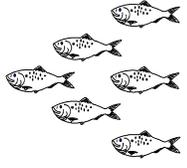




Forecast for the 2007 Gulf and Atlantic Menhaden Purse-Seine Fisheries and Review of the 2006 Fishing Season



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by the
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National Marine Fisheries Service - Beaufort

INTRODUCTION

The 2007 fishing year is the thirty-fifth 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 2007 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 (Fig. 1) have differed an average of 14% from those forecast for the thirty-four year period, 1973-2006. 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 2006 gulf and Atlantic menhaden fishing seasons in terms of

- landings and fleet size,
- age composition of the catch,
- status of the 2006 forecasts, and

we forecast landings for the 2007 gulf and Atlantic menhaden fishing seasons.

GULF MENHADEN FISHERY

Gulf Menhaden Landings, Fishing Conditions, and Vessel Participation in 2006

Final purse-seine landings of gulf menhaden for reduction in 2006 amounted to 464,393 metric tons (1,528 million standard fish). This is up 7% from total landings in 2005 (433,784 t), and down 8% from the previous five-year mean (503,098 t) (Fig. 1). Landings in 2006 were the second lowest reported since 1995, and follow in the wake of the 2005 fishing season and the two major hurricanes which struck the Gulf Coast.

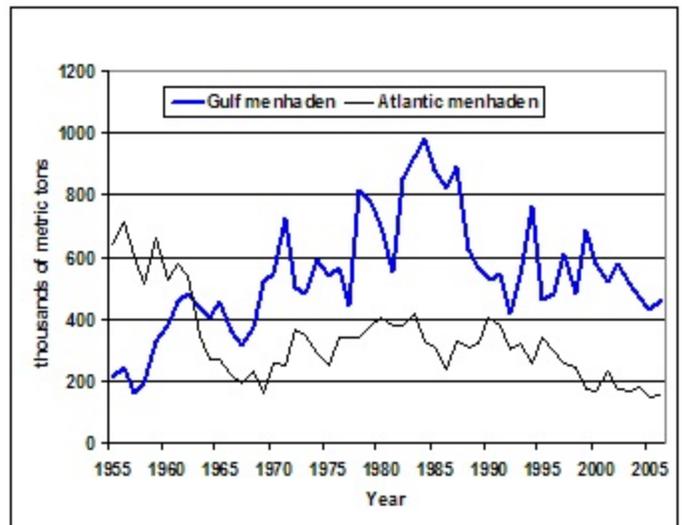


Figure 1. Gulf and Atlantic menhaden landings, 1955-2006.

Gulf menhaden landings by month during summer 2006 were rather flat-topped (Fig. 2). Landings in April (32,600 t) were above those for the previous three years, while landings in May (67,300 t) tended toward the lower end of the range for recent fishing seasons. Landings in June climbed to 81,000 t, then landings in July leveled off at 81,400 t. Landings in August climbed slightly to 91,300 t, then plateaued again in September at 89,400 t. Landings in October fell precipitously to 21,400 t.

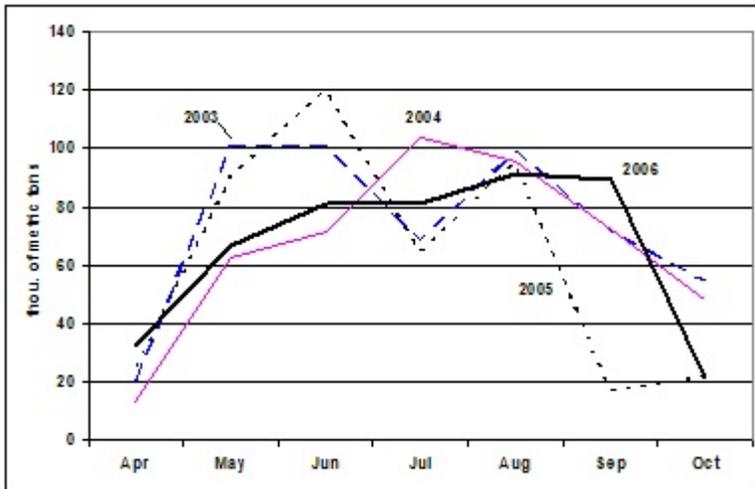


Figure 2. Gulf menhaden landings by month, 2003-2006.

Total landings of gulf menhaden in 2006 (7% above those of 2005) are noteworthy considering the damage suffered by the menhaden industry from hurricanes in 2005. The fish factory at Empire, LA, suffered severe damage from Hurricane Katrina in late August 2005 and did not operate for the remainder of the fishing season. Likewise, the fish factory at Cameron, LA, sustained heavy damage from Hurricane Rita in late September, and it too closed for the rest of the year. The factories at Moss Point, MS, and Abbeville, LA, also suffered considerable damage, but managed to process fish on a limited basis during the waning weeks of the 2005 fishing season. The fact that all four menhaden factories were back on line by mid-June 2006 - with total landings comparable to recent years - is quite remarkable.

The 2006 gulf menhaden season opened on April 17 with three of four fish factories operational. The factory at Moss Point had good catches for the first two weeks of the season, while supporting two visitor vessels from the Cameron plant. The factory at Abbeville had record-high catches for April and supported up to six vessels from the Cameron plant. The factory at Empire had start-up difficulties in April, but began processing fish regularly by early May. Unfortunately, the Empire flood gate - damaged during the hurricane - was not repaired until summer; this limited the Empire fleet's access to western Louisiana fishing grounds. Best catches during the first month of the season occurred offshore of the Dulac-Morgan City area. Fair weather prevailed in late May and early June. By mid-June, the factory at Cameron re-opened and recalled its vessels from the other factories.

Catches during summer 2006 were fair. Despite the lack of tropical cyclone activity in the northern Gulf of Mexico last summer, menhaden fleet activity was hampered by sporadic windy and wet weather. Freshwater runoff often caused nearshore waters to turn turbid, making fish spotting difficult. Throughout summer, best catches tended to occur along the western Louisiana coast. Numerous cold fronts and windy weather also made purse-seining operations difficult during late September and October. Few landings occurred at any of the gulf menhaden factories during the latter half of October. Low fish oil yields across the northern Gulf were reported for most of the 2006 fishing season.

As in recent years, four menhaden reduction factories were active on the Gulf Coast in 2006: Moss Point in Mississippi, and Empire, Abbeville, and Cameron in Louisiana. However, due to the hurricanes of 2005, the factory at Empire did not process fish at full capacity until May, and the factory at Cameron did not come on line until mid- June.

A total of 41 vessels reported unloading gulf menhaden for reduction in 2006 - 39 regular steamers, one run boat, and one bait boat. The run boat did not fish, but rather transferred menhaden from the fishing grounds to the factory. The bait vessel unloaded menhaden primarily for bait, but occasionally unloaded at a reduction plant. Prior to re-starting the factory at Cameron in mid-June, most of the Cameron vessels were assigned to the plants in Abbeville or Moss Point. In 2005, 43 vessels unloaded gulf menhaden for reduction: 40 steamers, two run boats, and one bait boat.

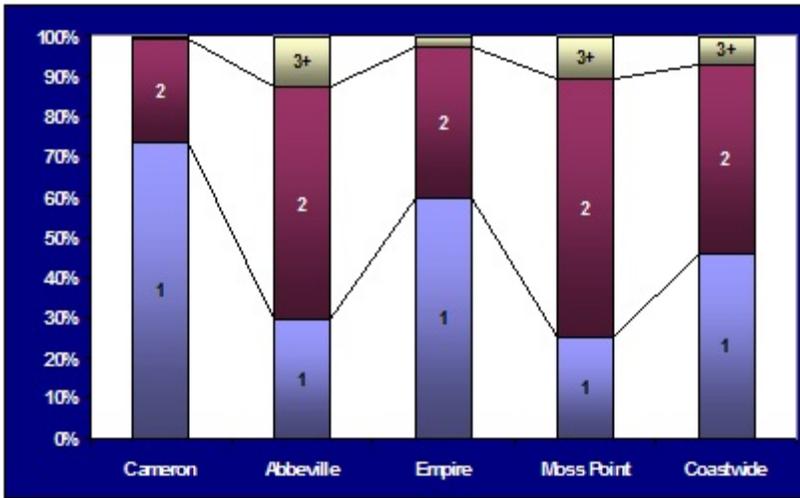


Figure 3. Percent estimated numbers of gulf menhaden caught at-age by port in 2006.

Age Composition of Gulf Menhaden in 2006

About 4,700 gulf menhaden were aged from the 2006 port samples (Fig. 3). From the catch-at-age matrix (not the ‘raw’ port samples), coastwide, age-1 fish (46%) and age-2 fish (47%) were almost equally represented. At Moss Point age-2 gulf menhaden comprised 64% of the port samples, while age-1's comprised 25%. At Empire age-1 fish (60%) were more numerous than age-2 fish (38%). At Abbeville age-2's (58%) predominate over age-1's (29%) by two-to-one, while at Cameron age-1 gulf menhaden (73%) outnumbered age-2 fish (26%) by almost three-to-one. 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, 2002-2006 (* 2006 data are preliminary).

Year	Age-1	Age-2	Est. total number of fish caught in billions	Landings in thou. of metric t
2006*	46	47	4.92	464.4
2005	44	52	4.51	433.8
2004	56	35	5.00	468.7
2003	36	57	5.28	517.1
2002	32	57	4.99	574.5

Fishing Effort in 2006 and Review of the 2006 Forecast for Gulf Menhaden

Nominal fishing effort for the gulf menhaden fishery during 2006 is estimated at 367,200 vessel-ton-weeks; this is 13% more than nominal fishing effort of 326,000 vessel-ton-weeks expended in 2005 (when two major hurricanes struck the Gulf), yet comparable to the 363,200 vessel-ton-weeks fished in 2003. That said, nominal fishing effort in 2006 was the third lowest value measured since 1965 when 335,600 vessel-ton-weeks were expended.

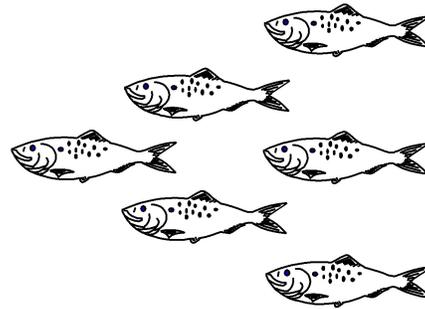
In March 2006, we anticipated that nominal fishing effort during 2006 could amount to 350,000 vessel-ton-weeks with 42 vessels participating in the fishery. With this level of anticipated fishing effort, we forecast 2006 gulf menhaden landings of 459,000 t with 80% confidence levels of 335,000 and 583,000 t. Nominal fishing effort in 2006 (367,200 vessel-ton-weeks) was 5% greater than we expected at the beginning of the fishing season. A “hindcast” using our forecast model and actual nominal

fishing effort in 2006 produced a post-season forecast of 478,000 t with 80% confidence levels of 353,000 and 602,000 t. Actual landings of 464,393 t were 3% less than our post-season forecast.

Forecast for the 2007 Gulf Menhaden Fishing Season

We expect that four menhaden factories (Moss Point, MS, and Empire, Abbeville, and Cameron, LA) will process gulf menhaden in 2007. Our best estimate of vessel participation is for 43 vessels: 40 regular steamers, two run boats, and one bait vessel. Based on average nominal fishing effort for recent years by vessels expected to be active in 2007, we expect that nominal fishing effort in 2007 may be about 375,000

regional landings could be best toward the central Gulf ports of Empire and Abbeville.



ATLANTIC MENHADEN FISHERY

Atlantic Menhaden Landings, Fishing Conditions, and Vessel Participation in 2006

Final catch information indicated that 2006 landings of Atlantic menhaden for reduction through January 2007 amounted to 157,385 t (518 million standard fish) (Fig. 1). This was 7% more than purse-seine landings for the 2005 season (146,860 t), but 13% less than average landings for the previous five years (180,833 t). As in 2005, only one menhaden factory, the plant at Reedville, VA (with 11 vessels), operated on the Atlantic coast in 2006. The fish factory in Beaufort, NC, has not operated since the 2004 fishing season.

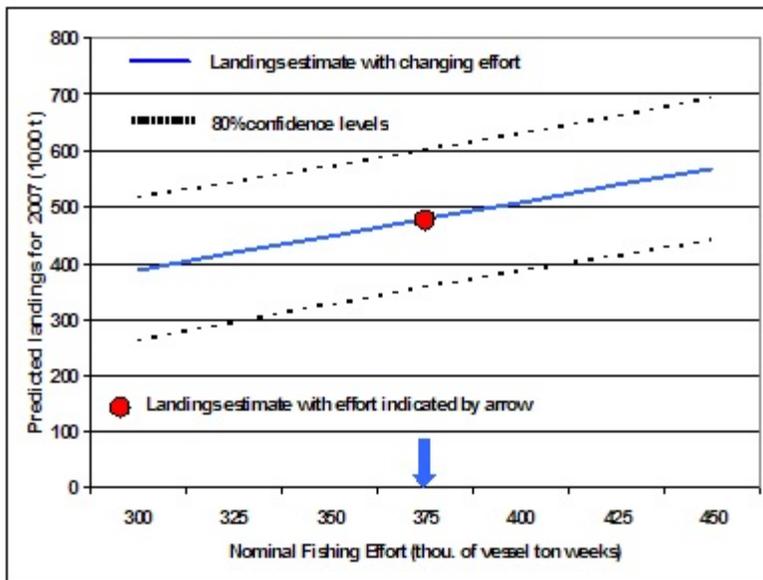


Figure 4. Forecast for the 2007 gulf menhaden fishery.

vessel ton weeks. With 375,000 vessel ton weeks of effort, we forecast 2007 gulf menhaden landings of 478,000 t, with 80% confidence levels of 356,000 and 600,000 t (Fig. 4). If the 2005 year class of gulf menhaden (as age-1 fish in 2006) is as strong as last year's age composition data suggests (46% of the catch-at-age in numbers), then landings for 2007 could be appreciably greater than the forecast value;

Atlantic menhaden landings were fair in May (5,800 t), rose throughout June (19,000 t) and July (29,400 t), and peaked in August (34,300 t) (Fig. 5). Landings declined during September (20,900 t), rebounded in October (28,200 t), then fell to lower levels in November (7,100 t) and December (12,700 t).

Winter 2005-06 was relatively mild. Pound nets in Chesapeake Bay made fair catches of Atlantic menhaden in March and April 2006. Surprisingly, port agents in New England reported

significant catches of large menhaden in fish traps in Rhode Island and Massachusetts by mid-May. Purse-seine catches for bait were reported off Massachusetts during late May. These observations are noteworthy - one, because 2006 was the second consecutive year in which adult menhaden were reported as abundant in nearshore waters of southern New England, and two, because May was relatively early in the calendar year for adult menhaden to occur in New England waters, especially north of Cape Cod.

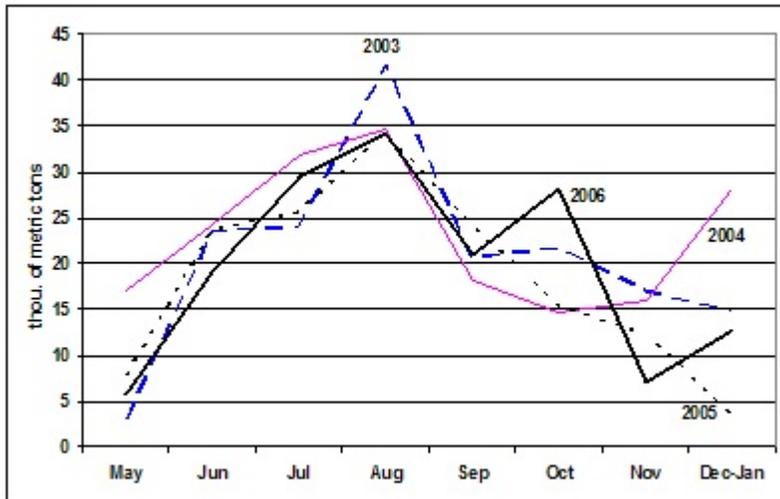


Figure 5. Atlantic menhaden landings by month, 2003-2006.

Weather during early May in Virginia was wet and windy. The first sets on menhaden by the Virginia “snapper” (= bait) vessels were on May 10. Initial catches by reduction vessels in Chesapeake Bay, which were generally low, occurred on May 17-18 and 25-26.

Virginia reduction vessels made good catches of adult menhaden off New Jersey and Delaware during late May and early June; this is the earliest the Virginia fleet fished in the Mid-Atlantic since the mid-1990s. Good fishing off southern New Jersey continued through June. Purse-seine sets in Chesapeake Bay during early June were scattered down the mainstem of the Bay; sets were concentrated near the Bay mouth and along the oceanside of Eastern Shore during the latter half of the month.

Schools of Atlantic menhaden finally showed in good concentrations in the mainstem of Chesapeake Bay beginning in mid-July through August, however, a majority of the sets continued to be located near the Bay mouth between Lynnhaven and Cape Charles. Some fishing also continue off southern New Jersey five to ten miles offshore.

Tropical Storm Ernesto visited Chesapeake Bay over Labor Day weekend; Northern Neck Virginia experienced considerable flooding and structural damage. In mid-September Hurricane Florence skirted Bermuda and sent high winds and swell toward the US East Coast. As in May and June, menhaden did not show well in Chesapeake Bay during September and October, and most sets during these months were made off New Jersey and the Delmarva Peninsula. Good catches of menhaden for bait continued in Long Island Sound during September, and as in recent years “peanuts” or age-0 menhaden were again abundant in nearshore waters of southern New England during fall 2006.

Some sets were made in Chesapeake Bay during November, but rain and wind plagued fishing operations during the latter half of the month. Fog beset the Virginia fleet during early December. By mid-month, good catches were made in the ocean off Cape Henry to Rudee Inlet until December 18. No menhaden were caught through December 31, and the last purse-seine set of the fishing season occurred on January 3 beyond 3 miles off Virginia Beach. The fish factory at Reedville ‘cut-out’ for the season on January 5. No menhaden were caught off the North Carolina Outer Banks for reduction during November through January.

Like the previous year, winter 2006-07 has been relatively mild, save for February. Anecdotal accounts from sources in various coastal fisheries suggest large concentrations of menhaden have again overwintered near the mouth of Chesapeake Bay and off the Virginia capes.

Fourteen vessels reported landing Atlantic menhaden for reduction in 2006. Eleven large purse-seine vessels fished regularly from the port of Reedville. Three small bait vessels, or “snapper” rigs, unloaded their catch infrequently at the reduction plant during summer and fall.

Age Composition of Atlantic Menhaden in 2006

About 3,400 Atlantic menhaden have been aged from the 2006 port samples. Although data for 2006 are still preliminary, the catch-at-age matrix indicates that coastwide, age-1 fish (42%) slightly outnumbered age-2 fish (40%) (Table 2 and Figure 6). Age-3 fish (14%) ranked a distant third, while age-0 fish represented only 1% of the catch.

Catches off the coasts of New Jersey and Delaware during 2006 consisted almost entirely of age-2 (48%), age-3 (40%), and age-4 (9%) Atlantic menhaden. Catches from Chesapeake Bay and ocean areas near the mouth of the Bay during summer slightly favored age-1 menhaden (47%) over age-2's (43%). During the fall fishery off the Virginia coast, age-1 (82%) fish predominated, followed by age-2's (10%) and age-0's (7%).

The high proportion of age-1 Atlantic menhaden in catches in Chesapeake Bay during summer 2006 (47% - versus a range of 3-23% during 2001-05) and off the Virginia capes in fall (82%) supports what was suspected last fall - that the 2005 year class of Atlantic menhaden is relatively strong compared to recent year classes. The 2005 year class as age-2 fish in 2007 may be a dominant component of the fishery in Chesapeake Bay this coming summer.

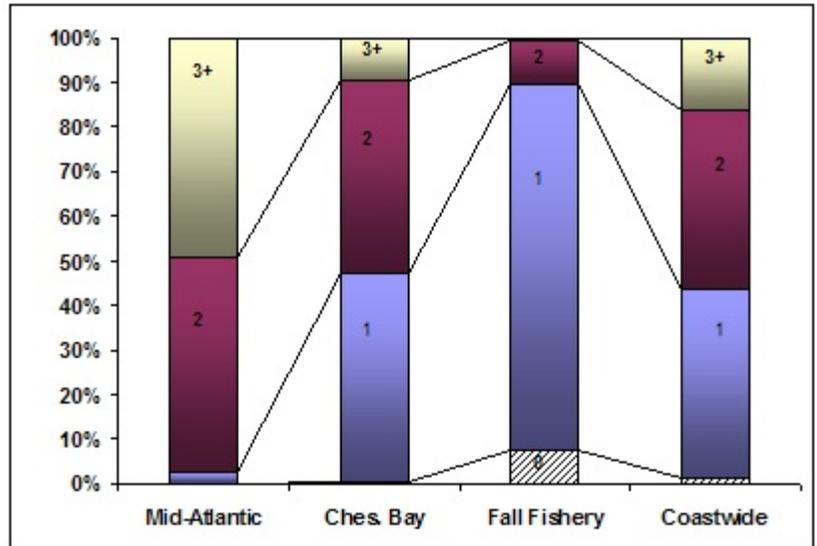


Figure 6. Percent estimated numbers of fish at age by Atlantic fishing areas in 2006.

Fishing Effort in 2006 and Review of the 2006 Forecast for Atlantic Menhaden

During 2006, fourteen purse-seine vessels (11 regular “steamers” and three “snapper” boats) unloaded Atlantic menhaden for reduction, and nominal fishing effort was estimated at 322 vessel weeks, up from 291 vessel weeks expended in 2005.

Last March, we anticipated that nominal fishing effort in 2006 could amount to 325 vessel weeks, and we forecasted 2006 Atlantic menhaden landings of 176,000 t with 80% confidence levels of 106,000 and 246,000 t. According to the historical relationship of landings and fishing effort for the Atlantic menhaden fishery, nominal

Table 2. Percent age composition of the catch in the Atlantic menhaden fishery, 2002-2006; data from 2006 are preliminary*.

Year	Age-0	Age-1	Age-2	Age-3+
2006*	1	42	40	17
2005	2	12	59	27
2004	2	22	67	9
2003	9	19	64	9
2002	22	26	32	20

fishing effort of 322 vessel weeks produced a post-season forecast of 175,000 t with 80% confidence levels between 105,000 and 245,000 t. Actual landings of 157,385 t were 10% less than our post-season forecast.

Forecast for the 2007 Atlantic Menhaden Fishing Season

In 2007, 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 2007 could reach 300 vessel weeks. With this level of fishing effort, we forecast 2007 Atlantic menhaden landings of 173,000 t with 80% confidence levels of 104,000 and 242,000 t (Fig. 7).

Combined 2006 Gulf and Atlantic Menhaden Landings

Combined landings by the gulf and Atlantic menhaden purse-seine fisheries for reduction during the 2006 calendar year amounted to 1.37 billion pounds, up slightly from landings during the 2005 calendar year which amounted to 1.29 billion pounds.

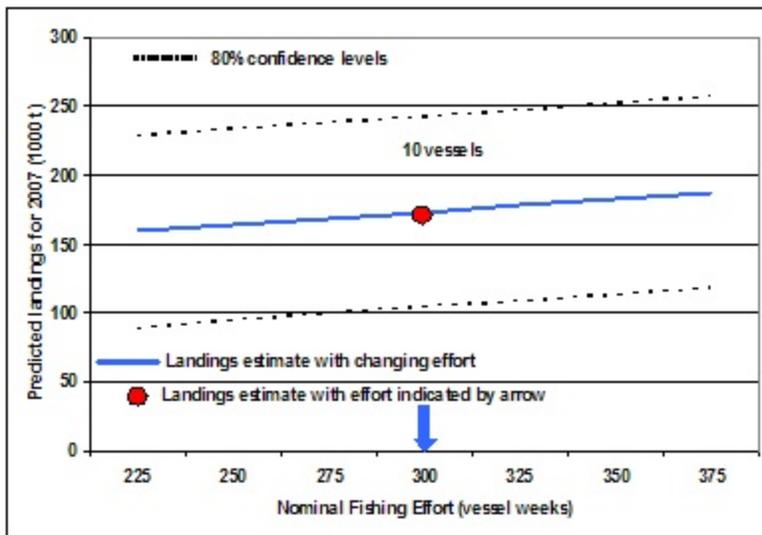


Figure 7. Forecast for the 2007 Atlantic menhaden fishery.

**Fishing effort and landings in the gulf menhaden purse-seine fishery,
1955-2006**

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

**Fishing effort and landings in the Atlantic menhaden purse-seine fishery,
1955-2006**

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

