the biggest decline in a catch with 20,447 mt.

The predominant gear types in the Atlantic herring fishery are purse seines and mid-water trawls (mobile gear) and to a much lesser extent stop seines and weirs (fixed gear). Within Management Area 1A, purse seines accounted for approximately 32% of the catches, but only accounted for 21% of the catches for the entire stock complex (Figures 1 and 2). Both types of mid-water trawler gear (single and pair) accounted for the bulk of the catches in Area 1A and total complex. Of the states, Maine had the highest landings (53%), followed by Massachusetts (27%), Rhode Island (12%), and New Hampshire (6%).

Under a provision of the Magnuson Fishery Conservation and Management Act, the sale of Atlantic herring to foreign processing ships operating in state internal waters have been conducted through the issuance of Internal Waters Processing (IWP) permits. These IWP sales continue to provide an alternative market opportunity for U.S. fishermen. While Amendment I and the subsequent addenda do not limit the allocation of IWP quota to specific areas, the Section has generally restricted the operation to Areas 2 and 3. The Section agreed to limit the harvest of IWP quota to these areas in effort to compliment the federal regulations and prevent further competition in Area 1. In 2002, the Section allocated 6,500 mt to Rhode Island, all of which was restricted to Area 2. The state of Rhode Island reports 6,133.8 mt of Atlantic herring caught by the IWP operation. In 2002, the Section could have allocated up to 10,000 mt to IWP operations. For the current fishing year (2003), the Commission's Atlantic Herring Section allocated 5,000 mt to Rhode Island. The total 2003 IWP quota is 10,000 mt, therefore 5,000 mt of the quota remains unallocated at this time.

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Table 1. Herring Catch (mt) - Management Area by Month, 1997 – 2002 (based on VTR data).

2002*														
Mgt Area	1	2	3	4	5	6	7	8	9	10	11	12	Total	TAC
1A	1,653	1,223	786	3,087	44	9,019	13,760	7,727	7,380	5,953	8,018	103	58,754	60,000
1B	1,701	753	473	126	1,030	369	643	159	259	32		1,800	7,343	10,000
2	5,387	3,951	664	107	187	0	1	1	138	1	125	303	10,866	50,000
3	589	0	29	5	879	412	2,837	2,555	3,056	3,697	4		14,063	50,000
Total	9,330	5,927	1,953	3,325	2,141	9,799	17,240	10,441	10,834	9,682	8,147	2,207	91,026	170,000
* uncompleted catch data														
2001*														
Mgt Area	1	2	3	4	5	6	7	8	9	10	11	12	Total	
1A	3	1,716	1,292	2,476	6,596	8,605	6,978	7,920	4,682	8,954	3,888	57	53,167	
1B	18	1	68	45	195	110		1,266	1,302	1,128	4,382	6,447	14,963	
2	8,582	4,900	430	828	56	100	0	2	96	3	64	327	15,388	
3						755	7,636	7,826	10,701	7,310	193	89	34,510	
Total	8,604	6,617	1,789	3,349	6,847	9,571	14,614	17,015	16,781	17,394	8,527	6,920	118,028	
2000														
Mgt Area	Month	1	2	3	4	5	6	7	8	9	10	11	12	Total
1A		3	3	76	1,339	7,076	10,390	14,355	12,818	4,334	8,525	812	0	59,730
1B			87	127		76	234	276	73	166	0	5,836	110	6,985
2		7,802	7,902	2,391	212	18	1	0	2	23	2	860	4,364	23,578
3		125		537	87	38		418	3,107	5,893	2,679			12,884
Total		7,929	7,992	3,132	1,638	7,208	10,624	15,049	16,001	10,415	11,207	7,508	4,474	103,178
1999														
Mgt Area	Month	1	2	3	4	5	6	7	8	9	10	11	12	Total
1A		628	120	93	3,264	4,975	8,055	12,939	9,415	9,497	5,907	8,644	5,110	68,648
1B		272		41		181	57		35	113	731	106	57	1,593
2		7,179	7,516	2,928	511	9	4	34	136	0	1	4	555	18,878
3			143	272	999	154	1,460	290	92	1,280	994			5,685
Total		8,080	7,779	3,334	4,775	5,320	9,575	13,263	9,678	10,890	7,633	8,754	5,722	94,803
1998														
Mgt Area	Month	1	2	3	4	5	6	7	8	9	10	11	12	Total
1A			193		2,705	3,831	4,014	7,200	4,092	5,101	5,973	6,004	4,473	43,586
1B				392		166	154	112	186	535	1,399	871		3,815
2		5,965	6,568	2,167	160	187	202	161		237	246	222	126	16,242
3				523	487	3,630	3,988	3,845	3,267	1,610	465	144		17,959
Total		5,965	6,761	2,167	3,779	4,505	8,012	11,503	8,049	8,792	8,364	8,091	5,614	81,601
1997														
Mgt Area	Month	1	2	3	4	5	6	7	8	9	10	11	12	Total
1A			6		2,801	3,302	5,885	10,311	12,530	12,841	11,647	7,303	983	67,608
1B				118	295	500	556	1,091	3	94	316			2,972
2		7,229	4,713	3,841	615	5					500	102	4,443	21,448
3			34		839	948	2,581			213	778			5,393
Total		7,229	4,719	3,875	3,534	4,441	7,333	13,448	13,621	13,057	13,018	7,721	5,426	97,422

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Figure 1. 2002 Landings of Atlantic Herring by Gear Type (based on VTR data).

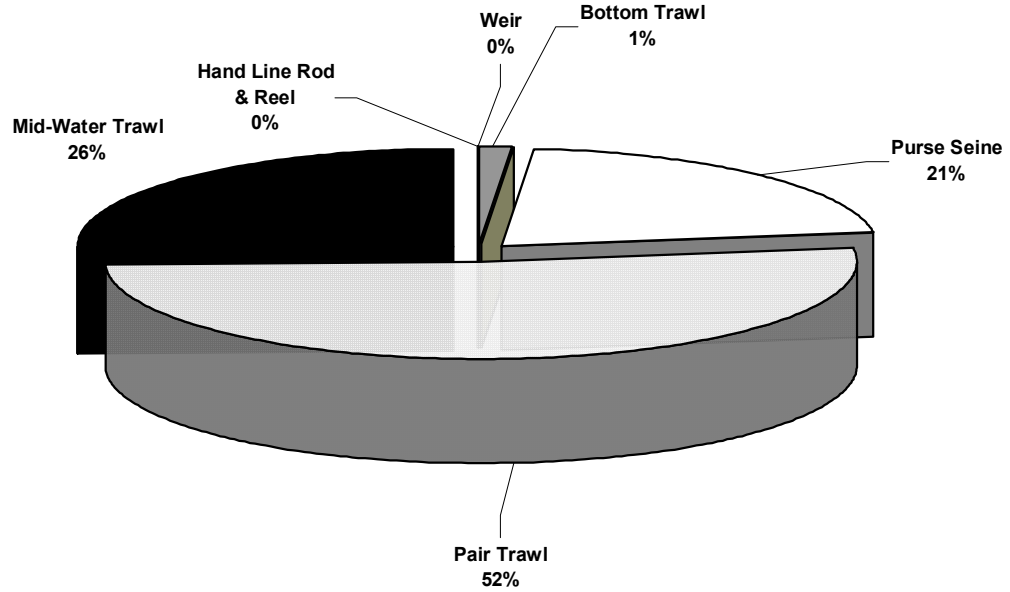
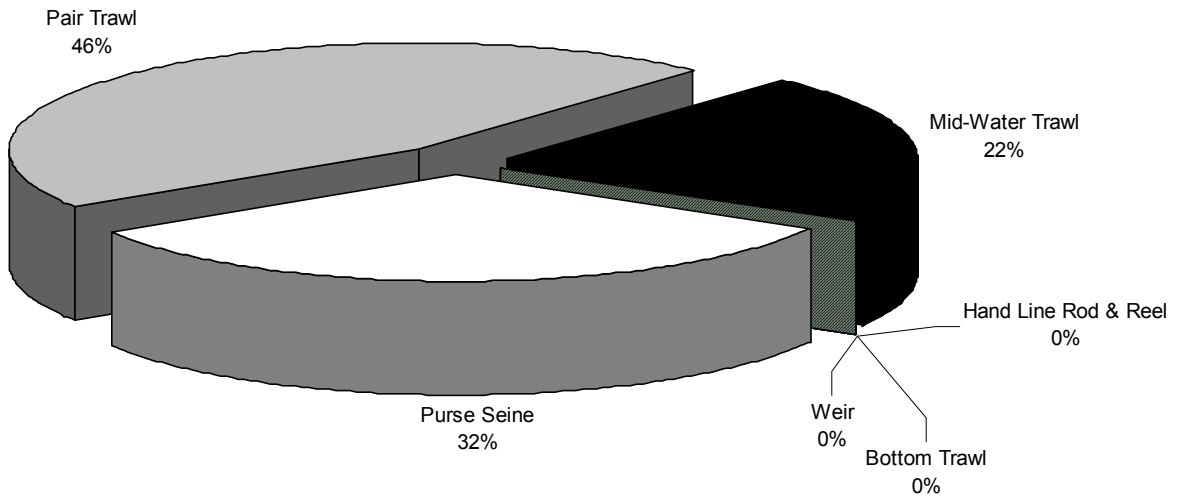


Figure 2. 2002 Landings of Atlantic Herring by Gear Type in Management Area 1A (based on VTR data).



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IV. Status of Assessment Advice

The most recent assessment of the Atlantic herring coastal stock complex was completed in 2003 and reviewed by the Transboundary Resource Assessment Committee (TRAC) in St. Andrews, New Brunswick, Canada (February 10-14, 2003). Two assessments were presented to the TRAC for a peer review. The US assessment used a delay difference model referred to as KLAMZ and the Canadian assessment employed a calibrated VPA model (ADAPT). The results from the two assessments differ considerably. The TRAC did not reach consensus on which assessment should be used as the basis for Atlantic herring management. The two assessments will be presented to the NEFMC's Scientific and Statistical Committee (SSC) in June 2003. The Council intends to move forward with the development of Amendment 2 to the Federal FMP based on the SSC's advice. ASMFC's Atlantic Herring Technical Committee has advised that the Section also develop their management decisions based on the SSC's advice.

V. Status of Research and Monitoring

Under Amendment I, the states are not required to conduct fishery independent surveys for Atlantic herring.

VI. Status of Management Measures and Issues

Spawning Closures

The following paragraph outlines the spawning regulations implemented by the state of Maine, except where noted otherwise. Landings and transfers at sea from the Eastern Maine Spawning Area was prohibited to protect spawning herring in stages V or VI from August 15th to September 12th, 2002. During the closure, there was a tolerance for 20% (by number) of the catch to be spawn herring, which was monitored by taking samples. The same regulations were implemented for the Western Maine Spawning Area during September 13th to October 11th, 2002. In Maine, landings from the New Hampshire/Massachusetts Spawning Area were prohibited from October 4th to November 1st, except for the 20% tolerance provision. In New Hampshire, landings from the New Hampshire/Massachusetts Spawning Area were prohibited from October 24th to November 1st. The state of New Hampshire does not allow the 20% tolerance provision. The Law Enforcement Committee's Report on Atlantic herring indicates enforcement difficulty when determining the gonad stages that may be landed under the spawning tolerance provision.

IWPs

Addendum II outlines the procedures and process to apply for an allocation of the annual IWP quota. In the addendum, requests from the herring industry must be submitted to the state by May 1st and the states must submit the application to ASMFC by May 15th. The purpose of these deadlines is to allow the Section to consider the IWP demand when setting the annual specifications for the upcoming fishing year. When the specifications were set in 2002 for the 2003 fishing year, the Board did not address the allocation of the 2003 IWP quota. As a result the Board was faced with addressing IWP requests several months into the fishing year and in an expedited manner. For the 2004 fishing year, the IWP applications will be considered according to the schedule described in Addendum II. When discussing the 2003 IWP allocation, a Section member requested that applications include information on how the IWP operation is designed to develop the US fishery and not compete with the US herring product in the industry and market.

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Cooperative Management

As a transboundary stock, both the U.S. and Canada should develop complementary management objectives for Atlantic herring. In addition, assessment biologists from both countries should continue to work together to provide the best scientific advice for the entire resource.

Days Out of the Fishery: Controlling Effort

Under Amendment I, effort controls are used to prevent the early closure of any management area. Landing restrictions have been used in Area 1 for the past couple of years because the TAC has been harvested before the peak market demand abates in the autumn. Based on the catch rates in the first several months of the 2002 fishing year and in comparison to the previous year, the landing restriction was effective June 1st, 2002. The States of Maine, New Hampshire and Massachusetts met and agreed to implement the landing restriction for every Saturday and Sunday until the end of the calendar year or achieving the TAC for Area 1A (whichever came first). On November 17th, the catch in Area 1A was 54,620 mt, ASMFC and NMFS closed the directed fishery in Area 1A effective December 1st, 2002. The Law Enforcement Report indicates difficulty in interpreting the definition of "landing". It is unclear if the regulations allow for unloading during a landing restriction and if it requires the boats to be specifically tied to the dock as opposed to a mooring in the harbor.

VII. Annual State Compliance Reports

Atlantic herring compliance report checklist - 2002 Reports

✓ refers to whether the report addressed the four compliance requirements listed below

Report Content ^a	ME	NH	MA	RI	CT	NY*	NJ
Date Rec'd	1/13/2003	2/19/2003	no report	4/02/2003	2/07/2003	2/06/2003	1/31/2003
1	✓	✓		✓	✓	✓	✓
2	✓	✓		✓	✓	✓	✓
3	✓	✓		✓	✓	✓	✓
4	✓	✓		✓	✓	✓	✓

*The state of New York maintains *de minimis* status.

^a Refers to *Section 5.1.3* of Atlantic Herring Amendment 1 as follows:

Reports on compliance should be submitted to the Commission by each jurisdiction annually, no later than February 1st each year. Each state must submit an annual report concerning its Atlantic herring fisheries and management program for the previous year. The compliance report shall cover (*Section 5.1.3*):

1. The previous calendar year's fishery and management program including activity and results of monitoring, regulations that were in effect and harvest, including estimates of non-harvest losses;
2. The planned management program for the current calendar year summarizing regulations that will be in effect and monitoring programs that will be performed, highlighting any changes from the previous year;
3. A description of the operation and amount of fish mealed in conjunction with herring processing activities conducted in each jurisdiction; and
4. The amount of herring harvested by fixed gear fisheries operating in state waters.

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VIII. Recommendations of FMP Review Team

Regulatory Recommendations

All of the states with a declared interest in the management of Atlantic herring have regulations in place that are in compliance with Amendment I to the Interstate Management Plan for Atlantic herring. The Plan Review Team could not evaluate the management program and practices for Massachusetts state waters because the Commission did not receive an annual state report.

Amendments

There are no plan amendments or addenda currently under development. However, in effort to continue the coordinated management of Atlantic herring between state and federal waters, the Commission intends to begin development of an amendment in 2004. The development of a new amendment will be based on the recent stock assessment completed in 2003.

Research and Monitoring Recommendations

Identify known herring spawning areas. Establish critical spawning habitat areas or special management zones to protect spawning aggregations of herring and/or demersal egg masses (1).

Develop a long-term strategy for assessing individual spawning stocks as a basis for more effective management of any heavily exploited portion(s) of the stock complex. Evaluate the merit of acoustic surveys and other techniques to achieve sub-stock complex monitoring (1).

Develop economic analyses necessary to evaluate the costs and benefits associated with different segments of the industry (2).

Pursue the development of a dedicated pelagic survey technique utilizing hydroacoustic and trawling methods to provide another direct and independent means of estimating stock sizes. Collaborative work between NMFS, DFO, state agencies, and the herring industry on acoustic surveys for herring should be encouraged (2).

Reinvestigate the estimation of age-3 herring, the natural mortality rate assumed for all ages, the use of catch-per-unit-effort tuning indices, and the use of NEFSC fall bottom trawl survey tuning indices in the analytical assessment of herring (2).

Develop new approaches to estimating recruitment (i.e. juvenile abundance) from fishery-independent data (3).

Consider using NEFSC fall survey mean weights at age as the spawning stock mean weight at age in the estimation of biological reference points. Evaluate alternative catch weights at age (3).

Investigate alternative methods of estimating mean weight at age used to determine the age composition of U.S. and Canadian landings from the coastal stock complex (3).

Conduct a retrospective analysis of herring larval and assessment data to determine the role larval data plays in anticipating stock collapse and as a tuning index in the age-structured assessment (3).

Continue resource monitoring activities, especially larval surveys to indicate the relative importance of individual spawning areas and stocks and the degree of spawning stock recovery on Georges Bank and Nantucket Shoals (4).

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Develop socio-economic analyses appropriate to the determination of optimum yield (5).

Evaluate the concept of a minimum biologically-acceptable level biomass (MBAL) for the herring coastal stock complex. Determine the adequacy of present methods and data to determine MBAL if appropriate (5).

Evaluate the concept of a fixed spawning stock size or spawning target for the herring coastal stock complex. Determine the adequacy of present methods and data to set a target if appropriate (5).

Investigate the effects of averaging maturity rates over blocks of years to help smooth some of the interannual variability in the calculation of spawning stock biomass (5).

Consider potential discards if fishing mortality increases in the future (6).

Additional Un-prioritized Research Needs

Possible effects of density-dependence (e.g. reduced growth rates at high population size) on parameter estimates used in assessments should be examined.

Potential changes in catchability within spring bottom trawl survey indices should be investigated.

Investigate the validity extremely high recruitment in recent years.

Identified Management Issues

Assure that the Clean Water Act (Section 319) Non-Point Source Plans and coastal Non-Point Pollution Control Plans are developed and implemented such that adverse impacts of non-point source pollutants on Atlantic herring are minimized.

Strengthen enforcement of sewage discharge, or National Pollutant Discharge Eliminations System (NPDES) permit effluent limits from treatment plants, and ensure proper maintenance and operation of domestic septic systems.

Implement effective oil and toxic chemical spill prevention and control programs to prevent accidental release, and prioritize cleanup plans to protect areas where Atlantic herring spawn or areas inhabited by Atlantic herring at different stages of their life history.

Establish and enforce vessel “non-discharge zones”, and promote education of recreational boaters to reduce contamination of nearshore waters from chronic fuel spills and waste disposal. Prohibit dredging activities, including disposal of dredge spoil, in areas where herring are known to deposit eggs.

Assist industrial siting councils in siting new power plants so that impingement and entrainment of Atlantic herring are minimized.

Organize annual US-Canada workshops to coordinate stock assessment activities and optimize cooperation in management approaches between the two countries.