

Forecast for the 2009

Gulf and Atlantic Menhaden Purse-Seine Fisheries and Review of the 2008 Fishing Season

March 2009

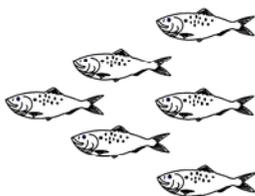
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INTRODUCTION

The 2009 fishing year is the thirty-seventh year for which quantitative forecasts of purse-seine landings of gulf and Atlantic menhaden have been made by the National Marine Fisheries Service. The forecasts are based on a multiple regression equation that relates landings and fishing effort over a series of years. Our 2009 forecasts of landings are conditioned on estimates of expected fishing effort for the upcoming fishing year. Estimates of fishing effort are vessel-specific and are derived from 1) industry input, that is, the number of vessels that companies expect to be active during the upcoming fishing year, and 2) historical performance (catch and effort) of the vessels expected to participate in the fishery. In the Atlantic menhaden fishery, actual purse-seine landings have differed an average of 13% from those forecast for the thirty-five year period, 1973-2008. Landings in the gulf menhaden fishery have differed from those forecast by an average of 15% for the same period. In this forecast report, we review the 2008 gulf and Atlantic menhaden fishing seasons in terms of:

- landings and fleet size,
- age composition of the catch,
- status of the 2008 forecasts, and

we forecast landings for the 2009 gulf and Atlantic menhaden fishing seasons.



GULF MENHADEN FISHERY

Gulf Menhaden Landings, Fishing Conditions, and Vessel Participation in 2008

Final purse-seine landings of gulf menhaden for reduction in 2008 amounted to 425,442 metric tons (1,400 million standard fish). This is down 6% from total landings in 2007 (453,832 t), and down 9% from the previous five-year mean (467,565 t) (Fig. 1). Landings in 2008 were the lowest reported since 1992 (421,436 t), and the second lowest since 1968 (371,900 t).

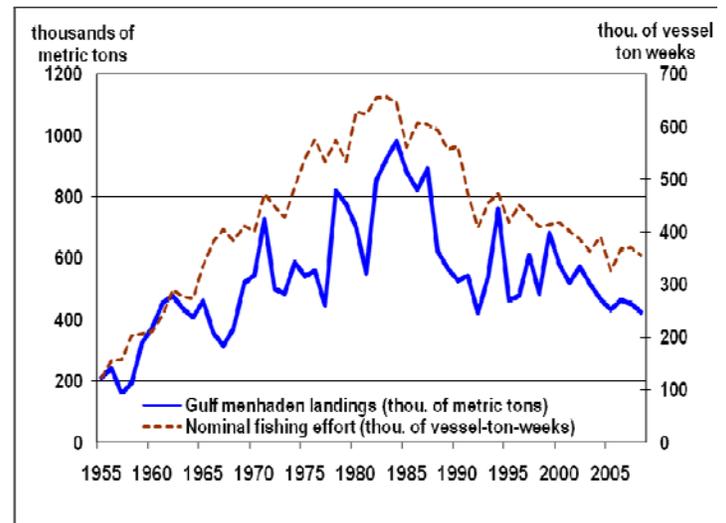


Figure 1. Gulf menhaden landings and nominal fishing effort, 1955-2008.

Gulf menhaden landings by month during 2008 were unimodal with peak landings in July, but with an upswing in landings during October (Fig. 2). Landings in April (29,100 t) were fair and slightly better than monthly landings for the previous three years. Landings in May 2008 (54,600 t) improved, but were only slightly greater than monthly landings for the previous two years. Landings in June 2008 climbed to 95,700 t, then landings in July peaked for the fishing season at 98,700 t.

Landings declined in August (75,600 t), and fell dramatically in September (24,100 t). Landings in October (48,800 t) improved considerably over the previous month.

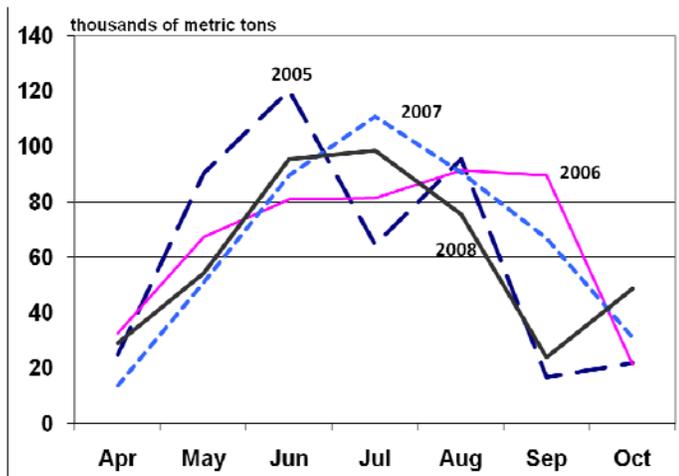


Figure 2. Gulf menhaden landings by month, 2005-2008.

The 2008 gulf menhaden season opened on April 21 with four fish factories active: Moss Point, Mississippi, and Empire, Abbeville, and Cameron, Louisiana. As in 2007, most factories again had difficulties crewing vessels in their respective fleets to begin fishing operations. Weather in the northern Gulf of Mexico for the first few weeks of the fishing season was fair. Catches were good especially off central and eastern Louisiana. Fish oil yields were good, as they were throughout 2008. Weather was windy and wet during mid- to late May and catches were only fair. Good weather prevailed in June and July, catches peaked in July, and landings improved commensurately. The Empire fleet lost several days of fishing in late July because a tanker-fuel barge collision closed the lower Mississippi River. Also, Hurricane Dolly struck near Brownsville, TX, in late July, and the vessels at Cameron and Abbeville lost fishing time because of large ground swell and high winds.

Good catches continued in early August, but rain and high winds from Tropical Storm Faye during the latter half of August hampered fishing efforts from Moss Point and Empire. During the first week of September Hurricane Gustav made landfall near the Houma-Morgan City area of central Louisiana. Vessels from all ports lost considerable fishing time. Gulf menhaden factories generally reported only minor damage from the storm, but frequent power outages after the storm slowed shore-side processing.

Hurricane Ike made landfall near Galveston, TX, on September 13th and caused major flooding at the fish plants in Cameron and Abbeville. The factory at Cameron closed for the remainder of 2008, and its vessels were re-assigned to the plants at Moss Point and Abbeville through the end of the fishing season; the factory at Abbeville required considerable repairs, but was operational about two weeks after the storm. The fish plant at Empire reported little damage, however, a nearby levee was breached, making highway access to the plant difficult.

Catches during October were surprisingly good. Landings in October 2008 of 48,800 t were the best for that month since 2003 when 54,000 t were harvested.

A total of 41 vessels reported unloading gulf menhaden for reduction in 2008 - 39 regular steamers and two run boats. The run boats do not fish, but rather transfer menhaden from the fishing grounds to the factory. The lone menhaden-for-bait business (1 vessel) at Morgan City, LA, closed after the 2007 fishing season.

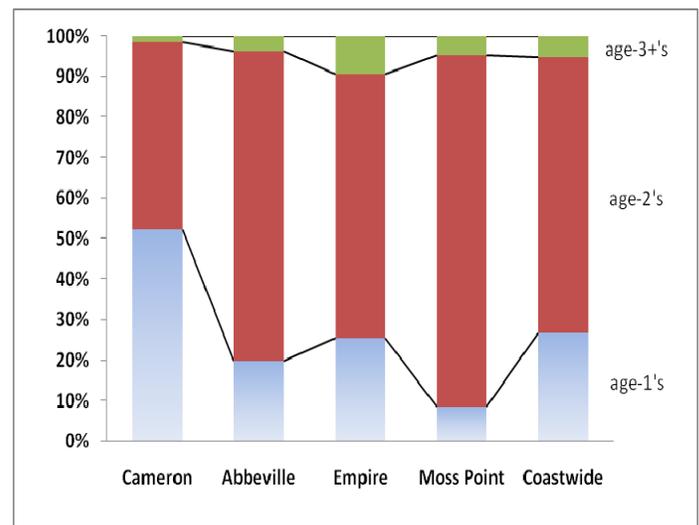


Figure 3. Percent estimated numbers at-age of gulf menhaden by port in 2008.

Age Composition of Gulf Menhaden in 2008

About 4,660 gulf menhaden were aged in the 2008 port samples (Fig. 3). From the catch-at-age matrix, coastwide age-2 fish (68%) outnumbered age-1 fish (27%) more than 2-to-1. At Moss Point age-2 gulf menhaden (87%) swamped age-1's (8%) in the catch. At Empire age-2 (65%) outnumbered age-1 fish (25%), and similarly at Abbeville age-2's (77%) predominated over age-1's

(20%). Only at Cameron did age-1 gulf menhaden (52%) outnumbered age-2 fish (46%). Comparisons of age compositions in the Gulf fishery for recent years are shown in Table 1.

Table 1. Percent age composition, estimated total numbers of fish caught, and total landings for the gulf menhaden fishery, 2004-2008 (* 2008 data are preliminary).				
Year	Age-1	Age-2	Est. total number of fish caught in billions	Landings in thou. of metric t
2008*	27%	68%	3.60	425.4
2007	46%	51%	4.75	453.8
2006	46%	47%	4.90	464.4
2005	44%	52%	4.51	433.8
2004	56%	35%	5.00	468.7

Fishing Effort in 2008 and Review of the 2008 Forecast for Gulf Menhaden

Nominal fishing effort for the gulf menhaden fishery during 2008 is estimated at 355,800 vessel ton weeks. This is down 4% from nominal fishing effort in 2007 (369,200 vessel ton weeks). The 2008 fishing season was the seventh consecutive year in which nominal fishing effort was less than 400,000 vessel ton weeks.

In March 2008, we anticipated that nominal fishing effort during 2008 could amount to 365,000 vessel ton weeks with 42 vessels participating in the fishery. With this level of anticipated fishing effort, we forecasted 2008 gulf menhaden landings of 460,000 t with 80% confidence levels of 339,000 and 582,000 t. Nominal fishing effort in 2008 (355,800 vessel ton weeks) was 3% less than we expected at the beginning of the fishing season. A "hindcast" using our forecast model and actual nominal fishing effort in 2008 produced a post-season forecast of 450,000 t with 80% confidence levels of 328,000 and 571,000 t. Actual landings of 425,442 t were 5% less than our post-season forecast.

Forecast for the 2009 Gulf Menhaden Fishing Season

We expect that four menhaden factories (Moss Point, MS, and Empire, Abbeville, and Cameron, LA) will process gulf menhaden in 2009. Our best estimate of vessel participation is for 41 vessels: 38 regular steamers and three run boats. Based on average nominal fishing effort for recent years by vessels expected to be active in 2009, we estimate that nominal fishing effort in 2009 may be about 355,000 vessel ton weeks. With 355,000 vessel ton weeks of effort, we forecast 2009 gulf menhaden landings of 443,000 t, with 80% confidence levels of 323,000 and 564,000 t (Fig. 4).

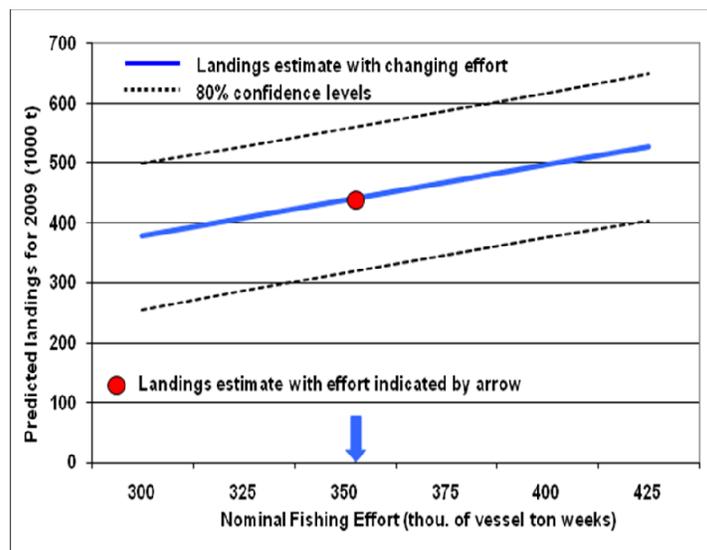


Figure 4. Forecast for the 2009 gulf menhaden fishery.



ATLANTIC MENHADEN FISHERY

Atlantic Menhaden Landings, Fishing Conditions, and Vessel Participation in 2008

Final catch information indicated that 2008 landings of Atlantic menhaden for reduction amounted to 141,133 t (464 million standard fish) (Fig. 5). This is 19% less than purse-seine landings for the 2007 season (174,455 t), and 15% less than average landings for the previous five years (165,634 t). As in the previous three years, only one menhaden factory, the plant at Reedville, VA (with 10 vessels), operated on the Atlantic coast in 2008. The fish factory in Beaufort, NC, closed after the 2004 fishing season.

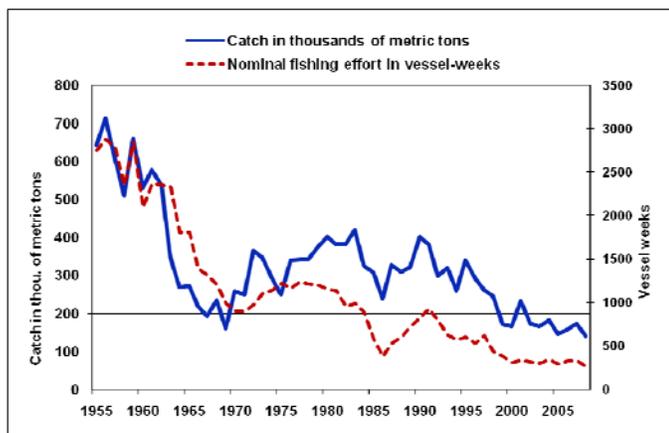


Figure 5. Atlantic menhaden landings and nominal fishing effort, 1955-2008.

Reduction fishing for Atlantic menhaden in 2008 started slowly, and landings during May were exceptionally low (575 t). Landings improved considerably in June (23,600 t) and July (30,200 t), and peaked in August (32,500 t) (Fig. 6). Landings declined during September (23,800 t), rose slightly in October (29,700 t), then declined sharply in November (6,100 t) and December (3,800 t).

As in recent years, winter 2007-08 was relatively mild. Pound nets in Chesapeake Bay again made fair catches of Atlantic menhaden in March and April 2008. Adult menhaden were reportedly caught in Delaware Bay in mid-March. Local newspapers reported menhaden in Narragansett Bay, Rhode Island, by April 14th. Remarkably, schools of menhaden appeared near Casco Bay, Maine, in late May and early June.

Initial landings for reduction in Chesapeake Bay were made on May 27. During June through early July, menhaden were very abundant in the Virginia

portion of Chesapeake Bay and catches were good, especially near the fish factory at Smith Point, the mouth of the Rappahannock River, and "down" Bay near Cape Charles. During July and August the fish factory developed substantial mechanical problems. Processing could not keep pace with catches; vessels often sat at the dock 1-2 days waiting to unload. Vessels were put on weekly and daily catch quotas through about late August, and one vessel temporarily did not fish for several weeks.

Many of the processing difficulties at the factory were resolved by late August. Virginia vessels made good catches off central and southern New Jersey during July and August. Spotter pilots reported large concentrations of menhaden schools 10-15 miles off the New Jersey coast throughout summer. Catches off New Jersey in mid-August were noteworthy in that some sets were made up to 30 miles offshore. Good fishing resumed in Chesapeake Bay in mid-September, and the Virginia fleet made good catches off Delaware Bay and the Delmarva Peninsula through mid-October. Fishing was slow late October through early November. During mid-November the Virginia fleet fished as far south as Ocracoke and Drum inlets, North Carolina, on fall-migratory schools. Weather in late November was windy. Final catches for the season occurred off the northern Outer Banks during the first week of December; final sets of the season occurred on December 5th. The factory at Reedville 'cut-out' for the year on December 12th.

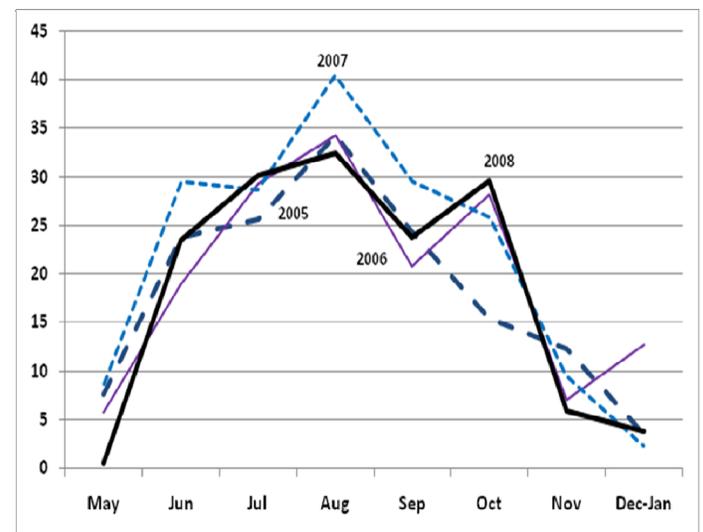


Figure 6. Atlantic menhaden landings by month, 2005-2008.

Summer 2008 was the fourth consecutive year in which adult menhaden were abundant in nearshore waters of southern New England. By late June, the RI Department of Environmental Management estimate that twice as many menhaden (24 million lbs) entered Narragansett Bay in 2008 versus the previous summer. Two bait purse-seine vessels made good catches in Narragansett Bay throughout June and July. By early August, most menhaden moved up into adjacent river systems where they were unavailable to the fishery.

By mid-July good gill net catches of adult menhaden were reported from Casco Bay, Maine, and several small herring seiners made sets on menhaden schools near Cumberland, Harpswell, and New Meadows River. Two bait seiners from Rhode Island moved to southern Maine in early August, and one vessel made good catches off Old Orchard Beach; some of the catch was transferred to Gloucester, Massachusetts, by 'run boat'. After persistent rain in mid-August which lowered salinities and increased turbidity in Casco Bay and vicinity, menhaden schools scattered into small bunches and were difficult to locate.

Also noteworthy in 2008 were the size, frequency, and seasonality of menhaden kills along the East coast. In northern New Jersey numerous fish kills were reported in mid-April and were attributed to the bacterium, *Vibrio* spp. In Riverhead, New

Carolina, and New Jersey. Even a winter kill was reported from Pawleys Island, South Carolina, on January 26th, 2009.

Eleven vessels reported landing Atlantic menhaden for reduction in 2008. Ten large purse-seine vessels fished regularly from the fish factory at Reedville. One bait vessel, or "snapper" rig, occasionally unloaded its catch at the reduction factory.

Age Composition of Atlantic Menhaden in 2008

About 2,200 Atlantic menhaden were sampled for size and age from the 2008 reduction fishery. From the catch-at-age matrix, coastwide age-2 fish (71%) outnumbered age-3+ fish (18%) by a wide margin (Table 2 and Figure 7). Age-1 fish (10%) ranked third, while age-0 fish represented 1% of the catch.

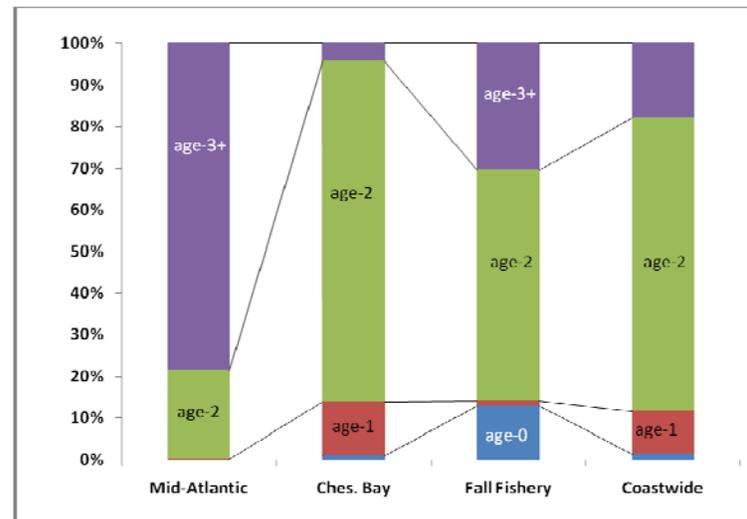


Figure 7. Percent estimated numbers at-age of Atlantic menhaden by area in 2008.

Catches off the coasts of New Jersey and Delaware during 2008 consisted mostly of age-3 (67%), age-2 (21%), and age-4 (11%) Atlantic menhaden. Catches from Chesapeake Bay and ocean areas near the mouth of the Bay during summer were dominated by age-2 menhaden (82%); age-1's represented only 13% of the catch. During the fall fishery off Virginia and North Carolina, age-2 (56%) fish predominated, followed by age-3's (28%) and age-0's (13%).

About 1,300 Atlantic menhaden were sampled for size and age from the bait fisheries on the East coast during 2008. Overall bait samples were nearly equally distributed between age-2 (40%)

Table 2. Percent age composition of the reduction catch in the Atlantic menhaden fishery, 2004-2008.

Year	Age-0	Age-1	Age-2	Age-3+
2008	1%	10%	71%	18%
2007	<1%	26%	65%	9%
2006	1%	40%	40%	19%
2005	2%	12%	59%	27%
2004	2%	22%	67%	9%

York, a massive fish kill, up to 300,000 adult menhaden, occurred on May 4th. Kills of young-of-the-year menhaden were documented in Delaware estuaries in mid-June and July. Additional kills in mid-summer were observed in Georgia, North

and age-3 fish (46%). Age-2 menhaden (85%) dominated bait samples in Virginia, while age-3 fish predominated in samples from New Jersey (56%), Rhode Island (59%), and Maine (72%).

The high proportion of age-3 Atlantic menhaden in the fisheries from New Jersey and north last year suggests that the 2005 year class as age-4 fish in 2009 may be a dominant component of the fishery in New England this coming summer.

Fishing Effort in 2008 and Review of the 2008 Forecast for Atlantic Menhaden

During 2008, eleven purse-seine vessels (10 regular steamers and one "snapper" boat) unloaded Atlantic menhaden for reduction, and nominal fishing effort was estimated at 262 vessel weeks, down from 333 vessel weeks expended in 2007. The decrease in nominal effort is primarily because of factory problems at Reedville, a 'late' start for the fishery in May, reduced number of "snapper" boats unloading for reduction, and poor weather conditions in November and December.

Last March, we anticipated that nominal fishing effort in 2008 could amount to 310 vessel weeks, and we forecasted 2008 Atlantic menhaden landings of 185,000 t with 80% confidence levels of 117,000 and 254,000 t. According to the historical relationship of landings and fishing effort for the Atlantic menhaden fishery, nominal fishing effort of 262 vessel weeks produced a post-season forecast of 176,000 t with 80% confidence levels between 107,000 and 245,000 t. Actual landings of 141,133 t were 20% less than our post-season forecast.

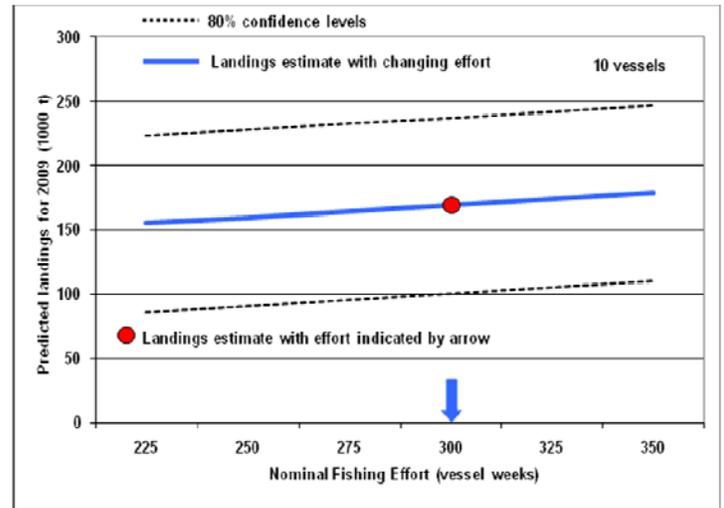


Figure 8. Forecast for the 2009 Atlantic menhaden fishery.

Forecast for the 2009 Atlantic Menhaden Fishing Season

In 2009, we expect that the fish factory in Reedville, VA, with a total of ten vessels, will be the only menhaden reduction plant active on the Atlantic coast. We estimate that nominal fishing effort in 2009 could amount to 300 vessel weeks. With this level of fishing effort, we forecast 2009 Atlantic menhaden landings of 169,000 t with 80% confidence levels of 100,000 and 237,000 t (Fig. 8).

Combined 2008 Gulf and Atlantic Menhaden Landings

Combined landings by the gulf and Atlantic menhaden purse-seine fisheries for reduction during the 2008 calendar year amounted to 1.25 billion pounds, down from landings during the 2007 calendar year which amounted to 1.39 billion pounds.

Fishing effort and landings in the gulf menhaden purse-seine fishery, 1955-2008.

Year	Fishing effort vessel-ton-weeks	Landings 1000 metric tons	Year	Fishing effort vessel-ton-weeks	Landings 1000 metric tons
1955	122.9	213.3	1982	653.8	853.9
1956	155.1	244.0	1983	655.8	923.5
1957	155.2	159.3	1984	645.9	982.8
1958	202.8	196.2	1985	560.6	881.1
1959	205.8	325.9	1986	606.5	822.1
1960	211.7	376.8	1987	604.2	894.2
1961	241.6	455.9	1988	594.1	623.7
1962	289.0	479.0	1989	555.3	569.6
1963	277.3	437.5	1990	563.1	528.3
1964	272.9	407.8	1991	472.3	544.3
1965	335.6	461.2	1992	408.0	421.4
1966	381.3	357.6	1993	455.2	539.2
1967	404.7	316.1	1994	472.0	761.6
1968	382.8	371.9	1995	417.0	463.9
1969	411.0	521.5	1996	451.7	479.4
1970	400.0	545.9	1997	430.2	611.2
1971	472.9	728.5	1998	409.3	486.2
1972	447.5	501.9	1999	414.5	684.3
1973	426.2	486.4	2000	417.6	579.3
1974	485.5	587.4	2001	400.6	521.3
1975	538.0	542.6	2002	386.7	574.5
1976	575.8	561.2	2003	363.2	517.1
1977	532.7	447.1	2004	390.5	468.7
1978	574.3	820.0	2005	326.0	433.8
1979	533.9	777.9	2006	367.2	464.4
1980	627.6	701.3	2007	369.2	453.8
1981	623.0	552.6	2008	355.8	425.4

Fishing effort and landings in the Atlantic menhaden purse-seine fishery, 1955-2008.

Year	Fishing effort vessel-weeks	Landings 1000 metric tons	Year	Fishing effort vessel-weeks	Landings 1000 metric tons
1955	2748	641.4	1982	948	382.4
1956	2878	712.1	1983	995	418.6
1957	2775	602.8	1984	892	326.3
1958	2343	510.0	1985	577	306.7
1959	2847	659.1	1986	377	238.0
1960	2097	529.8	1987	531	327.0
1961	2371	575.9	1988	604	309.3
1962	2351	537.7	1989	725	322.0
1963	2331	346.9	1990	826	401.2
1964	1807	269.2	1991	926	381.4
1965	1805	273.4	1992	794	297.6
1966	1386	219.6	1993	626	320.6
1967	1316	193.5	1994	573	260.0
1968	1209	234.8	1995	600	339.9
1969	995	161.6	1996	528	292.9
1970	906	259.4	1997	616	259.1
1971	897	250.3	1998	437	245.9
1972	973	365.9	1999	382	171.2
1973	1099	346.9	2000	311	167.2
1974	1145	292.2	2001	334	233.7
1975	1218	250.2	2002	318	174.0
1976	1163	340.5	2003	302	166.1
1977	1239	341.1	2004	345	183.4
1978	1210	344.1	2005	291	146.9
1979	1198	375.7	2006	322	157.4
1980	1158	401.5	2007	333	174.5
1981	1133	381.3	2008	262	141.1

