



# Summer Flounder Fishery Information Document

June 2018

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This document provides a brief overview of the biology, stock condition, management system, and fishery performance for summer flounder with an emphasis on 2017, the most recent complete fishing year.

## 1. Biology

Summer flounder (*Paralichthys dentatus*) spawn during the fall and winter over the open ocean areas of the continental shelf. From October to May, larvae and postlarvae migrate inshore, entering coastal and estuarine nursery areas. Juveniles are distributed inshore and in many estuaries throughout the range of the species during spring, summer, and fall. Adult summer flounder exhibit strong seasonal inshore-offshore movements, normally inhabiting shallow coastal and estuarine waters during the warmer months of the year and remaining offshore during the colder months.

Summer flounder habitat includes pelagic waters, demersal waters, saltmarsh creeks, seagrass beds, mudflats, and open bay areas from the Gulf of Maine through North Carolina. Summer flounder are opportunistic feeders; their prey includes a variety of fish and crustaceans. While the natural predators of adult summer flounder are not fully documented, larger predators (e.g., large sharks, rays, and monkfish) probably include summer flounder in their diets.<sup>1</sup>

Spawning occurs during autumn and early winter, and the larvae are transported toward coastal areas by prevailing water currents. Development of post larvae and juveniles occurs primarily within bays and estuarine areas. Most fish are sexually mature by age 2. The largest fish are females, which can attain lengths over 90 cm (36 in) and weights up to 11.8 kg (26 lb). Recent NEFSC trawl survey data indicate that while female summer flounder grow faster (reaching a larger size at the same age), the sexes attain about the same maximum age (currently age 15 at 56 cm for males, and age 14 at 65 cm for females). Unsexed commercial fishery samples currently indicate a maximum age of 17 for an 85 cm fish (M. Terceiro, NEFSC, personal communication).

## 2. Status of the Stock

The most recent benchmark summer flounder stock assessment was completed and reviewed during the 57<sup>th</sup> Stock Assessment Workshop and Stock Assessment Review Committee (SAW/SARC 57).<sup>3</sup> This assessment uses a statistical catch at age model (the age-structured assessment program, or “ASAP” model). Stock assessment and peer review reports are available online at the Northeast Fisheries Science Center (NEFSC) website:

<http://www.nefsc.noaa.gov/saw/reports.html>.

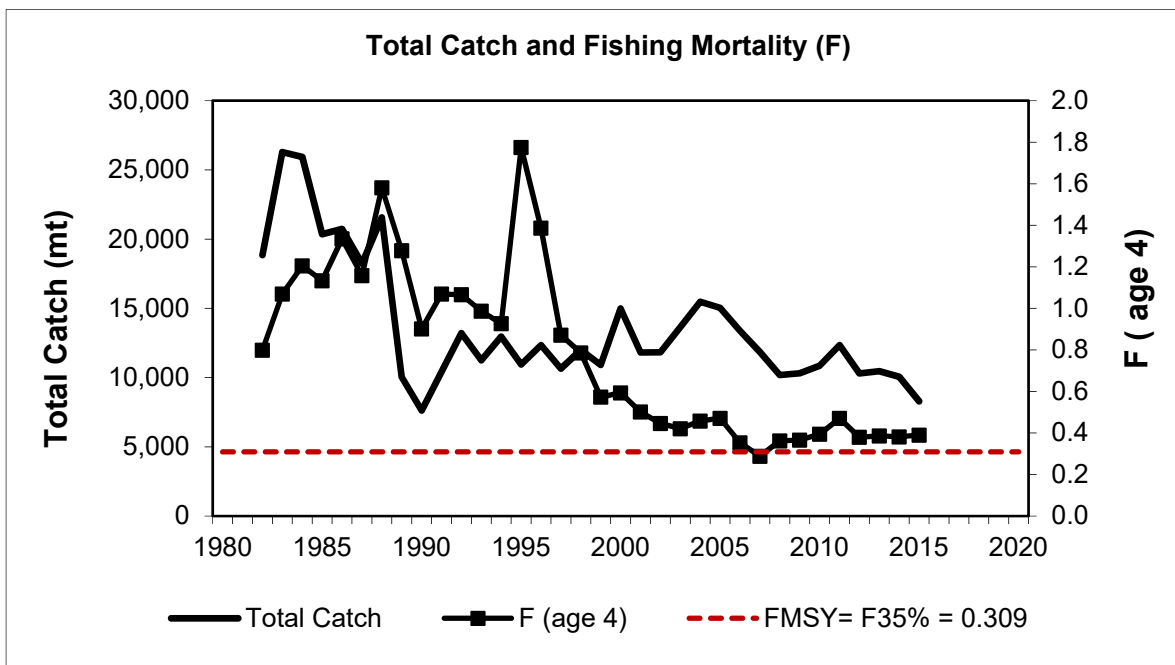
The last stock assessment update was completed by the NEFSC in June 2016, and incorporated data through 2015 into the population model used for the previous benchmark assessment. The 2016 assessment update indicated that the summer flounder stock was not overfished, but that overfishing was occurring in 2015, relative to the biological reference points established through the SAW/SARC 57 assessment. The model-estimated spawning stock biomass (SSB) was estimated to

be 79.90 million lb (36,240 mt) in 2015, 58% of the spawning stock biomass at maximum sustainable yield,  $SSB_{MSY} = 137.56$  million lb (62,394 mt). The fishing mortality rate (F) in 2015 was 0.390, 26% above the fishing mortality threshold reference point  $F_{MSYPROXY} = F_{35\%} = 0.309$  (Figure 1).<sup>4</sup>

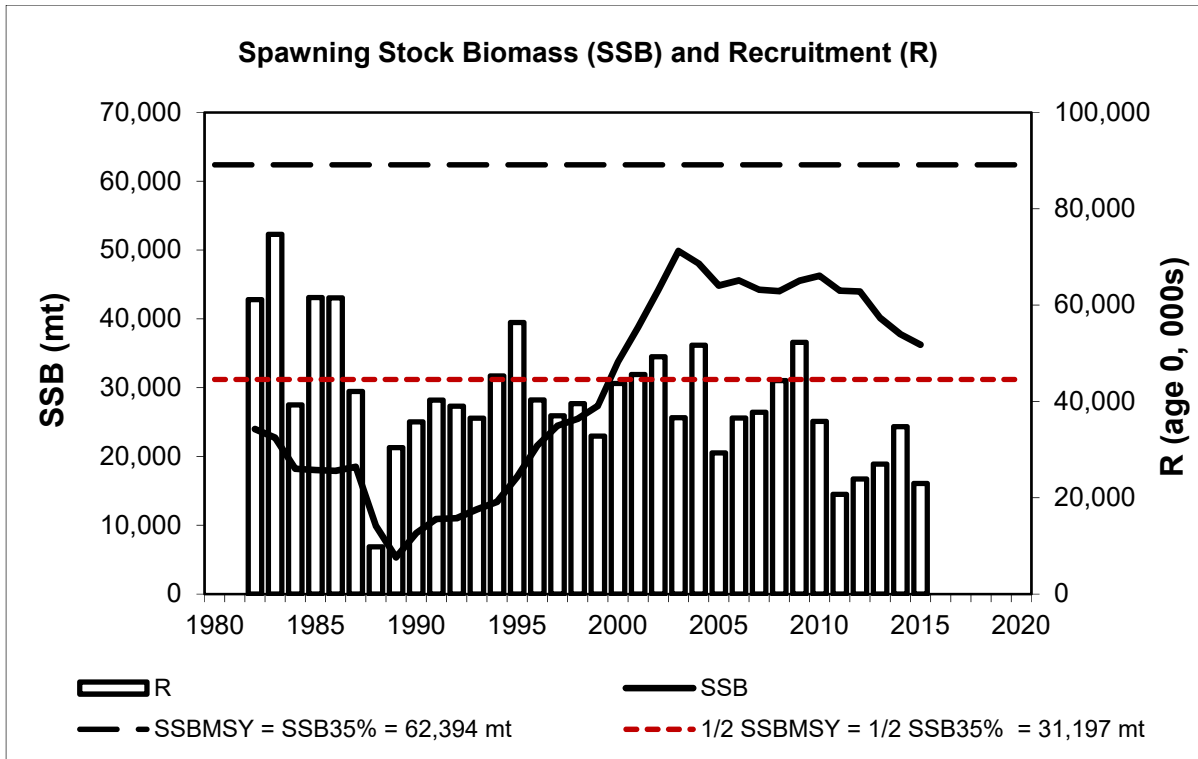
The 2016 assessment update indicated that while catch in recent years has not been substantially over the ABCs, the projected fishing mortality rates have been exceeded and projected spawning stock biomass has not been achieved. The assessment update shows a moderate internal model retrospective pattern with continued recent underestimation of F and overestimation of SSB. The assessment update indicates that the previous assessment had overestimated recruitment for several of the preceding years. These results appear to be largely driven by below average recruitment in each year from 2010-2015. The update shows that recruitment of age 0 fish was below the time series average (41 million fish at age 0; 1982-2015) each year from 2010 through 2015. Recruitment of age 0 fish in 2015 was estimated at 23 million fish.<sup>4</sup>

In June 2017, the Council received a data update for summer flounder, including updated catch and landings information as well as survey indices through 2016. No new stock projections or estimates of stock status were provided. The data update indicates that there is little evidence to suggest a substantial change in stock status from the 2016 assessment update (data through 2015). Most state and federal survey indices of abundance, with the exception of Massachusetts, remain below their most recent peaks (generally 2009-2012). Many of the indices decreased slightly between 2015 and 2016. Recruitment indices in 2016 were highly variable.

A new data update, including recent estimates of commercial and recreational fishery catch and fishery independent indices, will be provided by the NEFSC in July 2018.



**Figure 1:** Total fishery catch and fully-recruited fishing mortality (F, peak at age 4) of summer flounder, 1982-2015. The horizontal dashed red line is the 2013 SAW 57 fishing mortality threshold reference point proxy.<sup>4</sup>



**Figure 2:** Summer flounder spawning stock biomass (SSB; solid line) and recruitment at age 0 (R; vertical bars) by calendar year, 1982-2015. The horizontal long-dashed line is the 2013 SAW 57 biomass target reference point proxy, the horizontal short-dashed red line is the biomass threshold reference point proxy.<sup>4</sup>

### 3. Management System and Overall Fishery Performance

The Mid-Atlantic Fishery Management Council (Council) and the Atlantic States Marine Fisheries Commission (Commission or ASMFC) work cooperatively to develop fishery regulations for summer flounder off the east coast of the United States. The Council and Commission work in conjunction with the National Marine Fisheries Service (NMFS), which serves as the federal implementation and enforcement entity. This cooperative management endeavor was developed because a significant portion of the catch is taken from both state (0-3 miles offshore) and federal waters (3-200 miles offshore, also known as the Exclusive Economic Zone, or EEZ).

The joint Fishery Management Plan (FMP) for summer flounder became effective in 1988, and established the management unit for summer flounder as U.S. waters in the western Atlantic Ocean from the southern border of North Carolina northward to the U.S.-Canadian border. The FMP also established measures to ensure effective management of summer flounder fisheries, which currently include catch and landings limits, commercial quotas, recreational harvest limits, minimum fish sizes, gear regulations, permit requirements, and other provisions as prescribed by the FMP.

There are large commercial and recreational fisheries for summer flounder. These fisheries are managed primarily using output controls (catch and landings limits), with 60 percent of the landings being allocated to the commercial fishery as a commercial quota and 40 percent allocated

to the recreational fishery as a recreational harvest limit. Management also uses minimum fish sizes, gear regulations, permit requirements, and other provisions as prescribed by the FMP. Summer flounder was under a stock rebuilding strategy beginning in 2000 until it was declared rebuilt in 2011, based on an assessment update with data through 2010. Although the most recent (2016) assessment update included a revised biomass time series indicating that estimated biomass never actually reached the target biomass, current biomass estimates are still above the minimum stock size threshold that would trigger a new rebuilding plan. The Summer Flounder FMP, including subsequent Amendments and Frameworks, are available on the Council website at: <http://www.mafmc.org/fisheries/fmp/sf-s-bsb>.

The Council's Scientific and Statistical Committee (SSC) recommends annual Acceptable Biological Catch (ABC) levels for summer flounder, which are then approved by the Council and Commission and submitted to NMFS for final approval and implementation. The ABC is divided into commercial and recreational Annual Catch Limits (ACLs), based on the landings allocation prescribed in the FMP and the recent distribution of discards between the commercial and recreational fisheries. The Council first implemented recreational and commercial ACLs, with a system of overage accountability, in 2012. Both the ABC and the ACLs are catch limits (i.e., include both projected landings and discards), while the commercial quota and the recreational harvest limit are landing limits. Table 1 shows summer flounder catch and landings limits from 2007 through 2018, as well as commercial and recreational landings through 2017.

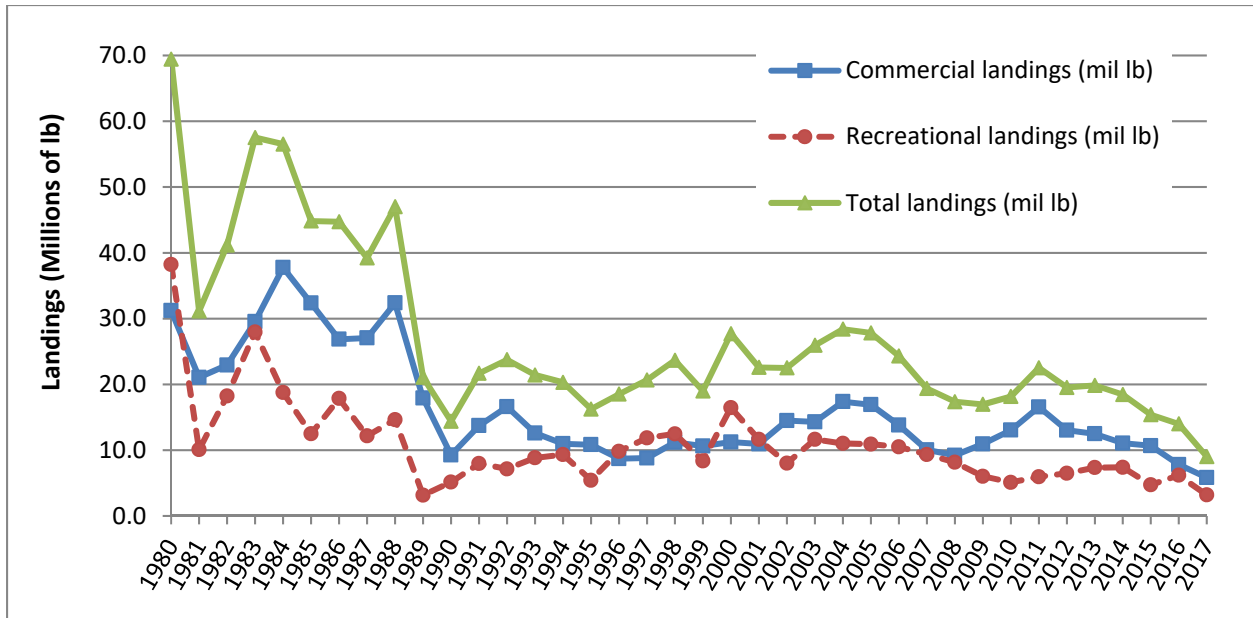
Total (commercial and recreational combined) summer flounder landings generally declined throughout the early 1980s, dropping to a time series low of 14.39 million lb in 1990, and in 2017 were about 9.02 million lb total (Figure 3).<sup>5,6</sup>

**Table 1:** Summary of catch limits, landings limits, and landings for commercial and recreational summer flounder fisheries from 2007 through 2018.

<b>Management measures</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
ABC (mil. lb) <sup>a</sup>	--	--	21.50	25.5	33.95	25.58	22.34	21.94	22.57	16.26	11.30	13.23
Commercial ACL (mil. lb) <sup>a</sup>	--	--	--	--	--	14.00	12.11	12.87	13.34	9.43	6.57	7.70
Commercial quota (mil. lb) <sup>b</sup>	9.79	9.32	10.74	12.79	17.38	12.73	11.44	10.51	11.07	8.12	5.66	6.63
Commercial landings (mil. lb.)	10.04	9.21	10.94	13.04	16.56	13.03	12.49	11.07	10.68	7.81	5.83	--
% of commercial quota landed	103%	99%	102%	102%	95%	102%	109%	105%	96%	96%	103%	--
Recreational ACL (mil. lb)	--	--	--	--	--	11.58	10.23	9.07	9.44	6.84	4.72	5.53
Recreational harvest limit (mil. lb) <sup>b</sup>	6.68	6.21	7.16	8.59	11.58	8.49	7.63	7.01	7.38	5.42	3.77	4.42
Recreational landings (mil. lb)	9.34	8.15	6.03	5.11	5.96	6.49	7.36	7.39	4.72	6.18	3.19	--
% of recreational harvest limit landed	140%	131%	84%	59%	51%	76%	97%	105%	64%	114%	85%	--

<sup>a</sup> The ABC is the annual Acceptable Biological Catch for the entire summer flounder fishery, and is divided into sector-specific Annual Catch Limits (ACLs) for the commercial and recreational fisheries. The ABC and ACLs include both landings and discards.

<sup>b</sup> Commercial quotas and recreational harvest limits reflect the removal of projected discards from the sector-specific ACLs. For 2006-2014, these limits are also adjusted for Research Set Aside (RSA). Quotas and harvest limits for 2015-2018 do not reflect an adjustment for RSA due to the suspension of the program in 2014.



**Figure 3:** Commercial and recreational summer flounder landings in millions of pounds, Maine-North Carolina, 1980-2017.<sup>5,6</sup>

#### 4. Commercial Summer Flounder Measures and Fishery Performance

Commercial landings of summer flounder peaked in 1984 at 37.77 million pounds, and reached a low of 5.83 million pounds in 2017 (corresponding to 103% of the commercial quota) according to preliminary data (Figure 3).<sup>5</sup>

In federal waters, a moratorium permit is required to fish commercially for summer flounder. Permit data indicate that 766 commercial moratorium permits for summer flounder were issued in 2017.<sup>7</sup>

The commercial quota is divided among the states based on the allocation percentages given in Table 2 and each state sets measures to achieve their state-specific commercial quotas. The Council and ASFMC are currently considering modifications to the commercial allocations through a Summer Flounder Commercial Issues Amendment (see: <http://www.mafmc.org/actions/summer-flounder-amendment>). If adopted, any changes to allocations would not be implemented until at least January 1, 2020.

**Table 2:** State-by-state percent share of commercial summer flounder allocation.

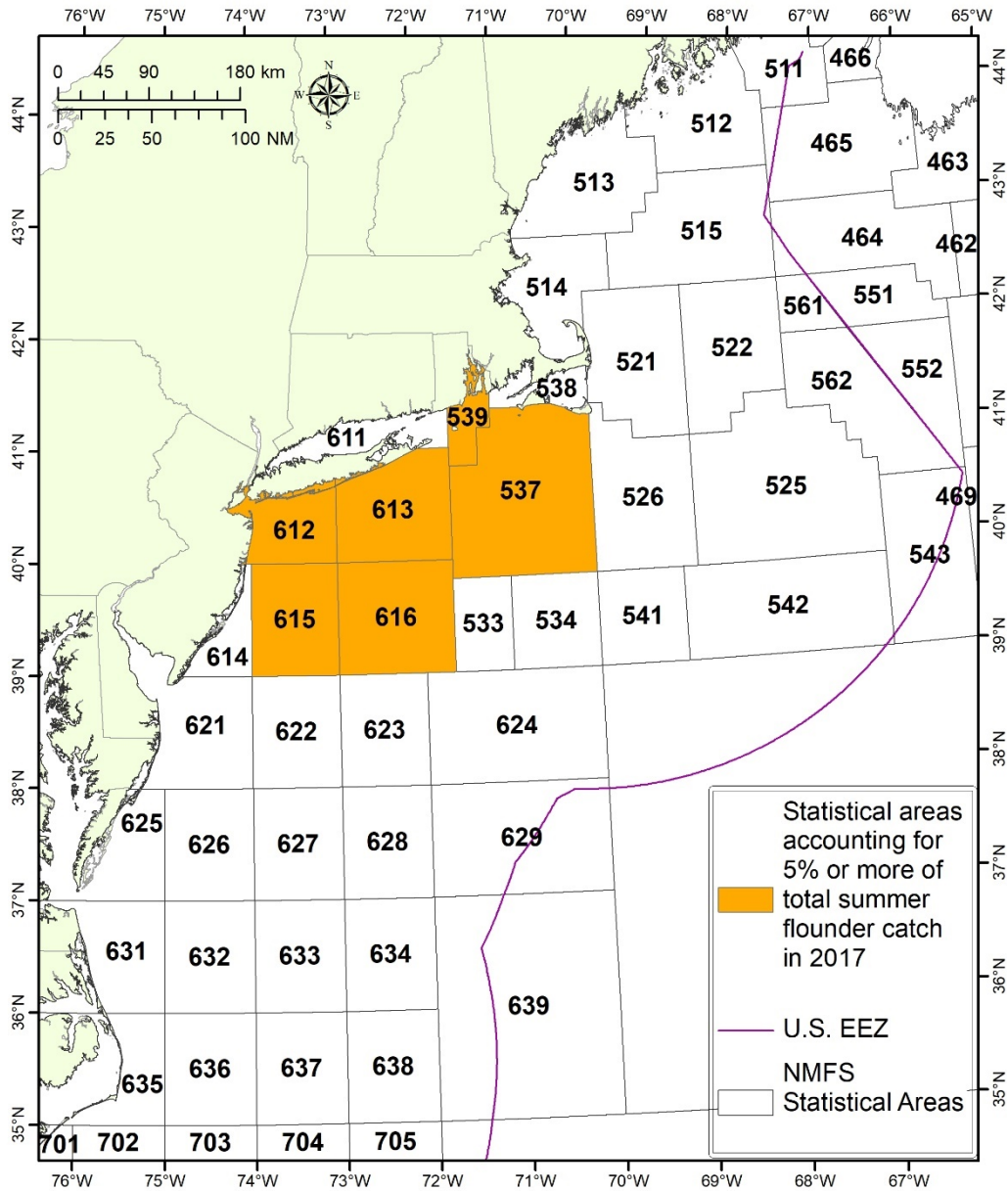
State	Allocation (%)
ME	0.04756
NH	0.00046
MA	6.82046
RI	15.68298
CT	2.25708
NY	7.64699
NJ	16.72499
DE	0.01779
MD	2.03910
VA	21.31676
NC	27.44584
Total	100

Vessel Trip Report (VTR) data for 2017 indicate that the bulk of the summer flounder landings were taken by bottom otter trawls (96 percent). All other gear types each accounted for less than 1 percent of landings.<sup>8</sup> Current regulations require a 14-inch total length minimum fish size in the commercial fishery. Trawl nets are required to have 5.5-inch diamond or 6-inch square minimum mesh in the entire net for vessels possessing more than the threshold amount of summer flounder (i.e., 200 lb from November 1-April 30 and 100 lb from May 1-October 31).

VTR data were also used to identify all NMFS statistical areas that accounted for more than 5 percent of the summer flounder commercial catch in 2017 (Table 3; Figure 4). Statistical areas 616 and 537 were responsible for the highest percentage of the catch (24% and 23% respectively; Table 3). While statistical area 539 accounted for only 6% of 2016 summer flounder catch, this area had the highest number of trips that caught summer flounder (2,478 trips).<sup>8</sup> Note that discards on VTRs are self-reported.

**Table 3:** Statistical areas that accounted for at least 5 percent of the total summer flounder catch in 2017, with associated number of trips.<sup>8</sup>

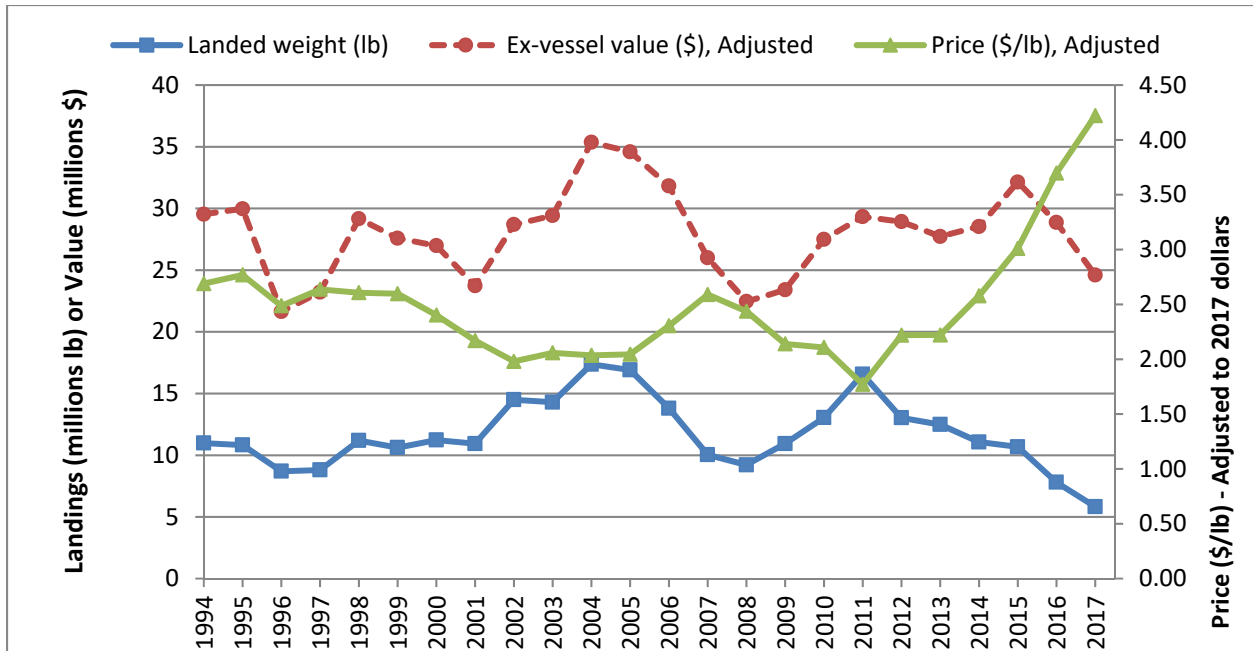
Statistical Area	Percent of 2017 Commercial Summer Flounder Catch	Number of Trips
616	24%	823
537	23%	1,469
613	13%	1,617
612	7%	1,205
615	7%	425
539	6%	2,478



**Figure 4:** NMFS Statistical Areas, highlighting those that each accounted for more than 5% of the commercial summer flounder catch in 2017.<sup>8</sup>

For the years 1994 through 2017, NMFS dealer data indicate that summer flounder total ex-vessel revenue from Maine to North Carolina ranged from a low of \$21.64 million in 1996 to a high of \$35.36 million in 2004 (values adjusted to 2017 dollars to account for inflation). The mean price per pound for summer flounder ranged from a low of \$1.77 in 2011 (in 2017 dollars) to a high of \$4.22 in 2017. In 2017, 5.83 million pounds of summer flounder were landed generating \$24.60 million in total ex-vessel revenue (an average of \$4.22 per pound; Figure 5).<sup>5</sup>





**Figure 5:** Landings, ex-vessel value, and price per pound for summer flounder, Maine through North Carolina, 1994-2017. Ex-vessel value and price are adjusted to real 2017 dollars.<sup>5</sup>

At least 100,000 lb of summer flounder were landed by commercial fishermen at each of 13 ports in seven states in 2017. These 13 ports accounted for approximately 82% of all 2017 commercial summer flounder landings. Beaufort, NC and Point Judith, RI were the leading ports in 2017 in terms of pounds of summer flounder landed, while Point Judith, RI was the leading port in terms of the number of vessels landing summer flounder (Table 4).<sup>5</sup> Detailed community profiles developed by the Northeast Fisheries Science Center’s Social Science Branch can be found at [www.mafmc.org/communities/](http://www.mafmc.org/communities/).

**Table 4:** Ports reporting at least 100,000 lb of summer flounder in 2017, and the corresponding percentage of total 2016 commercial summer flounder landings and number of vessels.<sup>5</sup>

Port	Summer Flounder Landings (lb)	% of 2017 commercial summer flounder landings	Number of vessels
BEAUFORT	902,639	15	69
POINT JUDITH	770,412	13	140
HAMPTON	598,478	10	57
PT. PLEASANT	480,258	8	58
NEWPORT NEWS	428,416	7	43
MONTAUK	289,375	5	77
WANCHESE	274,174	5	25
BELFORD	241,572	4	20
NEW BEDFORD	211,907	4	69
CHINCOTEAGUE	192,609	3	25
CAPE MAY	132,848	2	49
ENGELHARD	131,580	2	9
ORIENTAL	105,698	2	10

Over 194 federally permitted dealers from Maine through North Carolina bought summer flounder in 2017. More dealers bought summer flounder in New York than in any other state (Table 5). All dealers combined bought approximately \$24.60 million worth of summer flounder in 2017.<sup>5</sup>

**Table 5:** Dealers reporting buying summer flounder, by state in 2017.<sup>5</sup> C=Confidential.

State	MA	RI	CT	NY	NJ	DE	MD	VA	NC
Number Of Dealers	27	29	16	45	25	C	6	16	30

## 5. Recreational Summer Flounder Measures and Fishery Performance

There is a significant recreational fishery for summer flounder, primarily in state waters when the fish migrate inshore during the warm summer months. The Council and ASMFC determine annually whether to manage the recreational fishery under coastwide measures or conservation equivalency. Under conservation equivalency, state- or region- specific measures are developed through the ASMFC’s management process and submitted to NMFS. The combined state or regional measures must achieve the same level of conservation as would a set of coastwide measures developed to adhere to the overall recreational harvest limit. If NMFS considers the combination of the state- or region- specific measures to be "equivalent" to the coastwide measures, they may then waive the coastwide regulation in federal waters. Anglers fishing in federal waters are then subject to the measures of the state in which they land summer flounder.

The recreational fishery has been managed using conservation equivalency each year since 2001. From 2001 through 2013, measures were developed under state-by-state conservation equivalency. Since 2014, a regional approach has been used, under which the states within each region must

have identical size limits, possession limits, and season length. The 2018 regional conservation equivalency measures are given in Table 6.

**Table 6:** Summer flounder recreational fishing measures in 2018, by state, under regional conservation equivalency. 2018 regions include: 1) Massachusetts, 2) Rhode Island, 3) Connecticut and New York, 4) New Jersey, 5) Delaware, Maryland, The Potomac River Fisheries Commission, and Virginia, and 6) North Carolina.

State	Minimum Size (inches)	Possession Limit	Open Season
Massachusetts	17	5 fish	May 23-October 9
Rhode Island	19	6 fish	May 1-December 31
Connecticut	19	4 fish	May 4- September 30
CT Shore Program (45 designed shore sites)	17		
New York	19	4 fish	May 4- September 30
New Jersey	18	3 fish	May 25-September 22
NJ Shore program site (Island Beach State Park) <sup>a</sup>	16	2 fish	
New Jersey/Delaware Bay COLREGS	17	3 fish	
Delaware	16.5	4 fish	January 1- December 31
Maryland	16.5	4 fish	January 1- December 31
PRFC	16.5	4 fish	January 1- December 31
Virginia	16.5	4 fish	January 1- December 31
North Carolina	15	4 fish	January 1- December 31

Recreational data for years 2004 and later are available from the Marine Recreational Information Program (MRIP). For years prior to 2004, recreational data were generated by the Marine Recreational Fishery Statistics Survey (MRFSS). Recreational catch and landings for summer flounder peaked in 1983 with 32.11 million fish caught and 21.00 million fish landed (27.97 million pounds). Catch reached a low in 1989 with 2.69 million fish caught, while landings reached a low in 2017 with 1.03 million fish landed (3.19 million pounds; Table 7).<sup>6</sup>

For-hire vessels carrying passengers in federal waters must obtain a federal party/charter permit. In 2017, there were 820 party and charter vessels that held summer flounder federal for-hire permits.<sup>7</sup> Many of these vessels also hold recreational permits for scup and black sea bass.

**Table 7:** Recreational summer flounder landings data from the NMFS recreational statistics databases, Maine through North Carolina, 1981-2017.<sup>6</sup>

<b>Year</b>	<b>Catch (millions of fish)</b>	<b>Landings (millions of fish)</b>	<b>Landings (millions of pounds)</b>
1981	13.58	9.57	10.08
1982	23.56	15.47	18.23
1983	32.06	21.00	27.97
1984	29.78	17.48	18.76
1985	13.53	11.07	12.49
1986	25.29	11.62	17.86
1987	21.02	7.86	12.17
1988	17.17	9.96	14.62
1989	2.68	1.72	3.16
1990	9.10	3.79	5.13
1991	16.07	6.07	7.96
1992	11.91	5.00	7.15
1993	22.90	6.49	8.83
1994	17.73	6.70	9.33
1995	16.31	3.33	5.42
1996	18.99	7.00	9.82
1997	20.03	7.17	11.87
1998	22.09	6.98	12.48
1999	21.38	4.11	8.37
2000	25.38	7.80	16.47
2001	28.19	5.29	11.64
2002	16.67	3.26	8.01
2003	20.53	4.56	11.64
2004	20.34	4.32	11.02
2005	25.81	4.03	10.92
2006	21.40	3.95	10.50
2007	20.73	3.11	9.34
2008	22.90	2.35	8.15
2009	24.09	1.81	6.03
2010	23.72	1.50	5.11
2011	21.56	1.84	5.96
2012	16.53	2.27	6.49
2013	16.11	2.52	7.36
2014	18.97	2.46	7.39
2015	12.15	1.62	4.72
2016	14.17	2.03	6.18
2017	8.44	1.03	3.19

On average, an estimated 87 percent of the landings (in numbers of fish) occurred in state waters over the past ten years, and about 81 percent of landings came from state waters in 2017 (Table 8). The majority of summer flounder were landed in New York and New Jersey in 2017 (Table 9).<sup>6</sup>

**Table 8:** Estimated percentage of summer flounder recreational landings in state vs. federal waters, Maine through North Carolina, 2008-2017.<sup>6</sup>

Year	State <= 3 mi	EEZ > 3 mi
2008	96.49%	3.51%
2009	90.93%	9.07%
2010	92.40%	7.60%
2011	95.31%	4.69%
2012	87.76%	12.24%
2013	76.97%	23.03%
2014	77.08%	22.92%
2015	80.95%	19.05%
2016	80.91%	19.09%
2017	79.57%	20.43%
<b>Avg. 2008 - 2017</b>	<b>86.8 %</b>	<b>14.2%</b>
<b>Avg. 2015 - 2017</b>	<b>80.5%</b>	<b>19.5%</b>

**Table 9:** State contribution (as a percentage) to total recreational landings of summer flounder (in numbers of fish), from Maine through North Carolina, 2015-2017.<sup>6</sup>

State	2015	2016	2017
Maine	0.0%	0.0%	
New Hampshire	0.0%	0.0%	0.0%
Massachusetts	4.9%	2.7%	2.6%
Rhode Island	10.1%	4.3%	6.1%
Connecticut	5.7%	10.7%	8.5%
New York	30.3%	35.1%	21.5%
New Jersey	30.7%	37.2%	43.9%
Delaware	3.2%	4.4%	3.3%
Maryland	2.7%	1.1%	2.5%
Virginia	9.8%	3.5%	9.0%
North Carolina	2.5%	0.9%	2.5%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

MRIP data indicate that about 82% of recreational summer flounder landings in 2017 were caught by anglers fishing on private or rental boats, about 13% from anglers aboard party or charter boats, and 5% from shore (Table 10).<sup>6</sup>

**Table 10:** The number of summer flounder landed by recreational fishing mode, Maine through North Carolina, 1981-2017.<sup>6</sup>

Year	Shore (numbers of fish)	Party/Charter (numbers of fish)	Private/Rental (numbers of fish)
1981	3,145,683	1,362,252	5,058,639
1982	1,120,521	5,936,006	8,416,173
1983	3,963,680	3,574,229	13,458,398
1984	1,355,595	2,495,733	13,623,843
1985	786,185	1,152,247	9,127,759
1986	1,237,033	1,608,907	8,774,921
1987	406,095	1,150,095	6,308,572
1988	945,864	1,134,353	7,879,442
1989	180,268	141,320	1,395,177
1990	261,898	413,240	3,118,447
1991	565,404	597,610	4,904,637
1992	275,474	375,245	4,351,387
1993	342,225	1,013,464	5,138,352
1994	447,184	836,362	5,419,145
1995	241,906	267,348	2,816,460
1996	206,927	659,876	6,130,182
1997	255,066	930,633	5,981,121
1998	316,314	360,777	6,302,004
1999	213,447	300,807	3,592,741
2000	569,612	648,755	6,582,707
2001	226,996	329,705	4,736,910
2002	154,958	261,554	2,845,647
2003	203,717	389,142	3,965,811
2004	200,368	463,776	3,652,354
2005	104,295	498,614	3,424,557
2006	154,414	315,935	3,479,934
2007	98,418	499,160	2,510,000
2008	79,339	171,951	2,098,583
2009	62,691	176,997	1,566,490
2010	59,812	160,109	1,281,546
2011	34,849	137,787	1,667,240
2012	106,344	169,473	1,996,404
2013	132,804	271,060	2,117,502
2014	79,918	439,550	1,938,535
2015	47,680	272,227	1,301,573
2016	62,383	144,423	1,820,964
2017	49,269	138,277	840,937
<b>% of Total, 1981-2017</b>	9%	14%	78%
<b>% of Total, 2013-2017</b>	4%	13%	83%

## 6. References

- <sup>1</sup> Packer, D. B, S. J. Griesbach, P. L. Berrien, C. A. Zetlin, D. L. Johnson, and W.W. Morse. 1999. Essential Fish Habitat Source Document: Summer Flounder, *Paralichthys dentatus*, Life History and Habitat Characteristics. NOAA Technical Memorandum NMFS-NE-151.
- <sup>2</sup> Mark Terceiro, NEFSC, personal communication, January 2017.
- <sup>3</sup> Northeast Fisheries Science Center. 2013. 57<sup>th</sup> Northeast Regional Stock Assessment Workshop (57<sup>th</sup> SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 13-14; 39 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at: <http://nefsc.noaa.gov/publications/>.
- <sup>4</sup> Terceiro M. 2016. Stock Assessment of Summer Flounder for 2016. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 16-15; 117 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at <http://www.nefsc.noaa.gov/publications/>.
- <sup>5</sup> Unpublished NMFS dealer data as of May 21, 2018.
- <sup>6</sup> Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division. Accessed April 23, 2018. Available at: <http://www.st.nmfs.noaa.gov/recreational-fisheries/index>.
- <sup>7</sup> Unpublished NMFS permit data as of May 29, 2018.
- <sup>8</sup> Unpublished NMFS Vessel Trip Report (VTR) data as of May 29, 2018.