

Mackerel AP Informational Document - APRIL 2014

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****Note - Data Sources for the following are generally from unpublished NMFS Survey, Dealer, VTR, Permit, and MRFSS databases unless noted...everything should be considered preliminary.**

Basic Biology

Atlantic mackerel is a pelagic, schooling species distributed between Labrador (Newfoundland, Canada) (Parsons 1970) and North Carolina (Anderson 1976a). Sette (1943; 1950) identified two distinct groups consisting of a northern contingent and a southern contingent. The two contingents overwinter primarily along the continental shelf between the Middle Atlantic and Nova Scotia, although it has been suggested that overwintering occurs as far north as Newfoundland. With the advent of warming shelf water in the spring, the two contingents begin migration, with the northern contingent moving along the coast of Newfoundland and historically into the Gulf of St. Lawrence for spawning from the end of May to Mid-August (Berrien 1982). The southern contingent spawns in the Mid-Atlantic and Gulf of Maine from mid-April to June (Berrien 1982) then moves north to the Gulf of Maine and Nova Scotia. In late fall, migration turns south and fish return to the over-wintering grounds. Biochemical studies (Mackay 1967) have not established that genetic differences exist between the two groups and precise estimates of the relative contributions of the two groups cannot be made (ICNAF 1975). Atlantic mackerel in the northwest Atlantic are assessed as a unit stock and are considered one stock for fishery management purposes. *In the past some of the Council's advisers who mackerel fish have questioned if the historical patterns described above are reasonable and/or being maintained currently.*

An Icelandic project is currently underway to investigate Atlantic mackerel stock structure in the North Atlantic and both the U.S. and Canada have contributed samples for this project. Additionally, NOAA recently recommended a project for approval for the Saltonstall-Kennedy Grant Program that aims to investigate mackerel stock structure in the northwest Atlantic by examining the nature of certain elements ("stable isotopes") in mackerel otoliths.

Mackerel are 0.1" long at hatching, grow to about 2" in two months, and reach a length of 8" in December, near the end of their first year of growth (Anderson and Paciorkowski 1978). During their second year of growth they reach about 10" in December, and by the end of their fifth year they grow to an average length of 13" FL. Fish that are 10-13 years old reach a length of 15-16" (Grosslein and Azarovitz 1982). MacKay (1973) and Dery and Anderson (1983) have found an inverse relationship between growth and year class size. All Atlantic mackerel are sexually mature by age 3, while about 50% of the age 2 fish are mature. Average size at maturity is about 10.5-11" FL (Grosslein and Azarovitz 1982). The maximum age observed is 17 years (Pentilla and Anderson 1976).

Atlantic mackerel are opportunistic feeders that can ingest prey either by individual selection of organisms or by passive filter feeding (Pepin *et al.* 1988). Larvae feed primarily on zooplankton. Juveniles eat mostly small crustaceans such as copepods, amphipods, mysid shrimp and decapod larvae. They also feed on small pelagic molluscs (*Spiratella* and *Clione*) when available. Adults feed on the same food as juveniles but diets also include a wider assortment of organisms and larger prey items. For example, euphausiid, pandalid and crangonid shrimp are common prey; chaetognaths, larvaceans, pelagic polychaetes and larvae of many marine species have been identified in mackerel stomachs. Immature mackerel begin feeding in the spring; older fish feed until gonadal development begins, stop feeding until spent and then resume prey consumption (Berrien 1982).

Atlantic mackerel is an important prey species and is known to be preyed upon by many pelagic and demersal fish species, as well as by marine mammals and seabirds (Smith and Gaskin 1974; Payne and Selzer 1983; Overholtz and Waring 1991; Montevercchi and Myers 1995; Scott and Tibbo 1968; Maurer and Bowman 1975; Stillwell and Kohler 1982, 1985; Bowman and Michaels 1984). The recent TRAC estimated mortality for a subset of key finfish predators (www.mar.dfo-mpo.gc.ca/science/trac/tsr.html) but estimates for marine mammals and seabirds are not available.

Status of the Stock

The mackerel stock was most recently assessed via a Transboundary Resource Assessment Committee in 2010 (TRAC 2010), which analyzed data through 2008 (www.mar.dfo-mpo.gc.ca/science/trac/tsr.html). A number of different models and model formulations were evaluated. Given the uncertainty in the assessment results, the TRAC agreed that short term projections and characterization of stock status relative to estimated reference points would not be an appropriate basis for management advice at this time. Since the 2010 TRAC also identified substantial technical issues with the preceding assessment, the status of mackerel is currently classified as "unknown" with respect to stock status and/or overfishing.

Given indications of reduced productivity and lack of older fish in the survey and catch, the TRAC recommended that annual total catches not exceed the average total landings (80,000 mt) over the last three years (2006-2008) until such time that new information suggests that a different amount is appropriate.

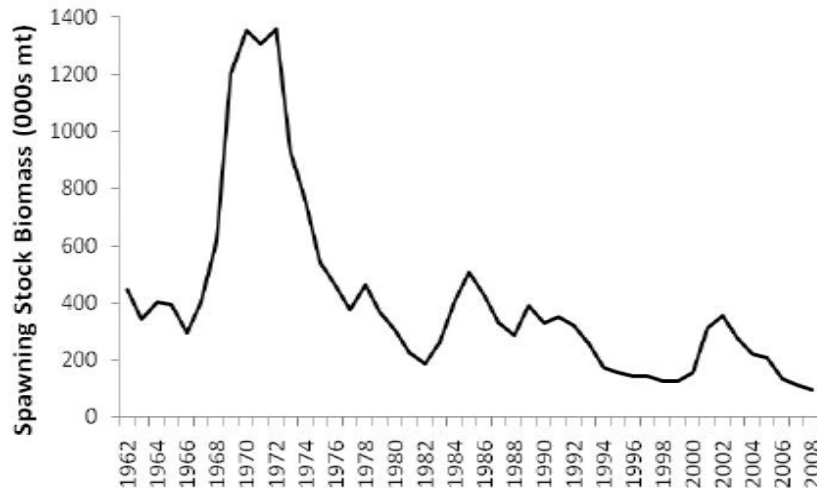


Figure 1. 2010 Mackerel TRAC SSB final model output.

The NMFS Northeast Science Center has provided updates regarding mackerel indices and recent biological data, including a summary of a recent assessment of the Canadian mackerel contingent conducted by Canada (<http://www.mafmc.org/council-events/2014/msb-ap-meeting>).

This document should be read in conjunction with the Center's mackerel update and information from that document is not repeated in detail here. The Canadian mackerel assessment concluded that the portion of the stock included in that assessment is in a depleted condition. Canadian catches in recent years have been very low. Another Canadian assessment is pending but not yet available. However, preliminary results do not appear positive.

Fishery Performance

Joint Venture Issue – It remains hard to pin down the exact nature of how JV landings have been handled in NMFS databases. It appears that JV transfers were added to domestic landings to get a "U.S. Commercial Landings" number, suggesting that about 1/2 of the blue line domestic landings from 1983-1991 in Figure 2 were related to JV transfers. The distance from the blue line to the pink line represents foreign catch (at the same time US vessels were delivering to foreign vessels, the foreign vessels were also catching mackerel) plus minor recreational harvest. Discussions with a few of the primary mackerel processors have supported this conclusion. Like the assessment, the figures/tables below that include the full historical data use the higher value for a total. However, when landings are broken down by state or month further below, only the dealer data is used, which would not include JV catches except for 1998, 2002, and 2003.

Atlantic mackerel were heavily exploited by distant water fleets during the late 1960s-early 1970's. Total landings averaged over 300,000 mt during 1970-1976 but decreased to less than 50,000 mt during 1978-1984. US waters harvest increased during 1985-1991 with the advent of a joint venture fishery in the Mid-Atlantic region. The domestic fishery was encouraged to expand in the early 2000s, especially in the realm of shoreside processing. Domestic landings peaked in 2004-2006 and declined to near none in 2011. About 5,300 mt were landed in 2012 and 4,400 mt in 2013. 2014 appears to be proceeding similarly to 2013.

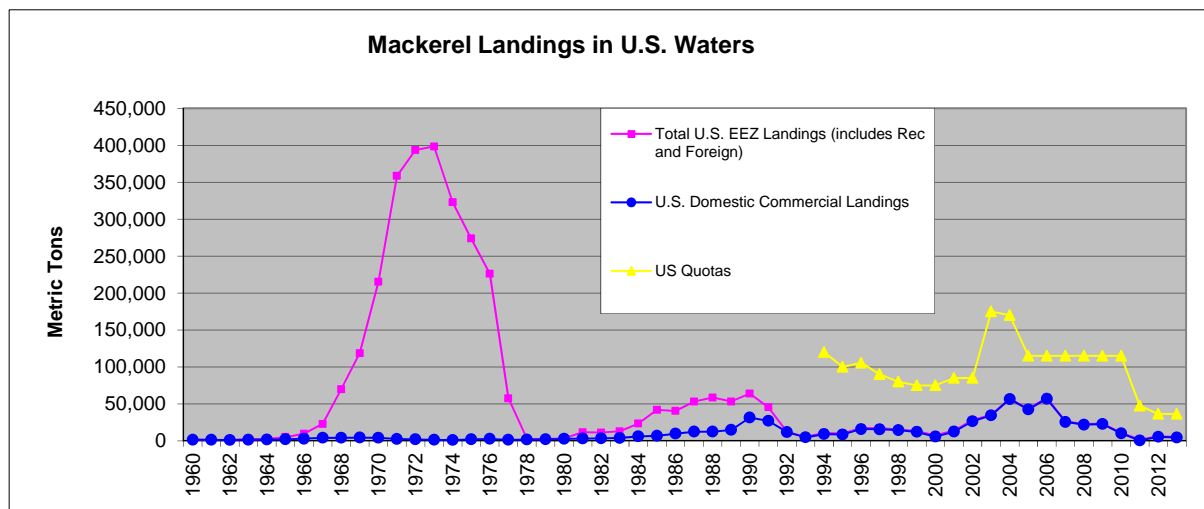


Figure 2. Atlantic mackerel landings within 200 miles of U.S. Coast (2013 Preliminary).
Source: TRAC 2010, unpublished NEFSC dealer reports

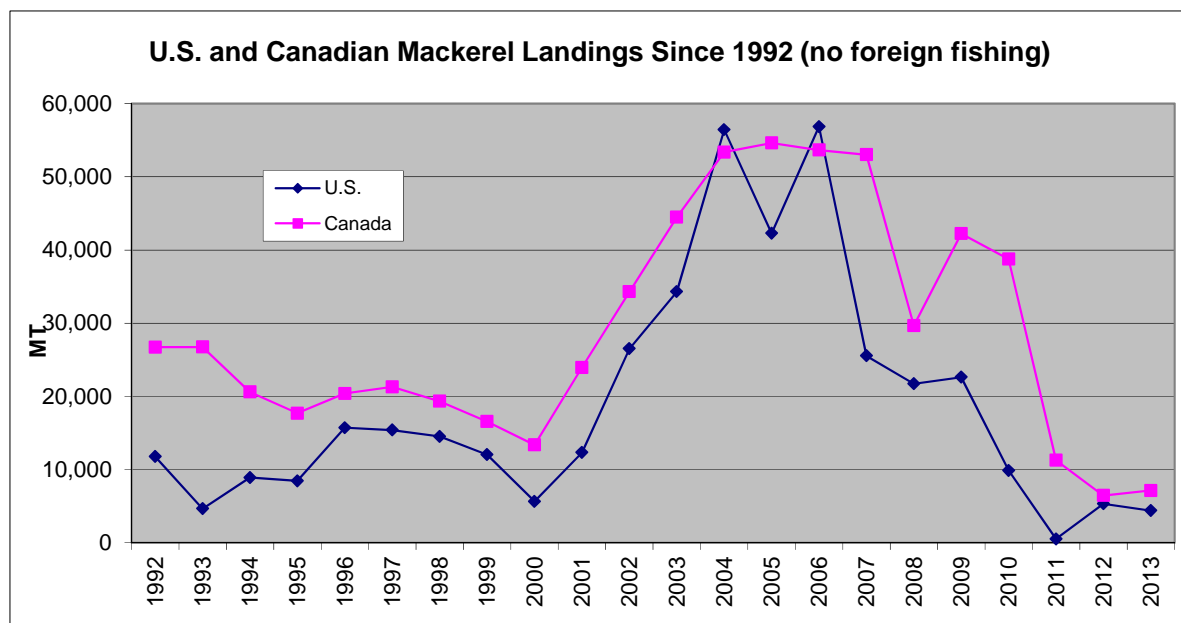


Figure 3. US and Canadian Atlantic mackerel landings (2013 Preliminary).
Source: unpublished NEFSC dealer reports; Perscom Francois Gregoire, Can. DFO)
 (Reported 2013 Canadian landings preliminary and approximate)

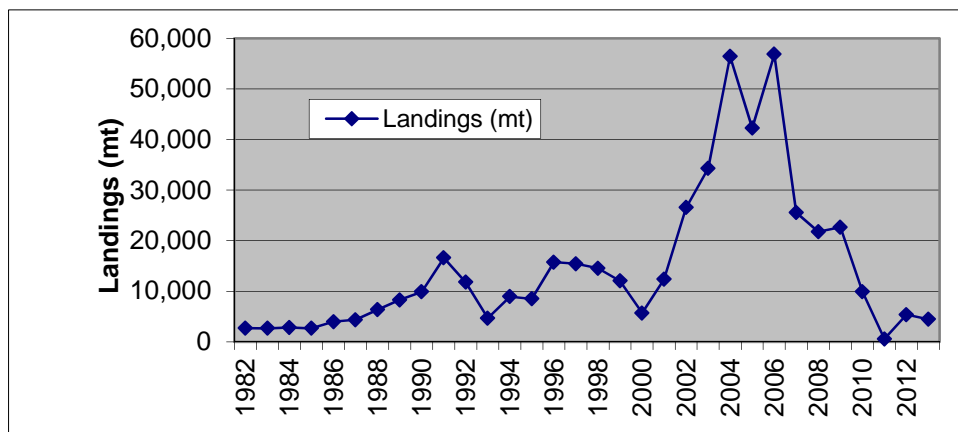


Figure 4. U.S. Atlantic mackerel landings.

Source: unpublished NEFSC dealer reports

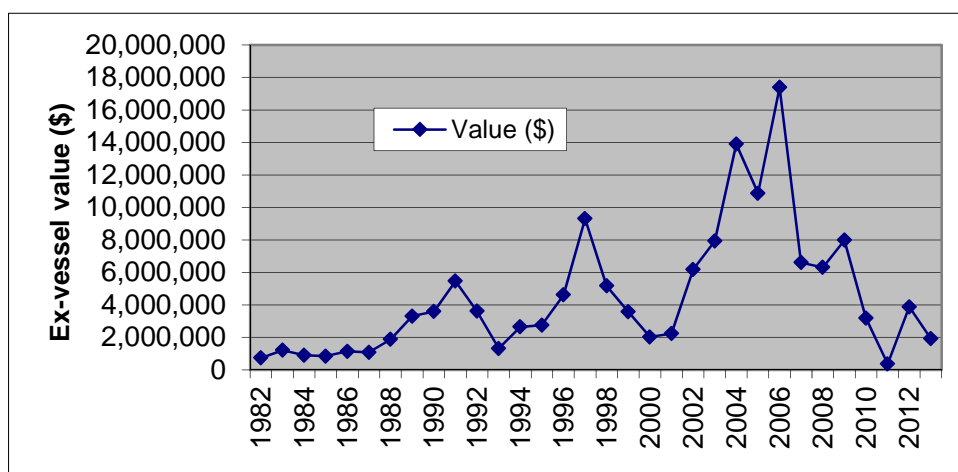


Figure 5. U.S. Atlantic mackerel ex-vessel revenues (nominal)

Source: unpublished NEFSC dealer reports

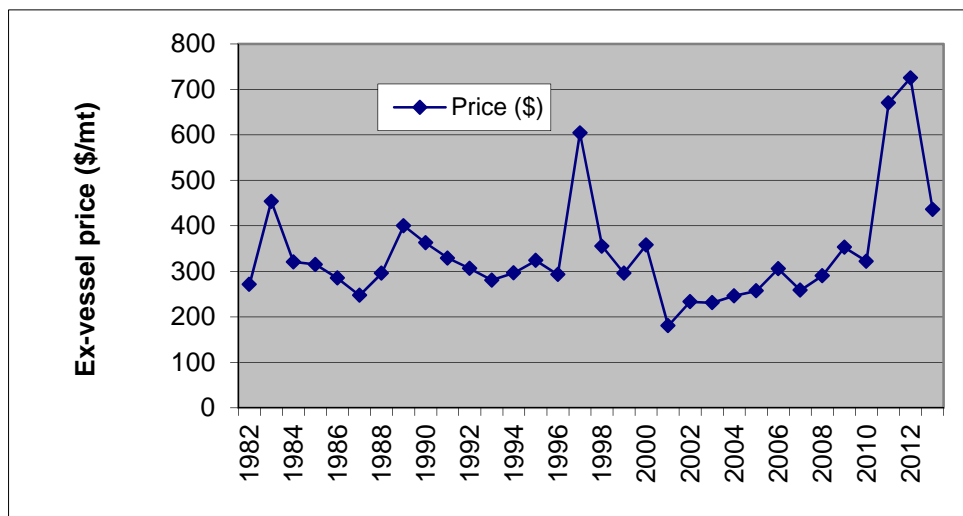


Figure 6. U.S. Atlantic mackerel ex-vessel prices (Nominal)

Source: Unpublished NMFS dealer reports

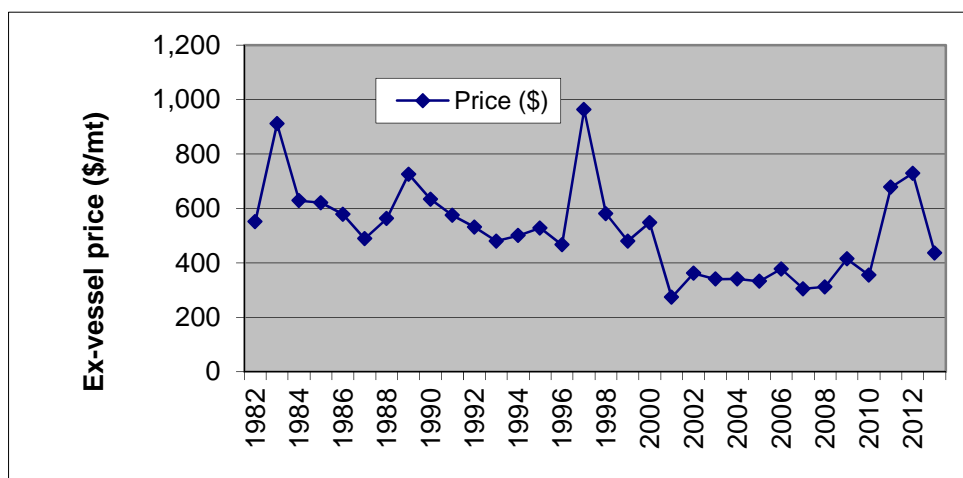


Figure 7. U.S. Atlantic mackerel ex-vessel prices (Producer Price Index adjusted, 2014 dollars)

Source: Unpublished NMFS dealer reports

Atlantic Mackerel Quota Monitoring Report

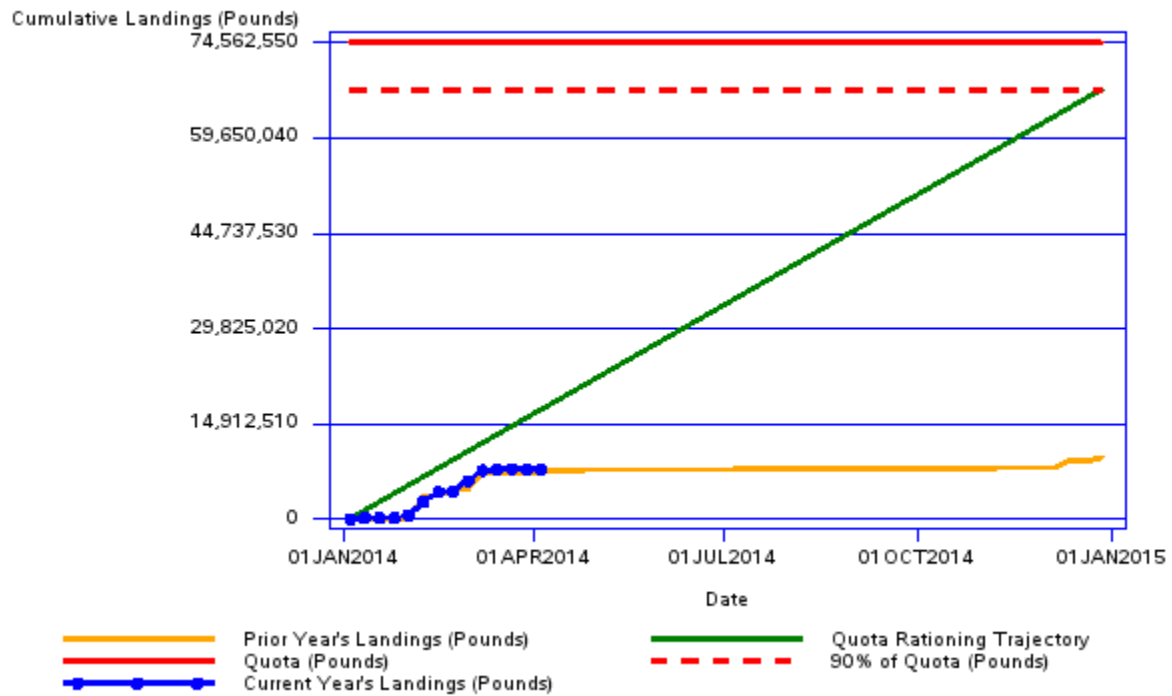


Figure 8. 2014 Landings to Date (April 5, 2014). Blue = 2014, Orange = 2013.

source: http://www.nero.noaa.gov/ro/fso/reports/reports_frame.htm

Specification Performance

The principle measure used to manage mackerel within a year is commercial monitoring via dealer weighout data that is submitted weekly. The dealer data triggers in-season management actions that institute relatively low commercial trip limits when 95% of the commercial quota is landed. A small amount of mackerel quota is set aside for assumed discards, which observer data have demonstrated to be low to date. There are no restrictions on the recreational fishery. Table 1 lists the performance of the mackerel fishery (commercial and recreational together) compared to the quota (and recreational allocation for 2012-2013). There have been no overages.

Table 1. Mackerel Quota Performance. (mt)

Year	Harvest (mt) (Commercial and Recreational)	Quota (mt) (Rec+Com)	Percent of Quota Landed
2003	35,068	175,000	20%
2004	56,905	170,000	33%
2005	43,275	115,000	38%
2006	58,351	115,000	51%
2007	26,142	115,000	23%
2008	22,489	115,000	20%
2009	23,235	115,000	20%
2010	10,736	115,000	9%
2011	1,478	47,395	3%
2012	6,019	36,264	17%
2013	5,297	36,264	15%

Source: Unpublished NMFS dealer reports

Table 2. 2013 Atlantic mackerel landings (mt) by state for states with more than 25 mt.

State	Records	Metric Tons	Percent
MA	917	3,299	75%
RI	427	552	13%
ME	109	465	11%
NJ	76	65	1%

Source: unpublished NEFSC dealer reports

*Percent may not add to 100% since states with low landings are not included.

Table 3. 2013 Atlantic mackerel landings (mt) by month.

MONTH	Metric Tons	Percent
1	108.69	2%
2	2074.97	47%
3	1148.59	26%
4	148.37	3%
5	25.52	1%
6	9.24	0%
7	51.8	1%
8	49.65	1%
9	22.82	1%
10	23.23	1%
11	31.49	1%
12	713.5	16%

Source: unpublished NEFSC dealer reports

Table 4. Vessels active in various annual landing ranges (pounds per vessel)

YEAR	Vessels 1 mil +	Vessels 100,000 - 1mil	Vessels 50,000 - 100,000	Vessels 10,000 - 50,000
1982	0	10	10	43
1983	0	10	5	26
1984	0	11	14	29
1985	0	12	10	28
1986	1	10	5	37
1987	1	15	8	31
1988	2	20	8	40
1989	6	17	8	27
1990	6	16	7	39
1991	13	18	1	38
1992	9	17	13	48
1993	0	16	11	55
1994	2	27	14	44
1995	4	24	11	50
1996	7	45	15	53
1997	6	30	20	46
1998	9	16	6	39
1999	6	15	9	36
2000	5	3	0	26
2001	5	3	2	20
2002	12	3	1	22
2003	14	6	5	23
2004	18	6	1	14
2005	16	11	4	17
2006	20	12	5	10
2007	16	12	2	20
2008	15	5	1	17
2009	15	5	7	18
2010	10	9	2	14
2011	0	3	3	17
2012	3	9	1	9
2013	4	4	3	12

Source: unpublished NEFSC dealer reports

Table 5. Number of Vessels to reach 75% and 95% of annual landings.

	This # of vessels accounted for about 75% of landings	This is the number that accounted for about the next 20%	The total of the first 2 columns equals the number of vessels that accounted for about 95% of landings
1997	11	48	59
1998	9	21	30
1999	6	25	31
2000	4	18	22
2001	3	4	7
2002	7	4	11
2003	8	6	14
2004	8	7	15
2005	10	6	16
2006	11	8	19
2007	10	10	20
2008	8	6	14
2009	10	5	15
2010	9	7	16

Source: unpublished NEFSC dealer reports

Note: Due to the low 2011-2013 landings this table was not updated for 2011-2013.

Table 6. Species Composition (by value) by the 11 vessels that accounted for 75% of total mackerel harvest by weight 2006-2010.

Species	For Primary Mackerel Vessels, percent of total revenue that came from various species.
Atlantic Herring	41%
Atlantic Mackerel	32%
Illex	19%
Loligo	4%
Other	1%

Source: unpublished NEFSC dealer reports

Note: Due to the low 2011-2013 landings this table was not updated for 2011-2013.

Table 7. Species Composition (by value) by the 11 vessels that accounted for 75% of total mackerel harvest by weight 2001-2005.

Species	For Primary Mackerel Vessels, percent of total revenue that came from various species.
Atlantic Herring	43%
Atlantic Mackerel	42%
Illex	9%
Squid	4%
Other	2%

Source: unpublished NEFSC dealer reports

DEALER INFORMATION

Table 8. Dealer Dependence on Mackerel 2008-2010 by dealers purchasing at least \$1,000 mackerel over 2008-2010.

Number of Dealers	Relative Dependence on Mackerel	Average Mackerel Purchased
62	<5%	\$5,456
3	5%-10%	\$360,526
2	10%-25%	\$834,519
4	25%-50%	\$547,148
2	50%-75%	\$268,757

Source: unpublished NEFSC dealer reports

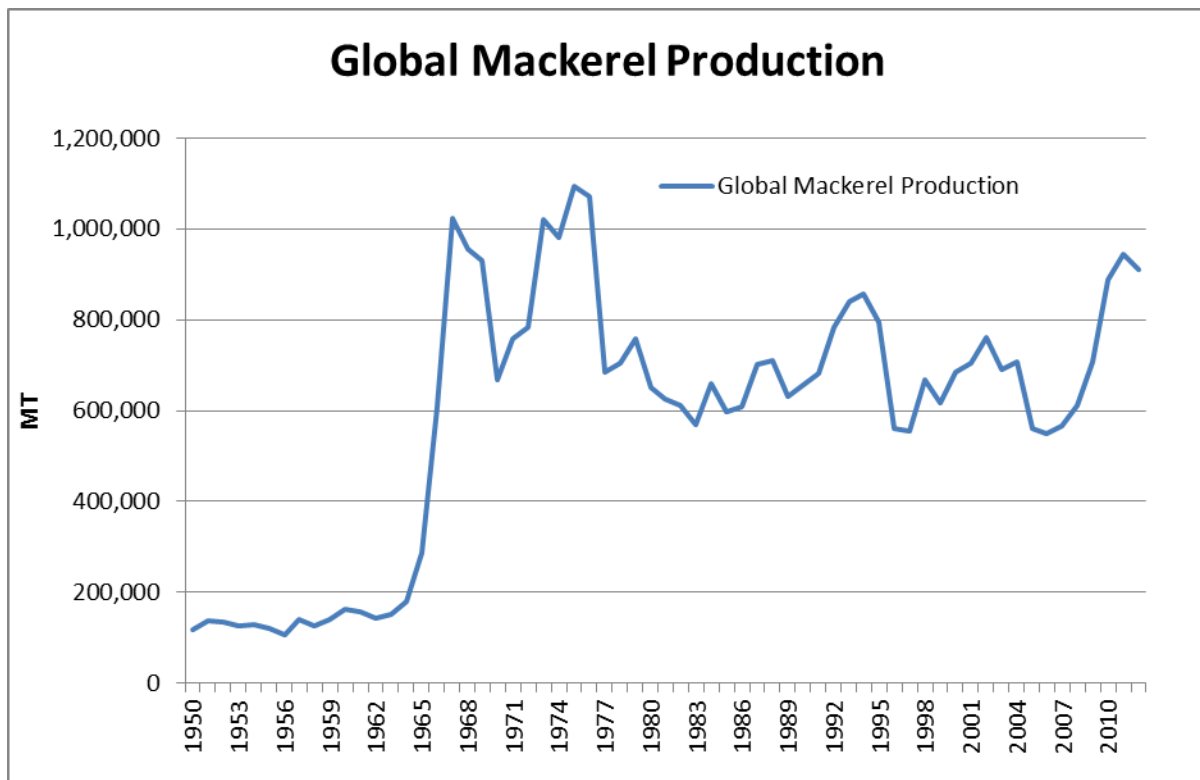
Note: Due to the low 2011-2013 landings this table was not updated for 2011-2013.

Recreational Fishery

Recreational catches in recent years have been focused in MA, NH, and Maine (mostly private/rental boats and from shore in Maine). There are also intermittent directed fisheries in the Mid-Atlantic (especially N. New Jersey and Long Island) but these have occurred primarily in Jan-Feb in recent years (there is no marine recreational data collection in Jan-Feb from VA to ME). Recreational harvest estimates averaged 828mt from 2004-2013 and ranged from 465 mt - 1491 mt during that same time period. Since mackerel are encountered relatively infrequently, the estimates have relatively low precision.

6.6.1.5.1 World Production and Prices

The nature of future mackerel supply depends largely on the future production of the European mackerel stock, which is much greater than the U.S./Canadian stock.



Source: FAO.

Figure 9. World production of Atlantic mackerel, 1950-2012 based on FAO (2013).