

# Atlantic States Marine Fisheries Commission

## Spiny Dogfish Management Board

*October 16, 2017*

*3:00 – 3:45 p.m.*

*Norfolk, Virginia*

### Draft Agenda

The times listed are approximate; the order in which these items will be taken is subject to change; other items may be added as necessary.

1. Welcome/Call to Order (*D. Borden*) 3:00 p.m.
2. Board Consent 3:00 p.m.
  - Approval of Agenda
  - Approval of Proceedings from October 2016
3. Public Comment 3:05 p.m.
4. Review and Set Specifications for the 2018-2019 Season **Final Action** 3:15 p.m.
  - Review Mid-Atlantic Fishery Management Council's Recommended 2018 Specifications (*M. Appelman*)
  - Set 2018-2019 Specifications (*D. Borden*)
5. Consider 2017 Fishery Management Plan Review and State Compliance Reports 3:35 p.m.  
(*M. Appelman*) **Action**
6. Other Business/Adjourn 3:45 p.m.

The meeting will be held at the Waterside Marriott Hotel; 235 East Maine Street; Norfolk, Virginia 757.627.4200

*Vision: Sustainably Managing Atlantic Coastal Fisheries*

## MEETING OVERVIEW

### Spiny Dogfish Management Board

October 16, 2017

3:00 – 3:45 p.m.

Norfolk, Virginia

Chair: David Borden (RI) Assumed Chairmanship: 10/15	Vice Chair: Rob O'Reilly	Law Enforcement Committee Representative: Moran
Spiny Dogfish Technical Committee Chair: Scott Newlin	Spiny Dogfish Advisory Panel Chair: VACANT	Previous Board Meeting: October 24, 2016
Voting Members: ME, NH, MA, RI, CT, NY, NJ, DE, MD, VA, NC, NMFS, USFWS (13 votes)		

#### 2. Board Consent

- Approval of Agenda
- Approval of Proceedings from October 2016

**3. Public Comment** – At the beginning of the meeting public comment will be taken on items not on the Agenda. Individuals that wish to speak at this time must sign in at the beginning of the meeting. For agenda items that have already gone out for public hearing and/or have had a public comment period that has closed, the Board Chair may determine that additional public comment will not provide additional information. In this circumstance the Chair will not allow additional public comment on an issue. For agenda items that the public has not had a chance to provide input, the Board Chair may allow limited opportunity for comment. The Board Chair has the discretion to limit the number of speakers and/or the length of each comment.

#### 4. Review and Set Fishery Specifications for the 2018-2019 Season (3:15 – 3:35 p.m.) Final Action

##### Background

- The Mid-Atlantic and New England Councils (Councils) implemented multiyear fishery specifications (i.e., ABC, commercial quota, and possession limits) for 2016 – 2018 (May 2016 – April 2019).
- In September, the Mid-Atlantic Council's Scientific and Statistical Committee reviewed the 2017 data update and Advisory Panel's Fishery Performance Report for spiny dogfish. Based on the information presented, the SSC decided not to change its ABC recommendation for the 2018 fishing year of ABC = 22,635 mt (49.9 million pounds). **(Briefing Materials)**

- The Councils will consider changes to the 2018 fishery specifications, October 11<sup>th</sup>, in Riverhead, New York.

**Presentations**

- Review of the MAFMC and NEFMC 2016-2018 Specifications by M. Appelman

**Board Actions for Consideration at this Meeting**

- Set the spiny dogfish specifications, including trip limit for the northern region, for the 2018-2019 fishing year

**5. Consider 2016 Fishery Management Plan Review and State Compliance (3:35 – 3:45 p.m.) Action**

**Background**

- Annual state compliance reports for spiny dogfish are due July 1<sup>st</sup>
- The Plan Review Team reviewed the reports and drafted the 2017 Fishery Management Plan Review (**Briefing Materials**)

**Presentations**

- 2017 Draft Fishery Management Plan Review by M. Appelman

**Board Actions for Consideration at this Meeting**

- Consider 2017 Fishery Management Plan Review and State Compliance

**6. Other Business/Adjourn**

**DRAFT PROCEEDINGS OF THE  
ATLANTIC STATES MARINE FISHERIES COMMISSION  
SPINY DOGFISH MANAGEMENT BOARD**

**The Harborside Hotel  
Bar Harbor, Maine  
October 24, 2016**

These minutes are draft and subject to approval by the Spiny Dogfish Management Board.  
The Board will review the minutes during its next meeting.

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1. **Approval of agenda by consent** (Page 1).
2. **Approval of proceedings of February 2016 by consent** (Page 1).
3. **Move to adopt the 2017 commercial quota of 39,099,717 pounds, which is consistent with the commercial quota recommended by the Mid-Atlantic Fishery Management Council to NOAA Fisheries, and a 6,000 pound trip limit for the Northern Region** (Page 2). Motion by Terry Stockwell; second by Eric Reid. Motion passes unanimously (Page 2).
4. **Move to approve the 2016 Spiny Dogfish FMP Review and state compliance, and *de minimis* status for Delaware in 2016**. Motion adopted by consensus (Page 5).
5. **Motion to adjourn** by consent (Page 6).

**ATTENDANCE**

**Board Members**

Terry Stockwell, ME, proxy for P. Keliher (AA)	Tom Fote, NJ (GA)
Doug Grout, NH (AA)	John Clark, DE, proxy for D. Saveikis (AA)
Dennis Abbott, NH, proxy for Sen. Watters (LA)	Roy Miller, DE (GA)
G. Ritchie White, NH (GA)	Craig Pugh, DE, proxy for Rep. Carson (LA)
Rep. Sarah Peake, MA (LA)	Rachel Dean, MD (GA)
David Pierce, MA (AA)	Ed O'Brien, MD, proxy for Del. Stein (LA)
William Adler, MA (GA)	Mike Luisi, MD, proxy for D. Blazer (AA)
David Borden, RI (GA)	Rob O'Reilly, VA, proxy for J. Bull (AA)
Eric Reid, RI, proxy for S. Sosnowski (LA)	Cathy Davenport, VA (GA)
Dave Simpson, CT (AA)	Kyle Schick, VA, proxy for R. Stuart (LA)
Lance Stewart, CT (GA)	Chris Batsavage, NC, proxy for B. Davis (AA)
Steve Heins, NY, proxy for J. Gilmore (AA)	Doug Brady, NC (GA)
Adam Nowalsky, NJ, proxy for R. Andrzejczak (LA)	Wilson Laney, USFWS
Tom Baum, NJ, proxy for D. Chanda (AA)	Peter Burns, NMFS

**(AA = Administrative Appointee; GA = Governor Appointee; LA = Legislative Appointee)**

**Ex-Officio Members**

**Staff**

Robert Beal	Max Appelman
Toni Kerns	Amy Hirrlinger

**Guests**

Derek Orner, NOAA	Colleen Giannini, CT DEEP
Harold Mears, NMFS	Matthew Gates, CT DEEP
Kelly Denit, NMFS	Katie Westfall, Environmental Defense Fund
Alan Risenhoover, NMFS	Doug Christel, MA F&G
Tim Sartwell, NMFS	Pat Augustine, Coram, NY
Kim McKown, NYS DEC	Arnold Leo, E. Hampton, NY
Rich Wong, DE DFW	Ray Kane, CHOIR
Kevin Sullivan, NH F&G	

The Spiny Dogfish Management Board of the Atlantic States Marine Fisheries Commission convened in the Statesbury Grand Ballroom of the Bar Harbor Club, Harborside Hotel, Bar Harbor, Maine, October 24, 2016, and was called to order at 1:25 o'clock p.m. by Chairman David V. Borden.

**CALL TO ORDER, APPROVAL OF AGENDA AND PROCEEDINGS**

CHAIRMAN DAVID V. BORDEN: **Welcome, call to order, approval of agenda and proceedings from February, 2016 meeting had technical difficulties. The agenda and proceedings were approved.**

**PUBLIC COMMENT**

CHAIRMAN BORDEN: Public comment, we allow individuals to speak on behalf of important issues that do not appear on the agenda. No one signed up on the attendance sheet.

Is there anyone in the audience who would like an opportunity to address the board on issues that did not appear on the agenda? No hands up again.

**REVIEW AND SET FISHERY SPECIFICATIONS FOR THE 2017-2018 SEASON**

CHAIRMAN BORDEN: We are going to proceed with Item 4 on the agenda, which is a review and set the specifications. Just for everyone's edification, this is a two-part action, which will be required. One is to set the actual quota, and the second is to set the trip limit. I've asked the staff to develop some language that we can look at after the presentation. Max.

**REVIEW MID-ATLANTIC FISHERY MANAGEMENT COUNCIL 2016-2018 SPECIFICATIONS RECOMMENDATION**

MR. MAX APPELMAN: I'll try to get us back on schedule. I'll get through this pretty quickly. If you were at the Mid-Atlantic Council meeting earlier this month, a lot of this information and some of the slides are taken straight from that

presentation. For new members around the table and any public listening in, this is a jointly managed species; managed jointly with the Mid-Atlantic and New England Councils. The Interstate FMP is complementary to that federal plan.

The council is currently in the middle of a three-year-specification cycle. Up on the screen there is the reminder that the fishing season is from May 1st to April 30th. The commission is going one year at a time with this, so right now, we're looking at that middle time period, May 1, 2017 to April 30, 2018. That is the 2017 fishing season.

In September, the SSC met to review the 2016 data update and the APs Fishery Performance Report. Based on those materials, they saw no compelling evidence to change its ABC recommendations for the 2017 and 2018 fishing season. Also, in September, the Monitoring Committee met and reviewed that same information and made no changes to their previous recommendations either.

This is just a table of that multiyear specification cycle. Starting with the OFLs and ABCs up at the top there, working its way down through the commercial quotas at the bottom. Taking Canadian landings into account, management uncertainty, discards, recreational landings, and at the bottom there the commercial quota for the current fishing season is 40.4 million pounds, 2017 is 39.1 and for 2018 is 38.2 million pounds. You did see that there is a decreasing trend in the ABC and the quotas throughout that specification cycle, and that is based on information coming out of the latest stock assessment, which projected SSB to dip somewhat through 2019, before rebounding back up again. Just making a point that those findings did show us it will be climbing again after that specification cycle, and you could expect to see quota increases while during the next Specs cycle; but of course, that does depend on survey results and other fishery information.



This is a figure of the spring survey data, observed index values through time. This is the primary fishery independent data source going into stock assessment. The red dots are the observed values, the blue and green lines are the Kalman filter. You'll recall, last year, there was limited information coming from that spring survey, and the council directed or asked the Science Center to do some additional exploration of some smoothing options or smoothing techniques to address that missing data.

The Kalman filter is what came out of that process. It was also endorsed by the SSC. The big take-home from this figure, though, is that the survey value was up in the last year, in 2016; so no hiccups or cause for alarm there. This figure is showing commercial landings through time. The orange line is last year's landings, and the blue line is this year; up-to-date.

This was taken from the GARFO quota monitoring page just late last week. You can see that landings have been a little bit higher this year, compared to last. There was pretty steep trajectory there over the summer, and it seems like it has tapered off a little bit; but just pointing out that if this trajectory continues throughout the season, we could see some fishery closures this year.

A couple things to keep in mind when you look at that trajectory compared to last year, is there were some measures that went into place recently and are just starting to impact the fishery. One was a trip limit increase from 5,000 pounds to 6,000 pounds. That went into effect August 15th. Then the second thing here is a framework action taken at the councils that sort of clarifies this gray area, whether spiny dogfish and monkfish could be targeted on the same trip using different gears and different areas.

I'm not exactly sure how much this could impact effort, as more as it just clarifies something that has already been going on. A

few points from the Fishery Performance Report to just put on your radar here, is that demand continues to be a critical part of this fishery. It is characterized as a low price-per-pound fishery, so any little changes in that price can have big impacts on the participation in the fishery.

Another point is that most participants seem to want small incremental changes, if any, although there is a small group that wants to see some bigger trip limits to explore some other market possibilities. Then this last point here is getting at that there are still some marketing and regulatory issues discouraging interest.

In the southern regions, the lack of processors, and it just continues to be a road block to participation in that region. Then one more slide here, just put some topics on the horizon, some reoccurring topics that have been coming up. One is the AP and the Monitoring Committee continue to note the need for a benchmark assessment. There are a couple bullets here. This is not a comprehensive list by any means, but just some things that they've noted that they would like explored further in that benchmark, one is the survey sampling design, how we're surveying the population and is it adequate? Then the other reviewing some reproductive information that goes in the stock assessment that might be a little bit outdated, and see if we can improve that. Then this last bullet is, continue discussion about interest in a male-only fishery.

There was some thesis work done in collaboration with GARFO and Science Center staff that sort of suggests that this could be possible; that there are certain times of the year and in very specific areas where male-only harvest is a viable option. To wrap it all up, the Mid-Atlantic Council met October 5<sup>th</sup>. They reviewed this exact same information and recommended no changes to the previously recommended specifications.

That is 39.1 million pounds for 2017, the commercial quota, and 38.2 million pounds for the commercial quota in 2018 and the 6,000 pound trip limit. This is, again, just that same slide I showed you earlier of all those specifications. But I think this next slide, I'll keep this up on the screen once I finish here, but this is showing you the state specific and regional specific allocations based on those quotas. That concludes my presentation. I'll take any questions.

CHAIRMAN BORDEN: Any questions for Max? No hands up. Let me try to speed this along and ask, is there anyone at the table, any of the board members want to propose anything different than what the Mid-Atlantic Council proposed, anyone? Is there anyone in the audience that thinks we should consider? No hands up. Okay, we anticipated this. I asked the staff to prepare a joint motion on both of these. If you could put it up. Then I would ask someone to make this motion, please. Terry Stockwell.

MR. TERRY STOCKWELL: **I move to adopt the 2017 commercial quota of 39,099,717 pounds, which is consistent with the commercial quota recommended by the Mid-Atlantic Fishery Management Council to NOAA Fisheries, and a 6,000 pound trip limit for the northern region.**

CHAIRMAN BORDEN: Seconded by Eric. We had like four hands up simultaneously. We have a motion and a second on the table, any discussion on the motion? No hands up. Are you ready for the question? Since it is a final action, we have to do this by roll call. Max, can you read the roll, please.

MR. APPELMAN: Yes. Maine.

MR. STOCKWELL: Yes.

MR. APPELMAN: New Hampshire.

MR. DENNIS ABBOT: Yes.

MR. APPELMAN: Massachusetts.

MR. WILLIAM A. ADLER: Yes.

MR. APPELMAN: Rhode Island.

MR. ERIC REID: Yes.

MR. APPELMAN: Connecticut.

MS. MELISSA ZIOBRON: Yes.

MR. APPELMAN: New York.

MR. STEPHEN HEINS: Yes.

MR. APPELMAN: New Jersey.

MR. TOM BAUM: Yes.

MR. APPELMAN: Delaware.

MR. JOHN CLARK: Yes.

MR. APPELMAN: Maryland.

MR. MICHAEL LUISI: Yes.

MR. APPELMAN: Virginia.

MR. JOE CIMINO: Yes.

MR. APPELMAN: North Carolina.

MR. W. DOUGLAS BRADY: Yes.

MR. APPELMAN: U.S. Fish and Wildlife Service.

DR. WILSON LANEY: Yes.

MR. APPELMAN: National Marine Fisheries Service.

MR. PETER BURNS: Yes.

CHAIRMAN BORDEN: It's unanimous, motion passes.

**CONSIDER 2016 FISHERY MANAGEMENT PLAN  
REVIEW AND STATE COMPLIANCE**

CHAIRMAN BORDEN: All right, next item on the agenda is to consider the Fishery Performance Report. Max.

MR. APPELMAN: Again, a very brief presentation here. This is an FMP review of the 2015 fishing year. Again, that is May 1st, 2015 through April 30, of 2016. A quick review of the latest stock status information, the latest info is coming from the 2015 stock assessment update. Based on those findings, spiny dogfish is not overfished and overfishing is not occurring.

In 2015, female SSB was estimated at just over 168,000 metric tons, which is above the target value, and fishing mortality was estimated at 0.21, which is similarly below the target value. This is a figure showing commercial landings versus the quota through time. You can see that there was a bit of a spike in the quota in 2012; whereas, landing sort of tapered off. Thoughts are these most likely are reflecting market conditions during that time. A quick summary of some harvest statistics in 2015, the commercial quota was 50.6 million pounds with a 5,000 pound trip limit for the northern region.

Commercial landings from the U.S. were estimated at 22 million pounds, and this is less than 50 percent of that quota; again, probably reflecting market conditions. A note here that all states and regions harvested within their quota allocations, and so no compliance issues there. Recreational landings were just over almost 87,000 pounds, and discards were estimated at 7.3 million pounds, which is actually a few million pounds lower compared to recent years.

This could be indicating improved utilization of the resource. The Plan Review Team reviewed all the state compliance reports, and based on those reports found that all states had implemented regulations consistent with the requirements of the interstate FMP in Addenda

I through V; however, the PRT does note that Connecticut did not meet the May 1, 2015 compliance schedule of Addendum V; that addendum requires fins to remain attached to the carcass through landing, and Connecticut just recently came into compliance with that addendum.

The last thing I have up here is a request for de minimis status by Delaware, the FMP states that de minimis status can be granted if their state landings are less than 1 percent of the commercial coastwide landings, and based on those estimates, Delaware does meet the requirements for de minimis status in 2016. That concludes my presentation, thank you.

CHAIRMAN BORDEN: Questions on the report, any questions? Yes; Dave Pierce.

DR. DAVID PIERCE: Yes, Max, you indicated that right now we're not overfishing dogfish. At the same time, on the report that you provided, it appears that we are a hairs breath under what would classify as overfishing. Do you have any information that would help us understand the significance of that; notably, the assessment information we have in hand, or updates that might be scheduled that will address this question. Have we got any preview of where we might find ourselves relative to overfishing or not?

MR. APPELMAN: I think the best way for me to answer that is back to what the AP and MC have been noting that we really need another benchmark assessment. I think we're scheduled for an update in two years; next year is still a data update. I'm not super familiar with the assessment. I'm kind of relatively new to this species management plan in the assessment, but I can look into that a little bit more maybe, and get back to you.

DR. PIERCE: It's a great assessment. Paul Rego, Dr. Rego of the Northeast Fisheries Science Center has retired. He is the one who did so many magical things with spiny dogfish, such as the Kalman Filter. I just want to bring to the

attention of the board a potential problem that might affect us, actually for 2017 going into '18.

The Kalman Filter was used in a creative way in order to deal with the fact that the albatross, actually the Bigelow, the Bigelow was not able to survey important areas in the Mid-Atlantic area, southern New England area, where dogfish were expected to be abundant. Those survey stations were not accomplished; so we had a missing data point for 2014. We used a three-year-moving average to come up with the biomass estimates and also estimates of fishing mortality. My understanding is that in 2016, this year in the spring, there was about a month, maybe over a month delay in the spring survey. My fear is that we may find ourselves with some update that would indicate that we don't have 2014 information and we don't have 2016 information, so we have two years missing from a three-year-moving average.

This is just something we need to follow; I wanted to call it to Max's attention, in particular, since you now have this responsibility. There is a lot of history behind how this stock has been assessed, so that is just some information for the board's consideration; since as I said, we're a hairs breath, according to the figure in front of me here.

Figure 1 in the Review of the Interstate Plan, actually it's Figure 2. We're very close to the threshold, so if there was a problem with the 2016 spring survey relative to getting us a good indication of the biomass; that I continue to think is so very high, we may find ourselves suddenly with an update that will tell us that we are overfishing. Again, for Max's consideration.

MS. TONI KERNS: David, we talked about, at our last NRCC meeting, the schedule for all the assessments. There is a data update. We've been doing a lot of what I call rumble strips that we are going to actually run the model with new years of data. I can't remember off the top of my head if we actually got a benchmark assessment put onto the books, because of all

of the MRIP species that need to be looked at in 2018.

I've sent an e-mail over to Emily Gilbert, who keeps track of everything that we do at the NRCC meeting, to see how we revised that SAW/SARC schedule. I will let the board know at the Policy Board, likely, how we change that.

CHAIRMAN BORDEN: Max, did you want to respond further to Dr. Pierce?

MR. APPELMAN: I'm just looking at the same figure. The dashed line at the top there is actually the target line. We are getting close to the target, but overfished wouldn't occur until it hits the threshold line.

CHAIRMAN BORDEN: Any other questions on the report? Any objection to approving the report as presented, which would include granting Delaware de minimis status? Yes.

MELISSA ZIOBRON: I just had more of a comment. I didn't catch you in time before we moved on. In terms of the compliance, I think it would be very helpful for states if we were able to get a list of the compliance requirements and the corresponding implementation dates, and then the states could respond with the actions taken. I think it would have been helpful for us to have implemented ours in a more-timely manner.

CHAIRMAN BORDEN: Okay, thank you. We've heard the report. **There are no questions on the report, any objections to approving a report as submitted, which would include granting Delaware de minimis status. No objections? Then it is adopted with unanimous consent.** Is there any further business to come before the board? If not, the meeting is adjourned. Coastal Sharks will start in two minutes.

MS. KERNS: Emily just sent an e-mail, and we are doing just a data update, we're actually not doing an assessment update in 2017, and we do

not have anything on the books for dogfish in 2018 currently.

CHAIRMAN BORDEN: Terry Stockwell, you've got a point?

MR. STOCKWELL: Before you completely adjourn Spiny Dogfish, you and I had a sidebar conversation about potential for a working group prior to setting the specs next year.

CHAIRMAN BORDEN: Oh yes. Thank you for reminding me. I'll just make this really brief. There have been a number of suggestions. Michael has made suggestions in the past, Rob O'Reilly, Terry Stockwell, I think some of the Rhode Island delegation have made the same suggestion that we put together like a subcommittee to evaluate some of the suggestions that have been put forth in the Fishery Performance Report by the Mid-Atlantic Council.

The idea would be not necessarily to take any action on it; it would be to just work through some of those concepts in anticipation of next year. This is kind of a long range planning group. Those suggestions have been made by a fair number of people. Does anyone object to doing that? If there are no objections, then we'll circulate a memo. If individual states want to volunteer for it at that point, we'll do that. I see no hands up and no objections. Then we will do that.

#### **ADJOURNMENT**

CHAIRMAN BORDEN: That concludes the meeting, this portion of the board meeting.

(Whereupon the meeting adjourned at 1:50 o'clock p.m. on October 24, 2016.)



**Mid-Atlantic Fishery Management Council**  
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Michael P. Luisi, Chairman | G. Warren Elliott, Vice Chairman  
Christopher M. Moore, Ph.D., Executive Director

## MEMORANDUM

**Date:** August 30, 2017  
**To:** Chris Moore, Executive Director  
**From:** Jason Didden, Staff *JDD*  
**Subject:** Spiny Dogfish Specifications Review for 2018 Fishing Year

Dogfish is in multi-year specifications for 2016-2018 (the 2018 fishing year ends April 30, 2019). The Council's Scientific and Statistical Committee (SSC) is scheduled to review the 2018 dogfish ABCs (year 3 of 3) during its September 2017 meeting. The Dogfish ABC is scheduled to decrease from approximately 51 million pounds in 2017 to 50 million pounds in 2018 under multi-year specifications.

A data update from NMFS' Northeast Fisheries Science Center (NEFSC), a fishery information document that supported the Advisory Panel's meeting, and the Advisory Panel's Fishery Performance Report have been posted to <http://www.mafmc.org/ssc>.

Staff recommends no changes to 2018 dogfish ABCs. While the historically-low 2017 spring survey data point does give pause for concern, the biology of dogfish does not lend itself to rapid changes in biomass given the moderate catches observed in recent years. The industry members of the Advisory Panel also have not reported any substantial changes in catch rates.



## Mid-Atlantic Fishery Management Council

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Michael P. Luisi, Chairman | G. Warren Elliott, Vice Chairman  
Christopher M. Moore, Ph.D., Executive Director

# MEMORANDUM

**Date:** 18 September 2017  
**To:** Michael P. Luisi, Chairman, MAFMC  
**From:**  John Boreman, Ph.D., Chair, MAFMC Scientific and Statistical Committee  
**Subject:** Report of the September 2017 SSC Meeting

The SSC met in Baltimore on the 13<sup>th</sup> of September 2017. The main objective of the meeting was to affirm (or develop new) ABC recommendations for Spiny Dogfish in light of updated information on stock status. Other topics discussed at the meeting included a presentation by Dr. John Wiedenmann on a management strategy evaluation he is currently conducting on ABC control rule alternatives for the Mid-Atlantic Fishery Management Council, and continued development of criteria for setting coefficients of variation (CVs) for overfishing limits (OFLs) (Attachment 1).

A total of 14 SSC members were in attendance (Attachment 2), 12 of whom were present for the discussion of the Spiny Dogfish ABC, which constituted a quorum. Also in attendance were MAFMC staff, staff from NMFS Northeast Fisheries Science Center (by phone), and a representative from the public. All documents referenced in the report can be accessed via the SSC's meeting website (<http://www.mafmc.org/ssc-meetings/2017/september-13>).

## Spiny Dogfish

Jason Didden (MAFMC staff), with assistance from Kathy Sosebee (NEFSC lead assessment scientist for Spiny Dogfish), presented the Advisory Panel's Fishery Performance Report and data update for Spiny Dogfish. Of particular note, the estimate of female spawning stock biomass for 2017 is the lowest in the time series, and a huge drop in Spiny Dogfish biomass on Georges Bank was also observed. However, all size and sex classes decreased in 2017, which likely indicates a year-specific availability issue. Mike Frisk (SSC) mentioned that he is completing an analysis of environmental and gear-related factors affecting distribution and abundance estimates of Spiny Dogfish along the Atlantic Coast, and will have that information available in time for next year's ABC deliberations.

Based on the information presented, the SSC decided not to change its ABC recommendation for the upcoming fishing year of **ABC = 22,635 mt (49.9 million pounds)**. A benchmark

assessment of Spiny Dogfish is listed as a possibility for 2019; the SSC requests an updated assessment for its September 2018 meeting.

## **ABC Control Rule Alternatives**

Dr. John Wiedenmann (Rutgers University) is under contract to the MAFMC to evaluate the impact of different types of ABC control rules on stock dynamics and fishery performance metrics. He is using a management strategy evaluation (MSE) approach, and has completed a preliminary analysis using Summer Flounder as a test species. He also plans to expand his analysis to include life history characteristics and stock assessment information for Butterfish and Scup. The SSC offered a number of suggestions regarding selection of approaches to setting ABCs, as well as content and format of output information from the MSE that would be most useful to the SSC (and Council). Dr. Wiedenmann has been working closely with the SSC's OFL CV Working Group, as his efforts coincide closely with the Working Group's objectives (see the following section of this report).

## **Criteria for Setting CVs for OFLs**

The SSC discussed objectives and considerations for determination of the coefficients of variation (CVs) for estimates of the overfishing limit (OFL), as well as a draft set of decision criteria for assigning OFL CVs into categories representing low, moderate, and high uncertainty in the OFL estimate. The SSC also discussed the estimation of low, moderate, and high OFL CVs that could represent default values.

The SSC adopted the following objectives for its OFL CV determination process:

We intend to elevate confidence in ABCs by establishing a replicable process that meets Council risk policy objectives, and identifies relevant components of assessment uncertainty to be provided to the SSC.

The SSC's approach to setting OFL CVs will:

- Result in prudent decisions for catch advice that are consistent in meeting the objectives of the Council's Risk Policy in considering the trade-offs of biological, social, and economic benefits;
- Be based on clear and transparent decision criteria; and
- Be supportable with evidence.

The SSC further discussed and refined a set of decision criteria for OFL CVs that had been presented at prior meetings, deciding on the following wording:

1. Rigor of model identification during the assessment process
2. Informed by retrospective analysis
3. Informed by empirical estimates of abundance, stock biology, and fishing pressure



4. How the reference points are informed by ecosystem factors or comparisons with other species
5. Informed by measures of trends in recruitment
6. Informed by prediction error
7. Informed by simulation analysis or a full management strategy evaluation
8. Assessment accuracy under different fishing pressures

The SSC agreed that the entire set would be considered for discussion related to the generic ToR 2 (provide an OFL estimate) during an ABC setting process, but each consideration would not necessarily be weighed against the others. There would not be a need for quantification of elements on the list; a narrative from the assessment team/review panel is more helpful to the SSC than a score.

The SSC discussed a process for using this information and the example decision framework proposed: a table aligning the eight decision criteria with different assessment characteristics that would result in low, moderate, or high OFL CVs. All SSC members agreed that such a table would help structure the discussion and ensure that a consistent set of considerations were applied to all stocks. Overall, the SSC considered the framework to structure discussion in a way that does not obligate the group to make a certain decision, but helps lead the SSC to a consensus decision in a transparent manner.

A range of opinions were provided on how formulaic the decision rules should be, with some members preferring to retain flexibility and a continuous range of OFL CV options, and others preferring a more formulaic “robotic” approach with a small set of pre-determined default OFL CV bins. A continuum from 0-100% would be difficult to use consistently given that OFL CV is generally unknown. Differences in OFL CV on the order of 5-10-15% are probably too hard to justify and distinguish. Simulation testing could determine whether there are any meaningful differences in performance of the control rule with OFL CV bins at least 30-50% apart. Further work on determining levels of OFL CV that reasonably represent low, moderate, and high uncertainty for the range of species and assessments in the Mid-Atlantic region is necessary and will be conducted by the Working Group in collaboration with Dr. John Wiedenmann (see the preceding section of this report).

The SSC OFL CV Working Group will summarize the revisions from this meeting and make further refinements to the approach during a call in the upcoming month. The full SSC may meet by webinar to review and approve refinements to the approach so that it can be presented to the Council at its December 2017 meeting, and at the National SSC meeting in January.

c: SSC Members, Warren Elliott, Chris Moore, Rich Seagraves, Brandon Muffley, Jason Didden, Kathy Sosebee, John Wiedenmann, Jan Saunders

**Mid-Atlantic Fishery Management Council  
Scientific and Statistical Committee Meeting**

September 13, 2017  
Royal Sonesta Harbor Court Baltimore  
550 Light Street, Baltimore, MD 2120

**Agenda**

**Wednesday, September 13, 2017**

- 9:00 Spiny dogfish data and fishery update; review of 2018-2019 fishing year ABC (Didden)
- 10:30 Review of Council's current and alternative ABC control rules (Wiedenmann)
- 12:00 Lunch
- 1:00 Review of OFL CV Working Group progress and recommendations
- 4:00 Adjourn

MAFMC Scientific and Statistical Committee  
 19-20 July 2017 Meeting Attendance

<u>Name</u>	<u>Affiliation</u>
<i>SSC Members in Attendance:</i>	
John Boreman (SSC Chairman)	NC State University
Tom Miller (SSC Vice-Chair) *	University of Maryland - CBL
Mark Holliday	NMFS (Retired)
Wendy Gabriel	NMFS Northeast Fisheries Science Center
Sarah Gaichas	NMFS Northeast Fisheries Science Center
Ed Houde	University of Maryland – CBL
Dave Secor	University of Maryland - CBL
Paul Rago (via phone)	NMFS (retired)
Yan Jiao	Virginia Tech
Lee Anderson	University of Delaware (retired)
Cynthia Jones	Old Dominion University
Mike Frisk	SUNY Stony Brook
Mike Wilberg	University of Maryland - CBL
Brian Rothschild *	UMass Dartmouth (retired)

\*not present for Spiny Dogfish ABC discussion

<i>Others in attendance:</i>	
Rich Seagraves	MAFMC staff
Brandon Muffley	MAFMC staff
Jason Didden	MAFMC staff
Kathy Sosebee (by phone)	NMFS Northeast Fisheries Science Center
John Wiedenmann	Rutgers University

**Spiny Dogfish Advisory Panel (AP) Informational Document - August 2017**  
**Prepared by Jason Didden, Council Staff**

**\*\*Note - Data Sources for the following are generally from unpublished standard NMFS databases unless noted...everything should be considered preliminary at this point.**

### **Basic Biology**

Spiny dogfish (*Squalus acanthias*) is a coastal shark with populations on the continental shelves of northern and southern temperate zones throughout the world. It is the most abundant shark in the western north Atlantic and ranges from Labrador to Florida, but is most abundant from Nova Scotia to Cape Hatteras, North Carolina. Its major migrations on the northwest Atlantic shelf are north and south, but it also migrates inshore and offshore seasonally in response to changes in water temperature. Spiny dogfish have a long life, late maturation, a long gestation period, and relatively low fecundity, making them generally vulnerable to depletion. Fish, squid, and ctenophores dominate the stomach contents of spiny dogfish collected during the Northeast Fisheries Science Center (NEFSC) bottom trawl surveys but they are opportunistic and have been found to consume a wide variety of prey. More detailed life history information can be found in the essential fish habitat (EFH) source document for spiny dogfish at: <http://www.nefsc.noaa.gov/publications/tm/tm203/tm203.pdf>.

### **Status of the Stock**

Reports on “Stock Status,” including Stock Assessment Workshop (SAW) reports and peer-review reports are available online at the NEFSC website: <http://www.nefsc.noaa.gov/nefsc/saw/>. An assessment update in 2015 found that the stock is not overfished nor subject to overfishing. A data update including the 2017 spring survey is available at <http://www.mafmc.org/ssc-meetings/2017/september-13>. The point estimate of mature female biomass from the 2017 spring survey is the lowest in the time series.

### **Regulatory Summary**

Spiny Dogfish regulations are summarized at <https://www.greateratlantic.fisheries.noaa.gov/regs/infodocs/spinydogfactsheet.pdf>. We are currently in multi-year regulations from May 2016-April 2019 (see Table 1 below), but the Council and its Scientific and Statistical Committee review multi-year specifications each year.

**Table 1. May 2016 to April 2019 Spiny Dogfish Specifications**

Specifications	Basis	2016 (pounds)	2016 (mt)	2017 (pounds)	2017 (mt)	2018 (pounds)	2018 (mt)
OFL	Projected Catch at Fmsy	64,414,664	29,218	na	na	na	na
New ABCs	Council Risk Policy	52,066,572	23,617	50,805,528	23,045	49,901,633	22,635
Canadian Landings	= avg last 3 years (10,11,12)	143,300	65	143,300	65	143,300	65
Domestic ABC	= ABC – Canadian Landings	51,923,272	23,552	50,662,228	22,980	49,758,333	22,570
ACL	= Domestic ABC	51,923,272	23,552	50,662,228	22,980	49,758,333	22,570
Mgmt Uncert. Buffer	Ave pct overage since 2011	0	0	0	0	0	0
ACT	= ACL - mgmt uncertainty	51,923,272	23,552	50,662,228	22,980	49,758,333	22,570
U.S. Discards	=3 year average 12-13-14	11,494,167	5,214	11,494,167	5,214	11,494,167	5,214
TAL	ACT – Discards	40,429,105	18,338	39,168,060	17,766	38,264,165	17,356
U.S. Rec Landings	= 2014 estimate	68,343	31	68,343	31	68,343	31
Comm Quota	TAL – Rec Landings	40,360,761	18,307	39,099,717	17,735	38,195,822	17,325

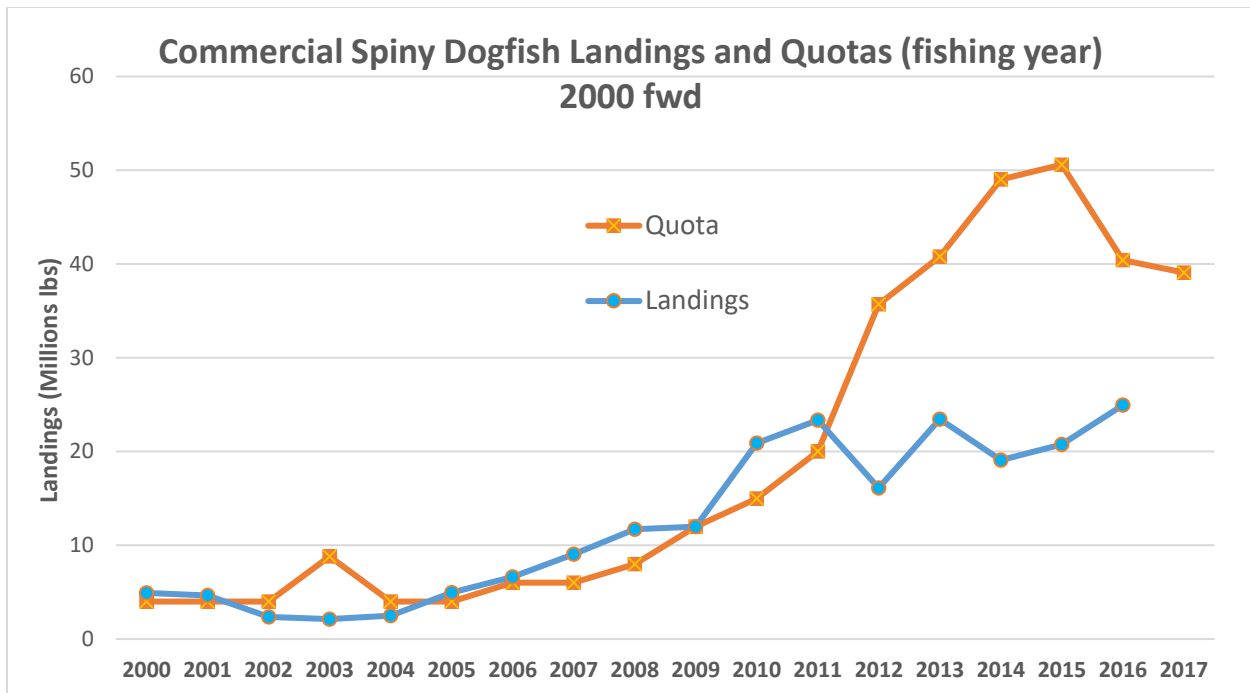
OFL = Overfishing Level; ABC = Acceptable Biological Catch; ACL = Annual Catch Limit; ACT = Annual Catch Target; TAL = Total Allowable Landings; Rec = Recreational; Comm = Commercial.

## Fishery Performance

At the onset of the domestic commercial fishery in the early 1990's, population biomass for the Northwest Atlantic stock of spiny dogfish was at its highest estimated level (approx. 1.2 billion lb). A large scale unregulated fishery developed and quickly depleted the stock of mature female spiny dogfish such that in 1997 a stock assessment showed that the stock was overfished (NEFSC 1997). The Spiny Dogfish FMP was developed in 1998 and implemented in 2000 in order to halt further depletion of mature female spiny dogfish and allow the stock to recover to a sustainable level. Because the directed commercial fishery concentrated on mature females, rebuilding required elimination of that directed fishery. In 2010 NMFS communicated the rebuilt status of the stock to the Councils.

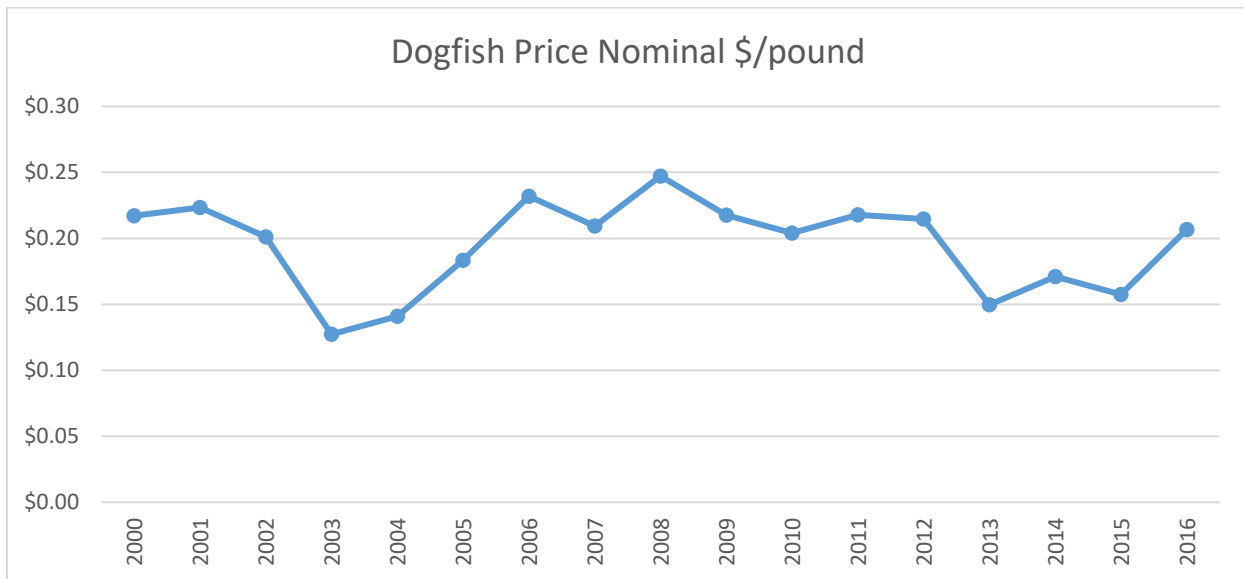
The current (May 1, 2016 – April 30 2019) quotas are derived from the recommendations of the Council's Scientific and Statistical Committee (SSC) for Acceptable Biological Catch (ABC), and how various components of fishing mortality are handled by the spiny dogfish fishery management plan, as described in the table above. The SSC uses the best available scientific information to set ABC consistent with the Council's risk policy to avoid overfishing and achieve optimum yield. The trip limit is 6,000 pounds in Federal waters; individual states may set more restrictive possession limits.

The following pages provide information on landings and prices since 2000 (pages 3-4), the progression of landings through the year for the current and previous fishing years (page 4), landings by state, month, and gear for 2014-2016 (page 5), and vessel activity since 2000 (page 6).



**Figure 1. Spiny Dogfish Landings and Quotas 2000-2016. 2016 = May 1, 2016 to April 30, 2017.**

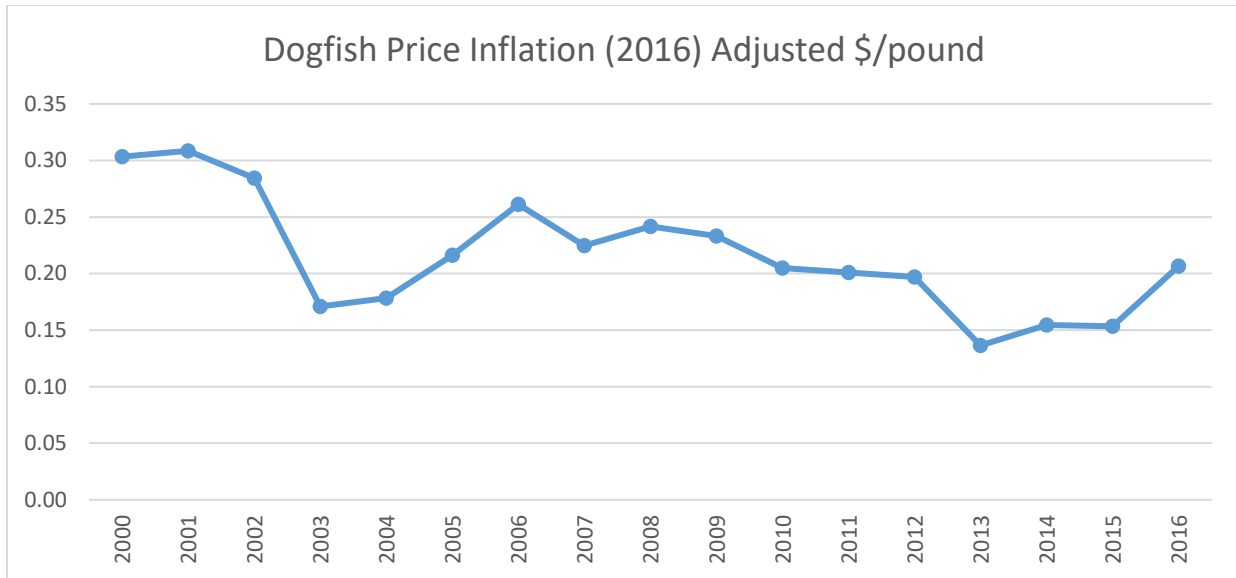
Source: Unpublished NMFS dealer reports



**Figure 2. U.S. Spiny Dogfish fishing year ex-vessel prices Calendar Year (Nominal)**

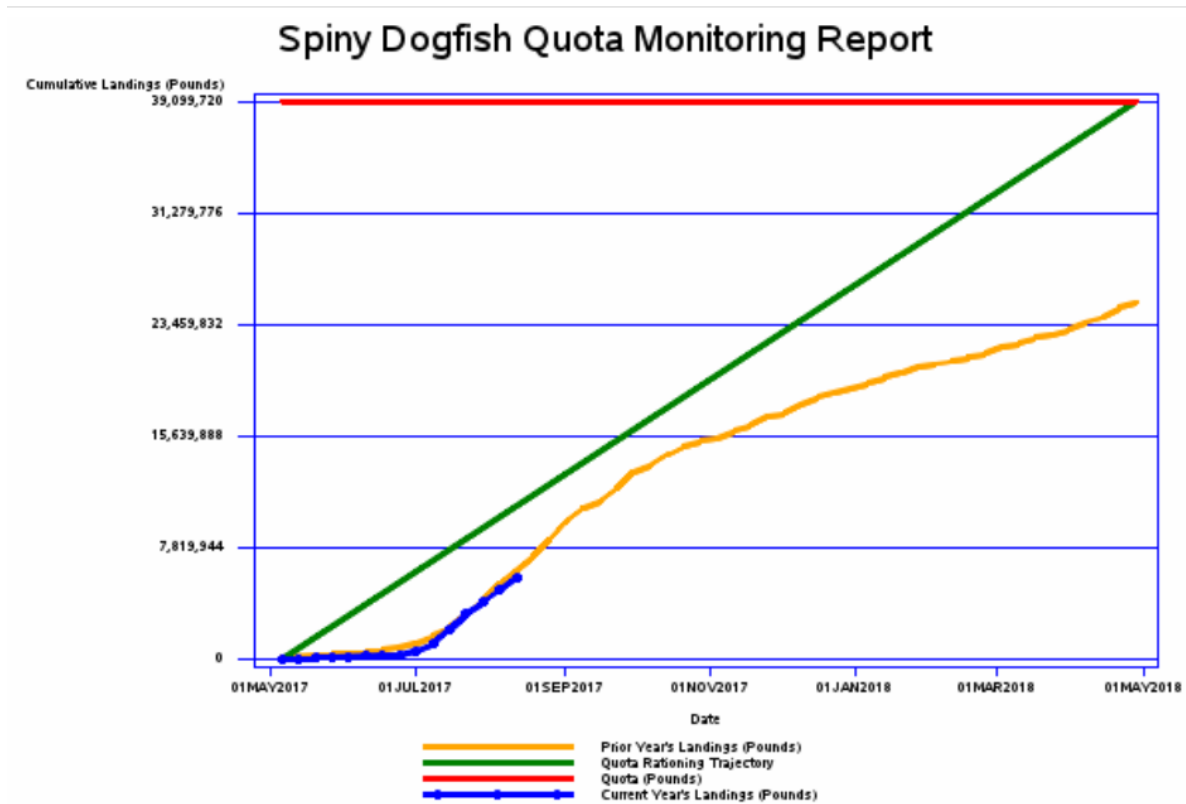
Source: Unpublished NMFS dealer reports

Note: Avg. Price since May 1, 2017 = 22 cents; Avg Price Aug 1-Aug 16, 2017 = 22 cents (Preliminary)



**Figure 3. U.S. Spiny Dogfish fishing year ex-vessel prices Calendar Year (Producer Price Index adjusted, 2016 dollars)**

Source: Unpublished NMFS dealer reports



**Figure 4. Spiny Dogfish Landings (Blue = 2017-2018 Fishing Year; Orange = 2016-2017 Fishing Year)**  
(Data through 8/12/17)

**Table 2. 2014-2016 Calendar Year dogfish landings by state (pounds)**

YEAR	CT	MA	MD	ME+Other	NC	NH	NJ	NY	RI	VA	Total
2014	33,864	9,422,869	1,051,609	230,687	5,396,223	1,704,651	2,202,747	69,034	689,445	2,641,962	23,443,091
2015	34,400	7,849,795	1,140,724	20,530	3,835,242	923,635	1,910,056	29,835	528,559	2,796,559	19,069,335
2016	33,128	14,365,312	1,381,015	678	2,320,523	755,605	3,607,489	39,064	670,682	3,495,086	26,668,582

Source: unpublished NEFSC dealer reports

**Table 3. 2014-2016 Calendar Year dogfish landings by month. (pounds)**

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2014	1,330,398	2,407,670	1,948,007	711,112	189,828	649,121	3,150,575	2,911,739	2,818,723	1,817,351	2,220,089	3,288,478	23,443,091
2015	2,149,252	1,879,910	1,042,833	664,004	217,713	188,187	3,051,504	2,879,635	1,859,773	811,894	1,737,913	2,586,717	19,069,335
2016	2,848,995	1,352,475	1,845,163	1,413,103	299,780	1,140,263	3,834,146	4,962,902	3,162,140	2,089,312	1,970,507	1,749,796	26,668,582

Source: unpublished NEFSC dealer reports

**Table 4. 2014-2016 Calendar Year dogfish landings by gear.**

YEAR	GILL_NET_SINK_ OTHER	LONGLINE_ BOTTOM	GILL_NET_SET_ STAKE_SEA_ BASS	HAND_LINE_ OTHER	TRAWL_OTTER_ BOTTOM_FISH	GILL_NET_ DRIFT_LA RGE_PELA GIC	GILL_NET_ RUNAROUND	GILL_NET_ OTHER	Other/Unk nown
2014	11,632,466	3,662,223	4,733,309	1,058,551	1,157,981	277,303	148,709	15,098	757,451
2015	10,103,553	2,939,522	3,283,804	1,228,404	846,502	184,228	169,974	25,895	287,453
2016	15,540,703	6,446,262	1,618,757	991,391	975,895	262,135	311,992	138,640	382,807
Total	37,276,722	13,048,007	9,635,870	3,278,346	2,980,378	723,666	630,675	179,633	1,427,711

Source: unpublished NEFSC dealer reports



**Table 5. Number of vessels active in various annual landing ranges (pounds per vessel per year). Federally-permitted vessels.**

YEAR	Vessels 200,000+	Vessels 100,000 - 199,999	Vessels 50,000 - 99,999	Vessels 10,000 - 49,999
2000	30	24	25	122
2001	4	12	11	32
2002	2	14	8	31
2003	4	5	3	11
2004	0	0	0	43
2005	0	0	2	65
2006	0	0	8	117
2007	1	5	17	74
2008	0	11	18	107
2009	0	11	42	191
2010	0	22	42	124
2011	2	55	71	140
2012	20	40	56	181
2013	10	29	43	83
2014	29	37	39	88
2015	26	26	34	56
2016	50	31	27	45

*Source: unpublished NEFSC dealer reports*

# Update of Landings, Discards and Survey Indices for Spiny Dogfish in 2016-2017

**Katherine Sosebee**  
**Northeast Fisheries Science Center**  
**National Marine Fisheries Service**

**Mid Atlantic Fishery Management Council**  
**Scientific and Statistical Committee**  
**August 18, 2017**

*This information is distributed solely for the purpose of pre-dissemination peer review. It has not been formally disseminated by NOAA. It does not represent any final agency determination or policy.*

## ***Commercial Data***

This document summarizes the most recent information on spiny dogfish stock status through 2017 and catch data through 2016. Landings data include landings from US and distant water commercial fisheries, and US recreational landings. Discard information includes discards from US commercial fisheries and US recreational fisheries. Estimates of dead discards are obtained by multiplying the total discards, estimated by the SBRM approach, by the gear-specific discard mortality rates.

Recreational landings and discards were obtained from the Marine Recreational Information Program (MRIP) <http://www.st.nmfs.noaa.gov/recreational-fisheries/access-data/run-a-data-query/index>. Canadian and distant water landings were obtained from the Northwest Atlantic Fisheries Organization (NAFO) catch statistics database (<https://www.nafo.int/Data/STATLANT>) for both spiny dogfish and unclassified dogfishes for NAFO Subareas 2-4.

Total landings are summarized in Table 1 and Fig. 1. US commercial landings in 2016 increased 40% from 8,663 mt in 2015 to 12,097 mt in 2016 (Table 1). These landings were the highest since 1999. Recreational landings and distant water fleet landings were negligible, totaling only 97 mt. Canadian landings have been less than 100 tons since 2009.

The precision of the recreational landings (catch types A and B1) in 2016 was relatively poor with Proportional Standard Errors of 67.3 and 73.4% respectively (Table 2). The precision of the discarded dogfish estimates (B2) was much better at 17.3%

The primary sources of commercial discards are otter trawls (5,084 mt; CV=7.9%) and sink gill nets (1,941 mt; CV=23.0%). Discards of spiny dogfish by scallop dredges (120 mt; CV=14.0%) and long lines (165 mt; CV=40.0%) are less important (Table 3). Additional estimates of precision of discard estimates by gear and sex may be found in Appendix 1.

Total discards in 2016 of 10,437 mt were 30% more than the 8,033 in 2015 but 13% less than the previous 5 year average (Table 4). Similar patterns were observed for dead discards. There were no major changes in the discarding patterns among fleets. The ratio of dead discards to landings

of 32% in 2016 was lower than 2015. The ratios of total discards to landings and total dead discards to landings exhibit a generally declining trend since 2004 (Fig. 3). The patterns suggest a continuing trend of improved utilization of the spiny dogfish resource. The total catch estimate in 2016 of 16,087 mt (Table 4) was about 96% of the 2016 ABC of 16,765 mt.

Biological samples collected by port agents are used to estimate the size and sex composition of the spiny dogfish landings (Table 5). Overall landings are dominated by females, a trend that has persisted since the US EEZ fishery began (Fig. 4). Most fishing takes place near shore where females are more abundant (Appendix 2).

The fraction of male dogfish in the landings decreased in 2016 to about 7%. This is more in line with the percentage in the previous decade of 4 to 9%, compared to the 18% of 2015. The average weights of male and female dogfish landed in 2016 were similar to recent averages compared to the average weights in 2015.

About 4.7 million spiny dogfish were landed in 2016. This was an increase of about 24% in total numbers landed (Table 5). In contrast the total weight of landings increased by 40% due to the increased average weight of both males and females. This is the highest number of spiny dogfish landed since 6.4 million fish were landed in 2000.

The sex ratios of discarded fish are dominated by females, but represent only 57% of total discards by weight (Table 6). This difference, compared to landings, is likely due to the much higher rate of discarding of male fish. On a numerical basis, about 58% of the female dogfish caught in 2015 were landed (Tables 5 and 6). In contrast, only about 13% of male dogfish caught were landed.

### ***Survey Data***

The Northeast Fisheries Science Center (NEFSC) bottom trawl survey was completed on time in 2017 but delayed in 2016 while all of the core survey strata were completed. In contrast, mechanical problems on the FSV Bigelow in 2014 not only delayed the NEFSC spring bottom trawl survey but also resulted in the loss of critical survey strata in the Mid-Atlantic region. The potential effects of the delay in survey timing in 2016 on the abundance indices are unknown.

Survey estimates of relative abundance were converted to Albatross-equivalent estimates using the methods described in Miller et al. (2010).

Female spawning stock biomass estimates from 2009 to 2015 exceeded the female spawning stock biomass target (159,288 mt; Rago and Sosebee 2015). The biomass estimates increased in 2016. Swept area abundance estimates for both male and female spiny dogfish decreased in 2017 compared to 2016 (Table 7, Figure 10). The female SSB estimate for 2017 of 24.4 kt is the lowest in the time series. However, all size and sex classes decreased, which likely indicates a year specific availability. The spatial distribution for 2017 is very different than 2016 with almost no dogfish caught on Georges Bank (Appendix 3). The 3-yr average of the mature female swept area biomass estimates was 112 kt which is less than the biomass target of 159 kt but above the threshold (79,644 mt). It is important to note that the comparisons with the biomass target and threshold are based on outputs of the stochastic model (which was not updated this

year) rather than the simple 3-yr average. However, these quantities are closely correlated so the raw survey data provides a first approximation.

Pup production (Fig. 5) in 2017 was below both the long term mean and median values. The ratio of mature males to mature females increased five-fold (Fig. 6). Both of these are likely a year specific effect. The mean length of mature females declined in 2017 (Fig. 7) but was above the average of 1997-2003 when recruitment was low. The mean length of pups (Fig. 8) in 2017 was above the long term mean and median values and well above the average of 1997-2003 when recruitment was low. The sizes of mature females have been maintained while males are relatively unchanged (Fig. 9). The size composition of sub adults is broadening and approaching distribution seen prior to major fisheries in 1990s.

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Table 1. Total spiny dogfish landings (mt, live) in NAFO Areas 2 to 6, 1962-2016.

Year	United States		Canada	Distant Water Fleets	Total Landings
	Commercial	Recreational			
1962	235		0	0	235
1963	610		0	1	611
1964	730		0	16	746
1965	488		9	198	695
1966	578		39	9,389	10,006
1967	278		0	2,436	2,714
1968	158		0	4,404	4,562
1969	113		0	9,190	9,303
1970	106		19	5,640	5,765
1971	73		4	11,566	11,643
1972	69		3	23,991	24,063
1973	89		20	18,793	18,902
1974	127		36	24,513	24,676
1975	147		1	22,523	22,671
1976	550		3	16,788	17,341
1977	931		1	7,199	8,131
1978	828		84	622	1,534
1979	4,753		1,331	187	6,271
1980	4,085		660	599	5,344
1981	6,865	1,493	564	974	9,896
1982	5,411	70	389	364	6,234
1983	4,897	67		464	5,428
1984	4,450	91	2	391	4,935
1985	4,028	89	13	1,012	5,142
1986	2,748	182	20	368	3,318
1987	2,703	306	281	139	3,429
1988	3,105	359	1	647	4,112
1989	4,492	418	167	256	5,333
1990	14,731	179	1,309	393	16,611
1991	13,177	131	307	234	13,848
1992	16,858	215	868	67	18,008
1993	20,643	120	1,435	27	22,225
1994	18,798	155	1,820	2	20,774
1995	22,578	68	956	14	23,615
1996	27,136	25	431	236	27,827
1997	18,351	66	446	214	19,078
1998	20,628	39	1,055	607	22,329
1999	14,855	53	2,091	554	17,552
2000	9,257	5	2,741	402	12,405
2001	2,294	28	3,820	677	6,819
2002	2,199	205	3,584	474	6,462
2003	1,170	40	1,302	643	3,155
2004	982	105	2,362	330	3,778
2005	1,147	45	2,270	330	3,792
2006	2,249	94	2,439	10	4,792
2007	3,503	84	2,384	31	6,002
2008	4,108	214	1,572	131	6,025
2009	5,377	34	113	82	5,606
2010	5,440	21	6	127	5,594
2011	9,480	32	124	143	9,779
2012	10,660	19	65	137	10,881
2013	7,312	37	NA	61	7,410
2014	10,651	31	54	31	10,767
2015	8,663	39	1	23	8,726
2016	12,097	73	37	24	12,231

Table 2. Summary of spiny dogfish landings and discards based on Marine Recreational Information Program estimates. As in previous assessments, the average weight of landed and discarded spiny dogfish is assumed to be 2.5 kg. Discard mortality is assumed to be 20%. The revised MRIP estimator was used for 2004 to 2016. Differences between MRFSS and MRIP were considered minor relative to total catch (ie Commercial landings and discards); no adjustments were made to historical recreational data.

Year	Catch in Numbers								Numbers		Weight		
	Observed Harvest (A)	PSE	Reported Harvest (B1)	PSE	Released Alive (B2)	PSE	Total Catch A+B1+B2	PSE	Total Landings A+B1 (number)	Discards B2 (number)	Landings (A+B1) (mt)	Discards (B2) (mt)	Dead Discards (mt)
1981	5,943	49.1	591,300	52.1	118,440	31.3	715,683	43.4	597,243	118,440	1493	296	59
1982	12,460	38.6	15,712	45.5	139,730	21.4	167,902	18.5	28,172	139,730	70	349	70
1983	13,154	36.3	13,675	34.1	215,973	23.7	242,803	21.2	26,829	215,973	67	540	108
1984	9,606	48.1	26,918	45.1	169,574	35.1	206,099	29.6	36,524	169,574	91	424	85
1985	5,495	47.7	30,172	38.3	385,745	41.8	421,412	38.4	35,667	385,745	89	964	193
1986	11,598	26.5	61,688	22.8	474,930	17.7	548,216	15.6	73,286	474,930	183	1187	237
1987	14,286	44	108,171	28.9	422,387	21.6	544,844	17.8	122,457	422,387	306	1056	211
1988	46,068	30.6	98,002	19.8	350,410	24.4	494,480	18	144,070	350,410	360	876	175
1989	63,031	40.6	104,511	34.4	539,731	17.2	707,273	14.5	167,542	539,731	419	1349	270
1990	22,364	26.1	49,045	28.6	468,085	14.6	539,494	13	71,409	468,085	179	1170	234
1991	30,459	21.9	21,884	22.7	539,883	13.5	592,227	12.4	52,343	539,883	131	1350	270
1992	46,753	22.8	50,483	23.1	407,485	10.6	504,721	9.1	97,236	407,485	243	1019	204
1993	23,350	21.6	24,535	30.8	444,077	15.5	491,963	14.1	47,885	444,077	120	1110	222
1994	17,714	34	44,230	35.6	387,274	15.2	449,218	13.6	61,944	387,274	155	968	194
1995	15,447	31.2	11,583	37.2	261,465	11.5	288,496	10.7	27,030	261,465	68	654	131
1996	8,500	29.8	1,843	48.4	131,672	12.7	142,015	11.9	10,343	131,672	26	329	66
1997	21,017	24.4	5,582	54.9	337,431	12.1	364,030	11.3	26,599	337,431	66	844	169
1998	14,831	28.7	9,445	78.2	243,988	13.2	268,264	12.4	24,276	243,988	61	610	122
1999	11,995	52.5	9,710	68.2	214,974	11.5	236,679	11.1	21,705	214,974	54	537	107
2000	1,773	46.6	271	89.5	276,258	16.3	278,302	16.2	2,044	276,258	5	691	138
2001	7,771	39.7	3,459	44.6	842,583	9.1	853,812	9	11,230	842,583	28	2106	421
2002	2,281	32.3	79,691	43.8	669,469	10.6	751,440	10.5	81,972	669,469	205	1674	335
2003	8,314	36.2	7,560	33.9	1,199,490	8	1,215,364	7.9	15,874	1,199,490	40	2999	600
2004	19,328	44.7	28,761	38.9	1,315,796	14.1	1,363,885	13.6	48,089	1,315,796	120	3289	658
2005	6,894	33.5	7,230	37.9	1,339,412	19.9	1,353,536	19.7	14,124	1,339,412	35	3349	670
2006	7,592	40.1	24,221	65.7	1,420,564	11.6	1,452,377	11.4	31,813	1,420,564	80	3551	710
2007	2,134	44.2	32,352	67.3	1,557,079	12.7	1,591,565	12.5	34,486	1,557,079	86	3893	779
2008	10,930	35.3	34,701	38	1,078,307	12.6	1,123,938	12.2	45,631	1,078,307	114	2696	539
2009	6,155	40.3	10,929	31.9	1,031,866	13	1,048,951	12.8	17,084	1,031,866	43	2580	516

Table 2. Cont.

Year	Catch in Numbers								Numbers		Weight		
	Observed Harvest (A)	PSE	Reported Harvest (B1)	PSE	Released Alive (B2)	PSE	Total Catch A+B1+B2	PSE	Total Landings A+B1 (number)	Discards B2 (number)	Landings (A+B1) (mt)	Discards (B2) (mt)	Dead Discards (mt)
2010	2,270	34.4	4,158	60.3	790,412	20.7	796,840	20.6	6,428	790,412	16	1976	395
2011	5,742	42.6	7,063	48.6	924,891	14.8	937,696	14.6	12,805	924,891	32	2312	462
2012	3,413	65.7	4,103	63.6	549,820	18	557,336	17.7	7,516	549,820	19	1375	275
2013	7,381	48.1	7,294	56.9	1,061,125	11.9	1,075,800	11.8	14,675	1,061,125	37	2653	531
2014	2,200	40.2	10,470	28.5	1,900,700	52.4	1,913,370	52.0	12,670	1,900,700	32	4752	950
2015	10,130	63.5	5,629	55.3	488,943	16.3	504,701	15.9	15,758	488,943	39	1222	244
2016	11,135	67.3	18,123	73.4	1,250,842	17.3	1,280,100	17	29,258	1,250,842	73	3127	625

Table 3. Estimated total discards of spiny dogfish (mt) from commercial and recreational US fisheries, 1981-2016. The values for otter trawl and gill net from 1981-1989 are hindcast estimates (see SARC 43).

							Assumed Discard Mortality Rate					
							0.50	0.30	0.75	0.10	0.20	
Total Discards (mt)							Dead Discards					
Year	Otter Trawl	Sink Gill Net	Scallop Dredge	Line gear	Recreational	Total	Otter Trawl	Sink Gill Net	Scallop Dredge	Line gear	Recreational	Total Dead
1981	36,360	5,360	na	na	296	42,016	18,180	1,608	na	na	59	19,847
1982	42,910	4,454	na	na	349	47,713	21,455	1,336	na	na	70	22,861
1983	42,188	4,042	na	na	540	46,770	21,094	1,213	na	na	108	22,415
1984	39,625	4,918	na	na	424	44,967	19,813	1,475	na	na	85	21,373
1985	33,354	4,539	na	na	964	38,857	16,677	1,362	na	na	193	18,232
1986	31,745	4,883	na	na	1,187	37,815	15,873	1,465	na	na	237	17,575
1987	29,050	4,864	na	na	1,056	34,970	14,525	1,459	na	na	211	16,195
1988	28,951	5,132	na	na	876	34,959	14,476	1,540	na	na	175	16,190
1989	28,286	5,360	na	na	1,344	34,990	14,143	1,608	na	na	269	16,020
1990	34,242	6,062	na	na	1,170	41,474	17,121	1,819	na	na	234	19,174
1991	19,322	11,030	32	97	1,350	31,831	9,661	3,309	24	10	270	13,274
1992	32,617	5,953	827	650	1,019	41,066	16,309	1,786	620	65	204	18,983
1993	17,284	9,814	209	44	1,110	28,461	8,642	2,944	157	4	222	11,969
1994	13,908	2,887	723	na	968	18,486	6,954	866	542	na	194	8,556
1995	16,997	6,731	378	na	654	24,760	8,499	2,019	284	na	131	10,932
1996	9,402	3,890	121	na	329	13,742	4,701	1,167	91	na	66	6,025
1997	6,704	2,326	198	na	837	10,065	3,352	698	149	na	167	4,366
1998	5,268	1,965	120	na	610	7,963	2,634	590	90	na	122	3,435
1999	7,685	2,005	41	na	532	10,263	3,843	602	31	na	106	4,581
2000	2,728	4,684	14	na	685	8,111	1,364	1,405	11	na	137	2,917
2001	4,919	7,204	30	na	2,099	14,252	2,460	2,161	23	na	420	5,063
2002	5,540	4,997	58	4,015	1,673	16,283	2,770	1,499	44	402	335	5,049
2003	3,853	5,413	103	2	2,987	12,358	1,927	1,624	77	0	597	4,225
2004	8,299	4,031	53	497	3,490	16,370	4,150	1,209	40	50	698	6,146
2005	7,515	3,338	15	1,175	3,509	15,552	3,758	1,001	11	118	702	5,589
2006	7,773	3,369	14	131	3,840	15,126	3,886	1,011	10	13	768	5,688
2007	8,115	5,133	61	73	4,300	17,681	4,058	1,540	45	7	860	6,510
2008	5,604	4,864	237	260	3,115	14,080	2,802	1,459	178	26	623	5,088
2009	7,010	4,874	364	835	2,869	15,952	3,505	1,462	273	84	574	5,897
2010	5,564	2,385	196	509	1,930	10,584	2,782	716	147	51	386	4,081



Table 3 cont.

							Assumed Discard Mortality Rate					
							0.50	0.30	0.75	0.10	0.20	
Total Discards (mt)							Dead Discards					
Year	Otter Trawl	Sink Gill Net	Scallop Dredge	Line gear	Recreational	Total	Otter Trawl	Sink Gill Net	Scallop Dredge	Line gear	Recreational	Total Dead
2011	6,540	2,831	226	356	2,312	12,264	3,270	849	170	36	462	4,787
2012	6,687	2,959	432	172	1,375	11,626	3,344	888	324	17	275	4,848
2013	6,897	3,107	127	37	2,653	12,820	3,448	932	95	4	531	5,010
2014	8,070	2,388	108	17	4,752	15,335	4,035	716	81	2	950	5,785
2015	5,096	1,655	41	19	1,222	8,033	2,548	496	31	2	244	3,322
2016	5,084	1,941	120	165	3,127	10,437	2,542	582	90	17	625	3,856

Table 4. Total landings, discards and total catch for spiny dogfish, 1989-2016.

Year	Total Discard (mt)	Total Dead Discards (mt)	Total Landings (mt)	Dead Discard/ Landings	Total Discard / Landings	Total Catch (mt)
1989	34,990	16,020	5,333	3.00	6.56	21,353
1990	41,474	19,174	16,611	1.15	2.50	35,785
1991	31,831	13,274	13,848	0.96	2.30	27,122
1992	41,066	18,983	18,008	1.05	2.28	36,991
1993	28,461	11,969	22,225	0.54	1.28	34,194
1994	18,486	8,556	20,774	0.41	0.89	29,330
1995	24,760	10,932	23,615	0.46	1.05	34,547
1996	13,742	6,025	27,827	0.22	0.49	33,852
1997	10,065	4,366	19,078	0.23	0.53	23,443
1998	7,963	3,435	22,329	0.15	0.36	25,764
1999	10,263	4,581	17,552	0.26	0.58	22,134
2000	8,111	2,917	12,405	0.24	0.65	15,321
2001	14,252	5,063	6,819	0.74	2.09	11,882
2002	16,283	5,049	6,462	0.78	2.52	11,510
2003	12,358	4,225	3,155	1.34	3.92	7,380
2004	16,370	6,146	3,778	1.63	4.33	9,925
2005	15,552	5,589	3,792	1.47	4.10	9,382
2006	15,126	5,688	4,792	1.19	3.16	10,480
2007	17,681	6,510	6,002	1.08	2.95	12,512
2008	14,080	5,088	6,025	0.84	2.34	11,113
2009	15,952	5,897	5,606	1.05	2.85	11,503
2010	10,584	4,081	5,594	0.73	1.89	9,675
2011	12,264	4,787	9,779	0.49	1.25	14,566
2012	11,626	4,848	10,881	0.45	1.07	15,729
2013	12,820	5,010	7,410	0.68	1.73	12,420
2014	15,335	5,785	10,767	0.54	1.42	16,552
2015	8,033	3,322	8,726	0.38	0.92	12,048
2016	10,437	3,856	12,231	0.32	0.85	16,087

Table 5. Summary of estimated landings of US, Canadian and foreign fisheries by sex, 1982-2016. US recreational landings included. Estimated total weights based on sum of estimated weights from sampled length frequency distributions from port samples. Estimated weights computed for female as  $W = \exp(-15.025)L^3.606935$  and males as  $W = \exp(-13.002)L^3.097787$  with weight in kg and length in cm. "Samples" = number of measured dogfish.

Year	NMFS Biological Samples from Ports							Prorated Landings by Sex					
	Total Samples Males	Est Total Wt (kg) Males	Average Wt (kg) Males	Total Samples Females	Est Total Wt (kg) Females	Average Wt (kg) Females	Fraction Females by Weight	Total Landings (mt)	Est Landings (mt) of Males	Est Landings (mt) of Females	Number of Males Landed (000)	Number of Females Landed (000)	Total Numbers Landed (000)
1982	24	52.0	2.167	680	3015.7	4.435	0.9830	6,234	106	6,128	49	1,382	1,431
1983				610	2513.9	4.121	1.0000	5,428	0	5,428		1,317	1,317
1984	9	15.8	1.760	1,499	6626.0	4.420	0.9976	4,935	12	4,923	7	1,114	1,120
1985	21	35.2	1.678	1,657	6799.2	4.103	0.9948	5,142	27	5,116	16	1,247	1,263
1986	64	104.1	1.626	1,165	4669.0	4.008	0.9782	3,318	72	3,246	44	810	854
1987	31	52.7	1.700	2,000	7550.1	3.775	0.9931	3,429	24	3,406	14	902	916
1988	7	14.8	2.114	1,764	7560.7	4.286	0.9980	4,112	8	4,104	4	957	961
1989	35	67.5	1.927	1,375	5528.0	4.020	0.9879	5,333	64	5,269	33	1,311	1,344
1990	19	33.7	1.772	2,230	8916.6	3.998	0.9962	16,611	63	16,549	35	4,139	4,174
1991	161	379.2	2.356	1,518	5923.9	3.902	0.9398	13,848	833	13,015	354	3,335	3,689
1992	12	22.3	1.861	3,187	12180.6	3.822	0.9982	18,008	33	17,975	18	4,703	4,721
1993	42	78.4	1.866	2,773	9927.5	3.580	0.9922	22,225	174	22,051	93	6,159	6,253
1994	47	86.6	1.843	2,092	6639.9	3.174	0.9871	20,774	267	20,507	145	6,461	6,606
1995	25	38.9	1.555	2,266	6676.6	2.946	0.9942	23,615	137	23,479	88	7,969	8,056
1996	569	886.7	1.558	1,662	4397.6	2.646	0.8322	27,827	4,669	23,158	2,996	8,752	11,749
1997	303	449.1	1.482	382	780.9	2.044	0.6349	19,078	6,966	12,112	4,700	5,925	10,625
1998	68	85.4	1.257	683	1434.5	2.100	0.9438	22,329	1,255	21,073	999	10,034	11,033
1999	93	130.3	1.401	311	625.5	2.011	0.8276	17,552	3,026	14,527	2,160	7,223	9,382
2000	345	473.1	1.371	1,921	3921.2	2.041	0.8923	12,405	1,335	11,069	974	5,423	6,397
2001	12	17.1	1.422	215	456.5	2.123	0.9640	6,819	246	6,573	173	3,096	3,269
2002	1	1.3	1.279	278	752.5	2.707	0.9983	6,462	11	6,451	9	2,383	2,392
2003	34	48.3	1.421	966	2338.4	2.421	0.9798	3,155	64	3,091	45	1,277	1,322
2004	15	23.9	1.593	1,180	3296.9	2.794	0.9928	3,778	27	3,751	17	1,343	1,360
2005	745	1018.7	1.367	2,065	5196.0	2.516	0.8361	3,792	622	3,171	455	1,260	1,715
2006	646	924.4	1.431	4,211	10382.9	2.466	0.9182	4,792	392	4,400	274	1,785	2,058
2007	507	720.7	1.421	2,865	7514.8	2.623	0.9125	6,002	525	5,477	370	2,088	2,458
2008	236	342.0	1.449	2,925	7973.8	2.726	0.9589	6,025	248	5,777	171	2,119	2,290
2009	472	696.6	1.476	3,378	9161.6	2.712	0.9293	5,606	396	5,210	268	1,921	2,189
2010	821	1213.4	1.478	4,963	14217.4	2.865	0.9214	5,594	440	5,154	298	1,799	2,097
2011	868	1109.9	1.279	4,800	12786.8	2.664	0.9201	9,779	781	8,998	611	3,378	3,989
2012	213	371.8	1.746	3,763	10727.9	2.851	0.9665	10,881	365	10,516	209	3,689	3,898
2013	450	736.7	1.637	5,441	16258.3	2.988	0.9567	7,410	321	7,089	196	2,372	2,569
2014	546	830.6	1.521	4,505	13198.1	2.930	0.9408	10,715	634	10,081	417	3,441	3,858
2015	1164	1705.9	1.466	2,943	7782.9	2.645	0.8202	8,726	1,569	7,157	1,070	2,706	3,777
2016	628	971.9	1.548	4,792	13192.7	2.753	0.9314	12,231	839	11,392	542	4,138	4,680
<i>formula</i>	<i>A</i>	<i>B</i>	<i>C=B/A</i>	<i>D</i>	<i>E</i>	<i>F=E/D</i>	<i>G=E/(E+B)</i>	<i>H</i>	<i>I=(1-G)*H</i>	<i>J=G*H</i>	<i>K=I/C</i>	<i>L=J/F</i>	<i>M=K+L</i>

Table 6. Summary of estimated discards of combined US fleets by sex, 1991-2016. Estimated total weights based on summation of estimated weights from sampled length frequency distributions. Estimated weights computed from length-weight regressions. Female  $W = \exp(-15.025)L^3.606935$ . Male  $W = \exp(-13.002)L^3.097787$  with weight in kg and length in cm. "Samples" = number of measured dogfish that were discarded. 2010 estimates based on fishing year rather than calendar year.

Year	NMFS Biological Samples from Observers							Prorated Discards by Sex					
	Total Samples Males	Est Total Wt (kg) Males	Average Wt (kg) Males	Total Samples Females	Est Total Wt (kg) Females	Average Wt (kg) Females	Fraction Females by Weight	Total Dead Discards (mt)	Est Landings (mt) of Males	Est Discards (mt) of Females	Number of Males Discarded (000)	Number of Females Discarded (000)	Total Numbers Discarded (000)
1991	376	463	1.231	894	2,350	2.628	0.8355	13,274	2,184	11,090	1,775	4,219	5,994
1992	449	504	1.123	632	1,090	1.724	0.6836	18,983	6,007	12,976	5,347	7,526	12,873
1993	57	62	1.087	130	414	3.184	0.8697	11,969	1,559	10,410	1,434	3,270	4,704
1994	207	207	1.001	747	1,397	1.870	0.8708	8,556	1,105	7,451	1,104	3,985	5,090
1995	2,191	2,342	1.069	2,384	3,064	1.285	0.5668	10,932	4,735	6,197	4,431	4,821	9,251
1996	1,643	1,833	1.115	1,370	2,013	1.469	0.5234	6,025	2,871	3,153	2,574	2,147	4,721
1997	1,359	1,391	1.024	1,427	2,070	1.451	0.5980	4,366	1,755	2,611	1,714	1,800	3,514
1998	1,289	1,320	1.024	1,463	1,939	1.326	0.5951	3,435	1,391	2,044	1,359	1,542	2,901
1999	447	440	0.984	870	1,808	2.078	0.8044	4,581	896	3,685	911	1,773	2,684
2000	423	568	1.343	1,498	3,207	2.141	0.8495	2,917	439	2,478	327	1,157	1,484
2001	650	842	1.295	2,987	7,377	2.470	0.8976	5,063	518	4,545	400	1,840	2,241
2002	1,293	1,819	1.407	5,880	13,899	2.364	0.8843	5,049	584	4,464	415	1,889	2,304
2003	4,711	5,367	1.139	12,826	27,210	2.121	0.8353	4,225	696	3,529	611	1,664	2,275
2004	10,878	14,480	1.331	28,583	64,771	2.266	0.8173	6,146	1,123	5,023	844	2,217	3,060
2005	7,470	9,450	1.265	13,024	28,593	2.195	0.7516	5,589	1,388	4,201	1,098	1,914	3,011
2006	4,512	5,449	1.208	7,041	14,559	2.068	0.7277	5,688	1,549	4,139	1,283	2,002	3,284
2007	3,955	5,183	1.310	9,830	24,621	2.505	0.8261	6,510	1,132	5,378	864	2,147	3,011
2008	3,096	3,969	1.282	6,140	14,857	2.420	0.7892	5,088	1,073	4,015	837	1,659	2,496
2009	1,719	2,088	1.215	3,083	6,849	2.221	0.7664	5,897	1,378	4,519	1,134	2,034	3,169
2010	1,634	2,190	1.340	2,086	4,994	2.394	0.6952	4,081	1,244	2,837	928	1,185	2,113
2011	2,286	2,920	1.278	2,428	5,864	2.415	0.6675	4,787	1,591	3,196	1,246	1,323	2,569
2012	734	1,010	1.376	1,384	3,302	2.386	0.7660	4,848	1,136	3,712	825	1,556	2,381
2013	448	381	0.850	701	1,210	1.725	0.7610	5,010	1,200	3,810	1,411	2,208	3,620
2014	743	786	1.058	784	1,428	1.822	0.6450	5,785	2,054	3,731	1,941	2,048	3,989
2015	750	938	1.251	559	1,050	1.878	0.5280	3,322	1,568	1,754	1,253	934	2,187
2016	384	469	1.222	314	611	1.945	0.5655	3,856	1,676	2,181	1,371	1,121	2,492
<i>formula</i>	<i>A</i>	<i>B</i>	$C=B/A$	<i>D</i>	<i>E</i>	$F=E/D$	$G=E/(E+B)$	<i>H</i>	$I=(1-G)*H$	$J=G*H$	$K=I/C$	$L=J/F$	$M=K+L$

Table 7. Biomass estimates for spiny dogfish (thousands of metric tons) based on area swept by NEFSC bottom trawl during spring surveys, 1968-2017. Estimate for 2014 not included as survey coverage was incomplete.

	Lengths $\geq$ 80 cm			Lengths 36 to 79 cm			Length $\leq$ 35 cm			All Lengths	3-pt Average Female SSB
	Females	Males	Total	Females	Males	Total	Females	Males	Total		
1968			41.4			110.4			1.52	153.3	
1969			27.4			69.3			0.66	97.3	
1970			36.7			33.0			3.19	72.9	
1971			103.8			27.6			2.76	134.2	
1972			126.6			145.9			1.55	274.1	
1973			178.7			165.3			2.58	346.5	
1974			221.9			179.6			2.66	404.1	
1975			105.1			125.0			3.97	234.0	
1976			96.3			120.8			1.20	218.3	
1977			77.3			68.0			0.53	145.9	
1978			87.4			131.2			1.24	219.8	
1979			52.3			18.6			1.82	72.7	
1980	104.7	15.3	168.1	16.8	72.2	123.5	0.32	0.39	0.84	292.4	
1981	266.5	24.4	293.8	25.5	75.1	100.6	2.14	2.80	5.06	399.5	
1982	454.0	34.6	488.6	61.6	143.3	204.9	0.48	0.69	1.17	694.6	275.1
1983	77.7	30.1	107.8	36.7	98.5	135.3	3.09	3.95	7.03	250.1	266.1
1984	115.6	27.5	143.1	33.4	88.0	121.4	0.14	0.21	0.35	264.9	215.8
1985	317.0	125.5	442.6	102.5	502.5	605.0	4.01	5.10	9.10	1056.7	170.1
1986	191.3	3.5	194.8	51.9	29.6	81.5	0.84	1.11	1.96	278.2	208.0
1987	219.1	90.5	309.6	61.5	171.7	233.1	2.46	4.76	7.22	550.0	242.5
1988	433.1	26.2	459.4	93.3	153.6	247.0	0.89	1.09	1.98	708.4	281.2
1989	162.1	40.5	202.6	100.4	158.2	258.6	1.14	1.54	2.68	463.9	271.5
1990	400.3	70.7	471.0	163.5	303.1	466.6	0.68	1.03	1.71	939.3	331.8
1991	220.4	30.0	250.3	108.4	186.3	294.7	0.98	1.43	2.41	547.4	260.9
1992	280.5	41.9	322.4	179.9	231.9	411.8	0.73	1.00	1.73	735.9	300.4
1993	234.6	27.8	262.5	104.1	198.5	302.6	0.55	0.65	1.21	566.3	245.2
1994	105.3	37.1	142.4	108.3	254.2	362.5	4.28	5.54	9.82	514.8	206.8
1995	102.4	29.5	131.9	154.0	174.5	328.5	0.25	0.35	0.59	460.9	147.5
1996	196.5	33.4	229.9	201.7	334.8	536.4	0.98	1.14	2.12	768.5	134.7
1997	83.7	17.5	101.2	205.2	209.1	414.3	0.05	0.05	0.10	515.5	127.5
1998	26.7	22.9	49.7	69.0	236.4	305.4	0.05	0.08	0.13	355.2	102.3
1999	62.7	20.4	83.1	140.8	256.4	397.2	0.02	0.03	0.05	480.4	57.7
2000	85.8	11.7	97.5	91.5	166.2	257.7	0.07	0.09	0.16	355.4	58.4
2001	56.7	16.7	73.4	71.4	160.5	231.9	0.04	0.03	0.07	305.4	68.4
2002	75.2	19.0	94.2	131.5	246.3	377.8	0.06	0.06	0.12	472.1	72.5
2003	64.5	22.5	87.1	125.5	256.3	381.8	0.13	0.14	0.27	469.1	65.5
2004	40.4	10.0	50.3	46.9	126.2	173.1	0.66	0.91	1.56	225.0	60.0
2005	55.8	30.8	86.6	59.8	294.7	354.5	0.28	0.42	0.69	441.9	53.6
2006	253.4	29.0	282.5	141.6	406.5	548.1	0.10	0.17	0.27	830.8	116.6
2007	158.0	18.9	176.9	73.6	227.6	301.1	0.23	0.32	0.56	478.6	155.8
2008	241.7	29.6	271.4	91.2	293.7	385.0	0.47	0.59	1.05	657.4	217.7

Table 7. cont.

	Lengths $\geq$ 80 cm			Lengths 36 to 79 cm				Length $\leq$ 35 cm			All Lengths	3-pt Average Female SSB
	Females	Males	Total	Females	Males	Total		Females	Males	Total		
2009	148.3	21.9	170.2	54.9	326.1	381.0	2.95	3.76	6.71		557.9	182.7
2010	160.6	18.3	178.8	64.0	287.3	351.3	1.15	1.44	2.59		532.7	183.5
2011	213.9	26.7	240.6	60.0	408.6	468.6	0.99	2.48	3.47		712.6	174.2
2012	348.4	44.5	399.0	72.6	584.7	723.0	4.06	5.04	9.16		1131.1	241.0
2013	145.6	57.2	202.7	133.1	444.3	577.4	5.25	6.48	11.73		791.8	235.9
2014	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA
2015	125.4	22.3	147.7	40.5	280.2	320.6	1.07	1.35	2.42		470.8	135.5
2016	184.9	29.5	214.4	119.9	429.4	549.3	1.30	1.81	3.11		766.8	181.0
2017	24.4	12.7	37.1	92.5	284.8	377.3	0.23	0.31	0.53		414.9	111.6

Notes: Total equals sum of males and females plus unsexed dogfish. Data for dogfish prior to 1980 are currently not available by sex. Data have been adjusted to AL IV equivalents using weight specific HB Bigelow calibration coefficients. Average SSB for 2015 is 2013 and 2015 only. Average for 2016 is 2015 and 2016 only. Average for 2017 is 2015-2017 as years prior to 2014.

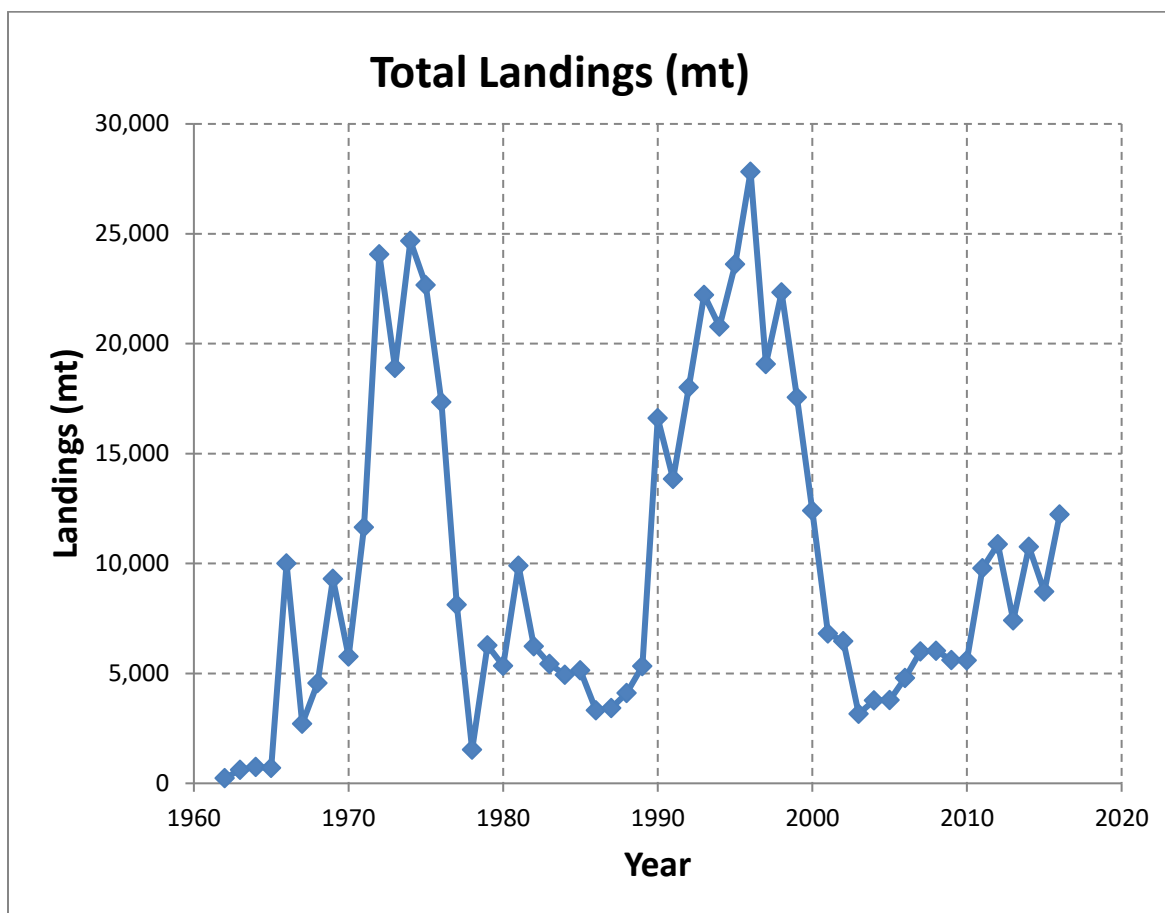


Figure 1. Estimated total landings (mt, live) of spiny dogfish in NAFO Areas 2 to 6, 1962-2016.

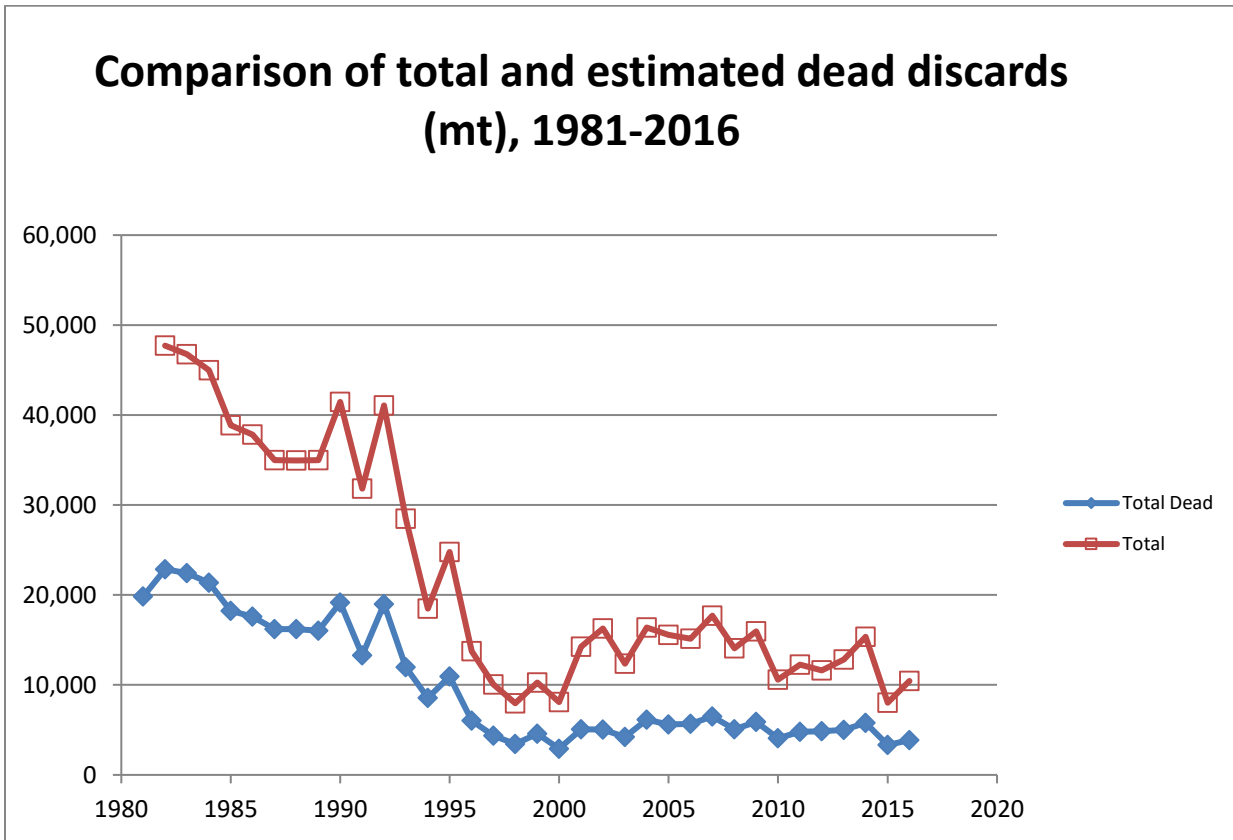


Figure 2. Estimated total and total dead discards in US, 1981-2016. Estimates for 1981 to 1989 are hindcast estimates rather than direct observations.



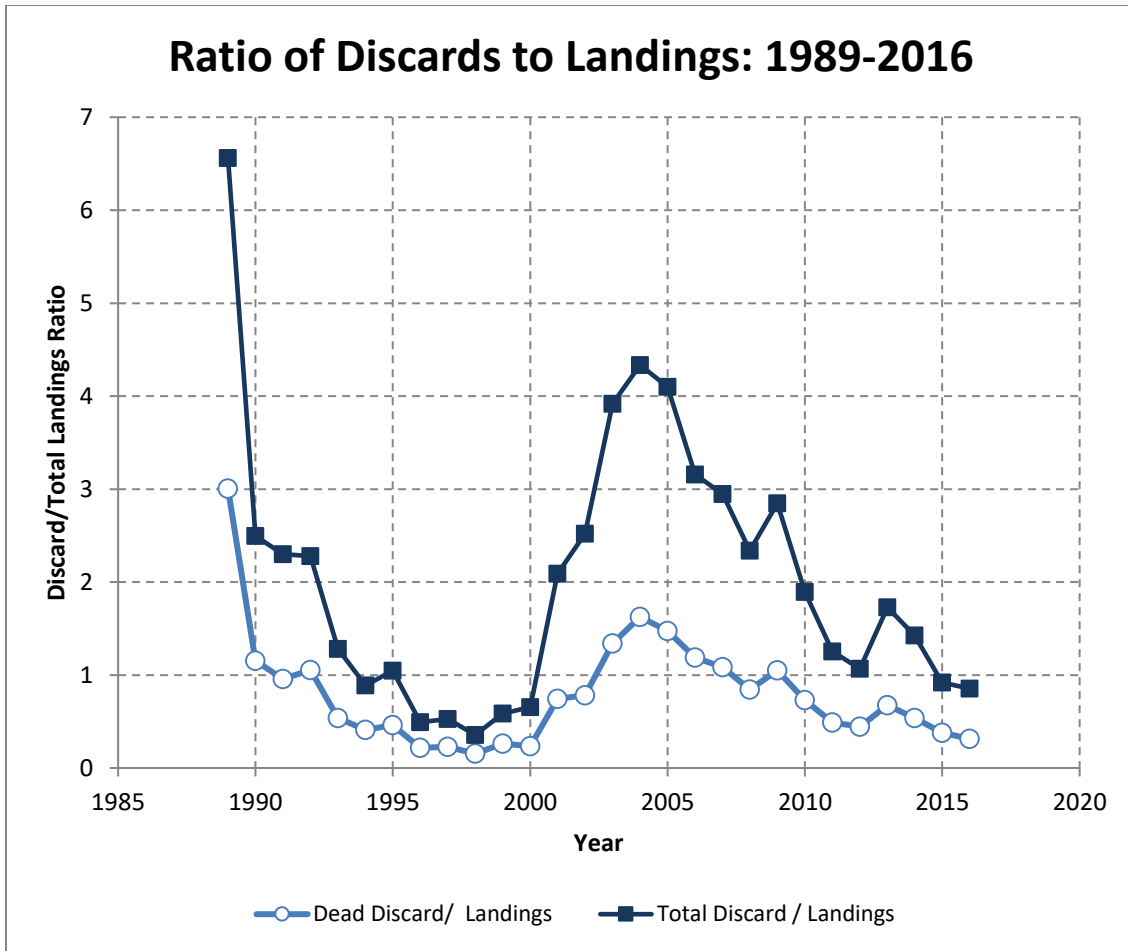


Figure 3. Trends in the ratio of total discards to landings and total dead discards to landings for spiny dogfish, 1989-2016.

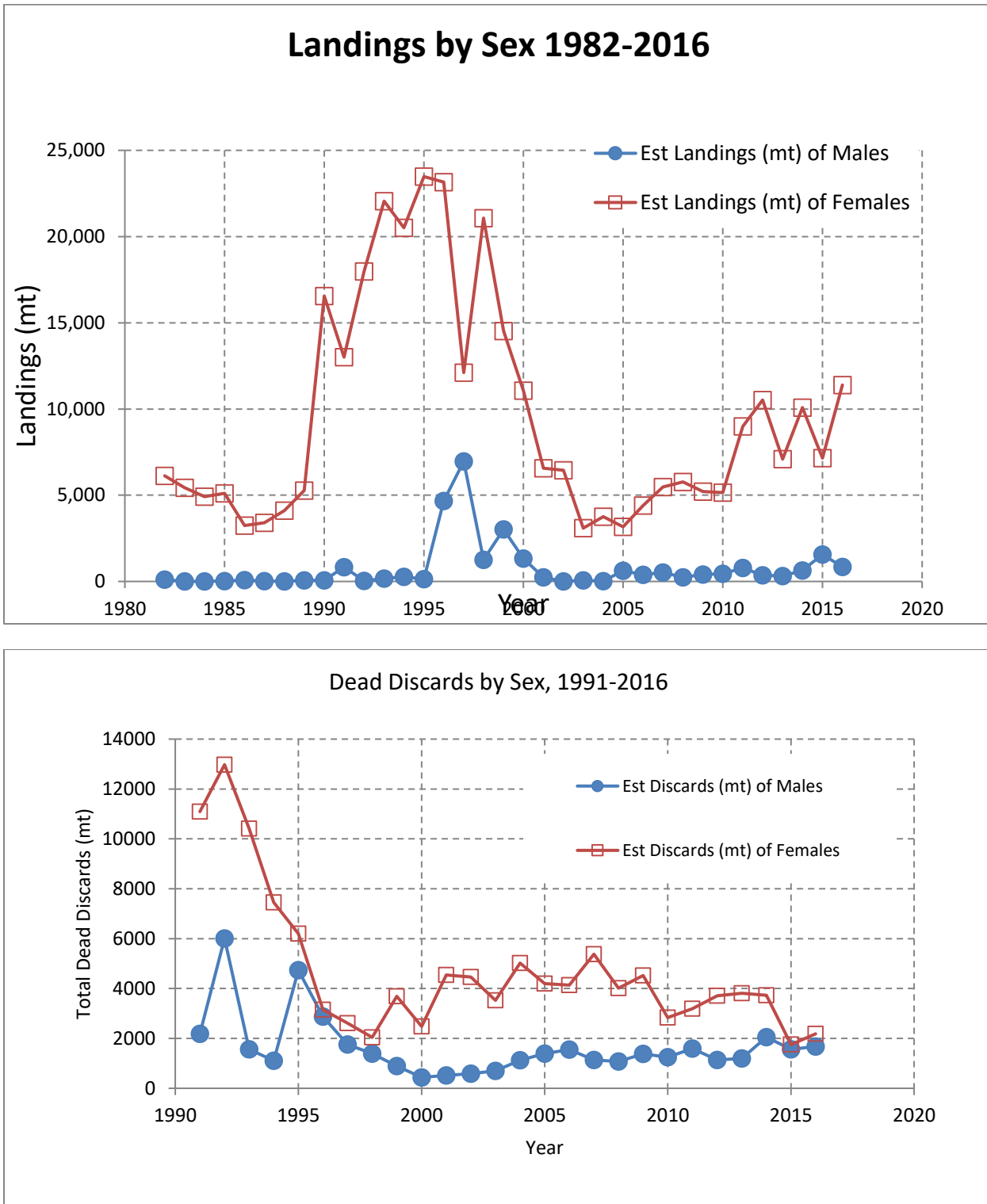


Figure 4. Estimated total landings, 1982-2016 (top) and total dead discards, 1991-2016 (bottom) in mt by sex.

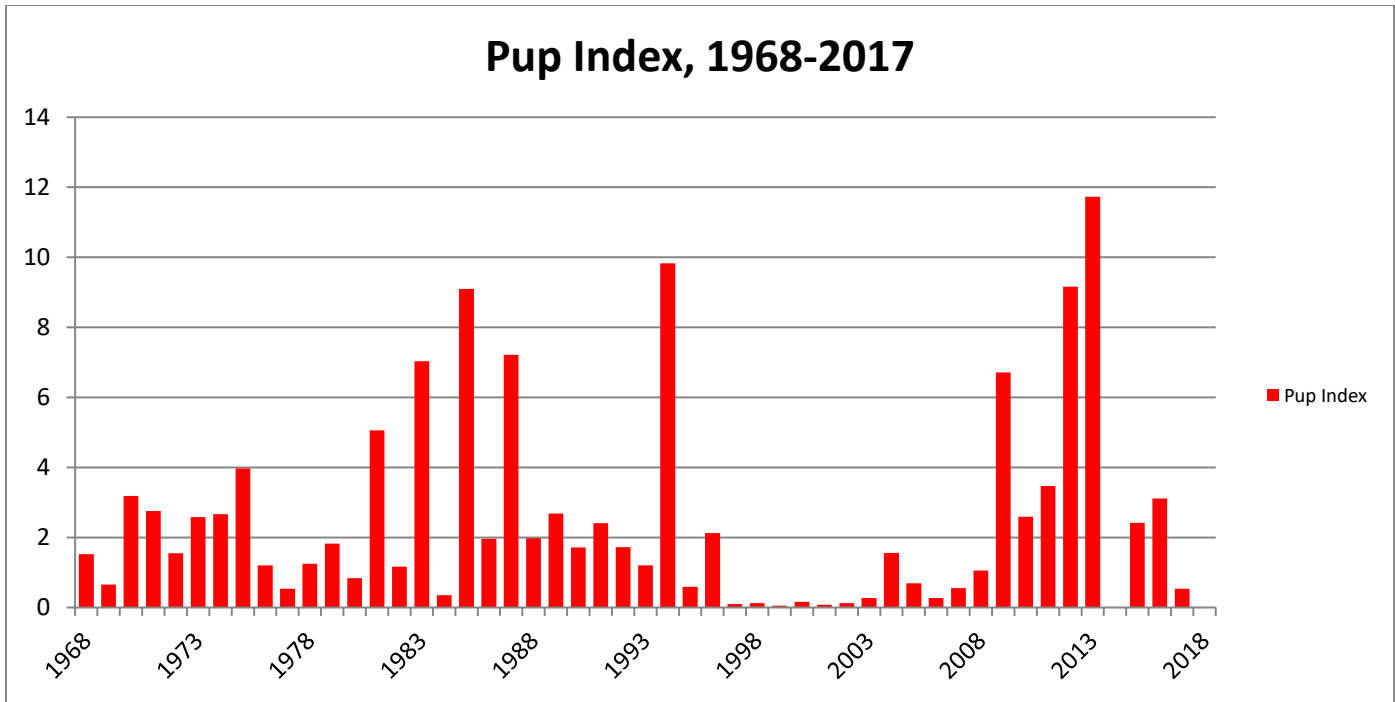


Figure 5. Estimated swept area biomass (mt) of total pups (spiny dogfish  $\leq 35$  cm) captured in the NEFSC spring bottom trawl survey, 1968-2017. Survey was incomplete in 2014; no estimate available.

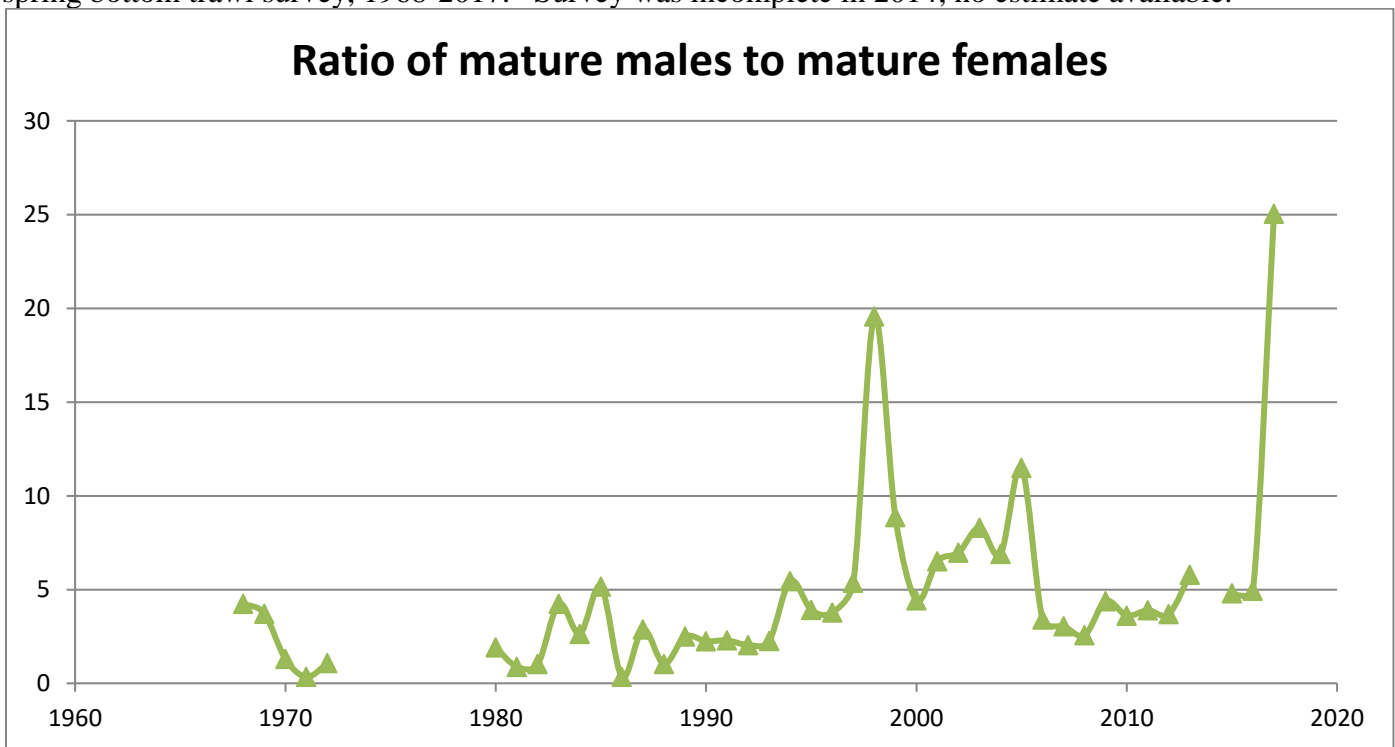


Figure 6. Annual ratios of mature males ( $\geq 60$  cm) to mature females ( $\geq 80$  cm) in NEFSC spring bottom trawl survey, 1968-1972, and 1980-2017. The 2014 survey was incomplete and no estimates were generated. Spiny dogfish sex was not recorded in the NEFSC database for 1973 to 1979.

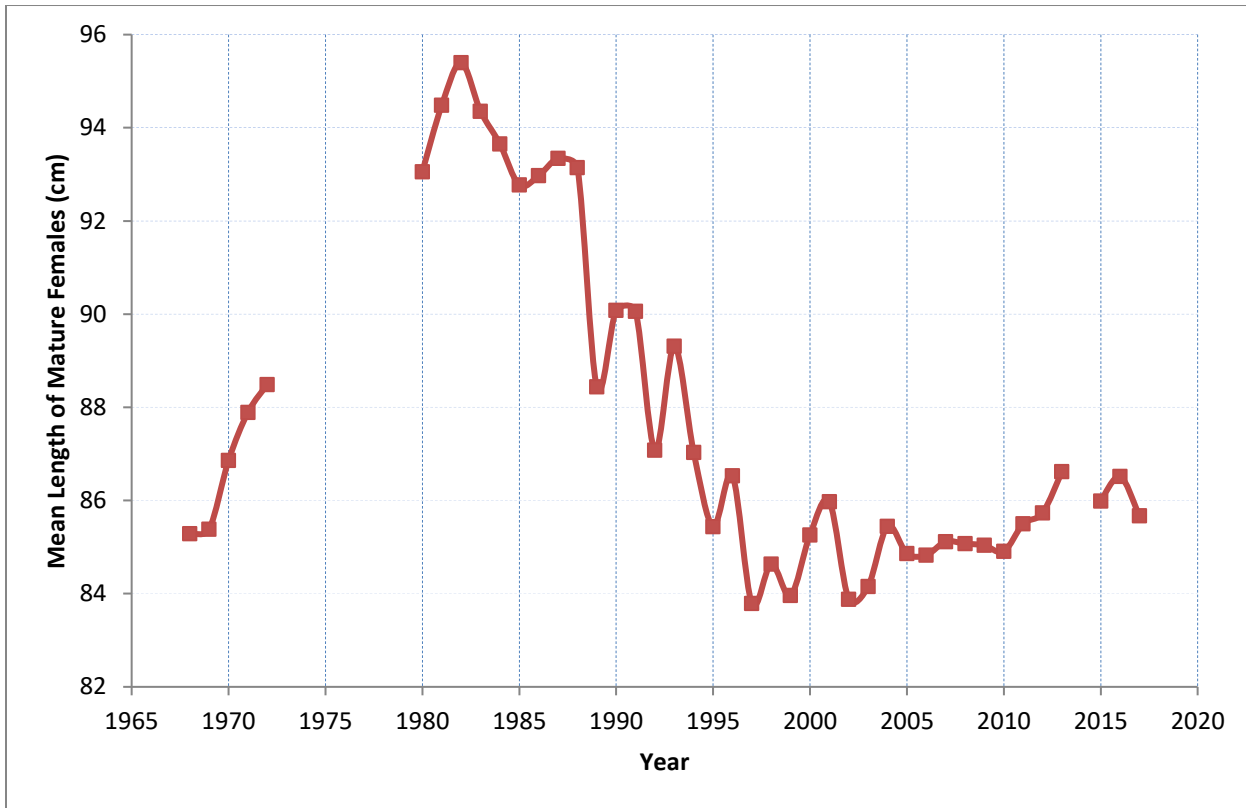


Figure 7. Mean Length of mature female spiny dogfish in NEFSC Spring bottom trawl survey, 1968-1972 and 1980-2017. Survey in 2014 was incomplete. Spiny dogfish sex was not recorded in the NEFSC database for 1973 to 1979.

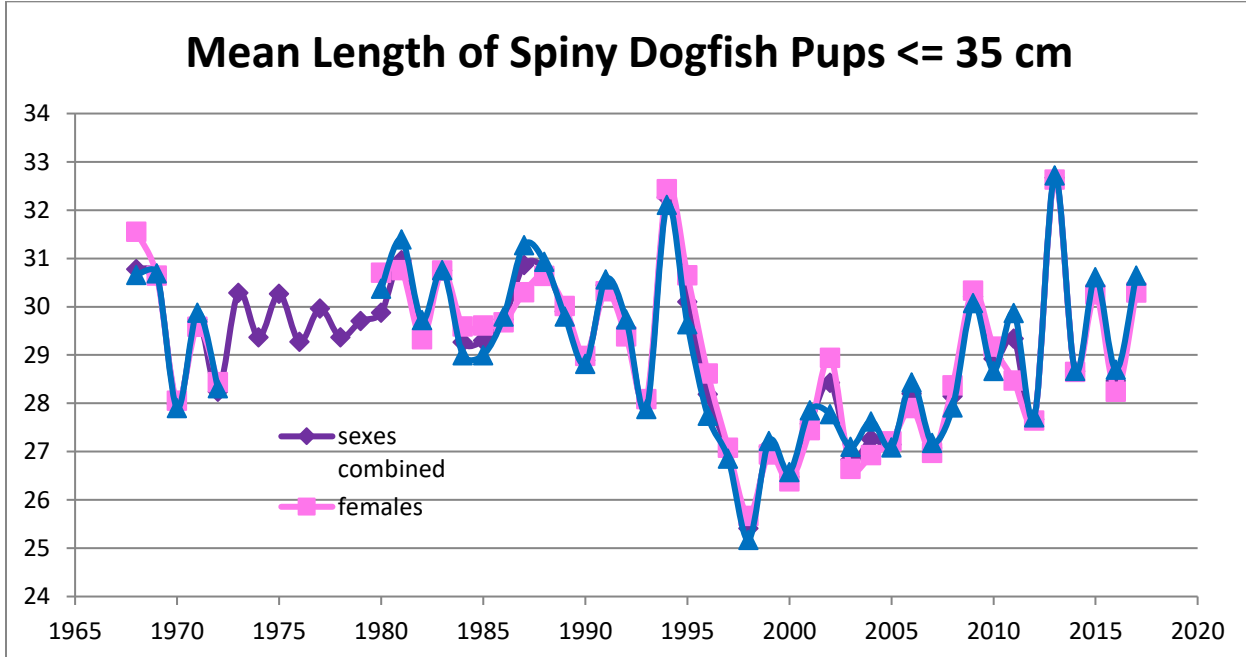


Figure 8. Mean length of male, female and sexes combined spiny dogfish pups ( $\leq 35$  cm) in spring bottom trawl survey 1968-2017. Survey in 2014 was incomplete. Spiny dogfish sex was not recorded in the NEFSC database for 1973 to 1979.

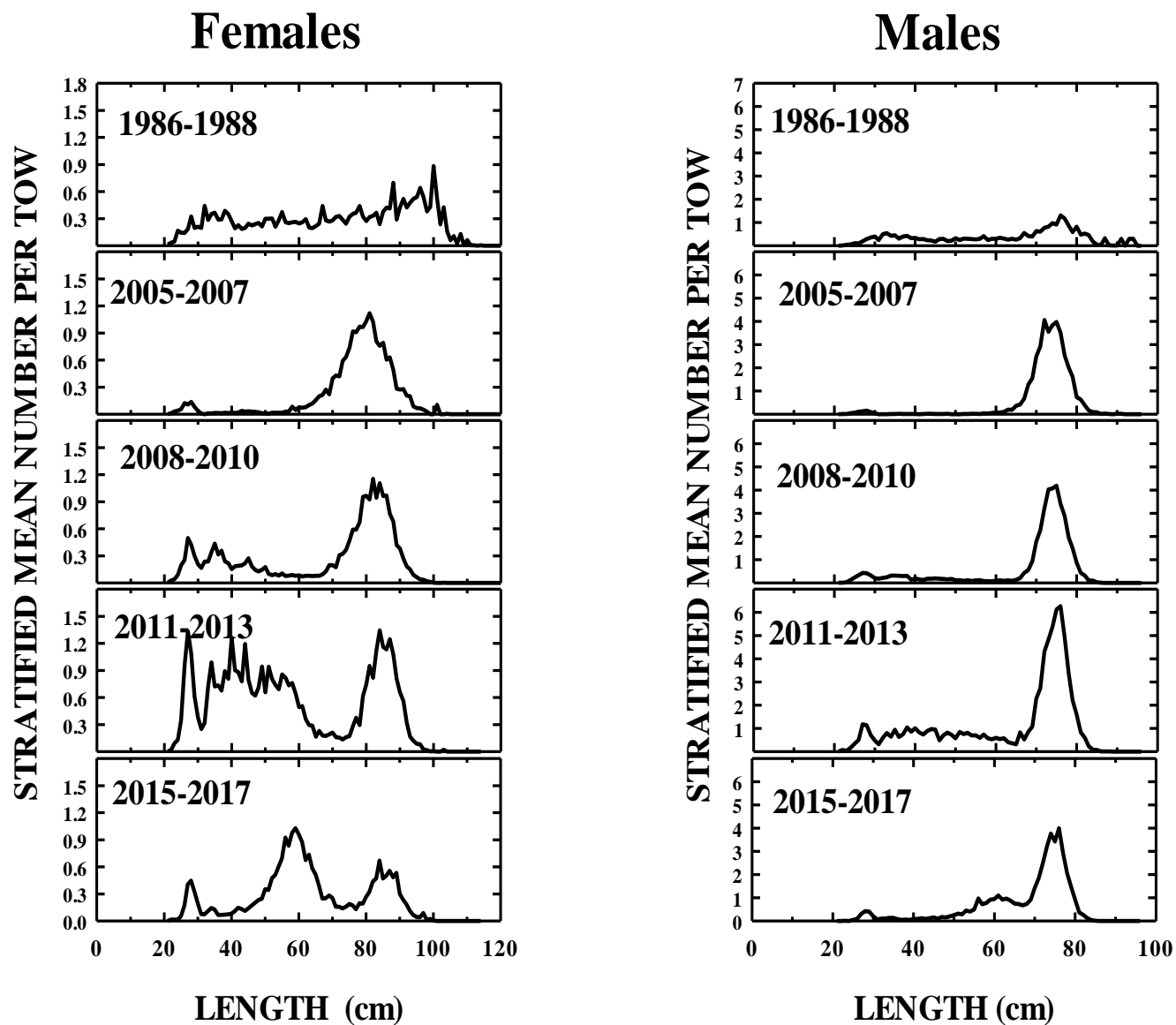


Figure 9. Composite size frequencies for female and male spiny dogfish in NEFSC spring bottom trawl survey. Survey was incomplete for 2014.

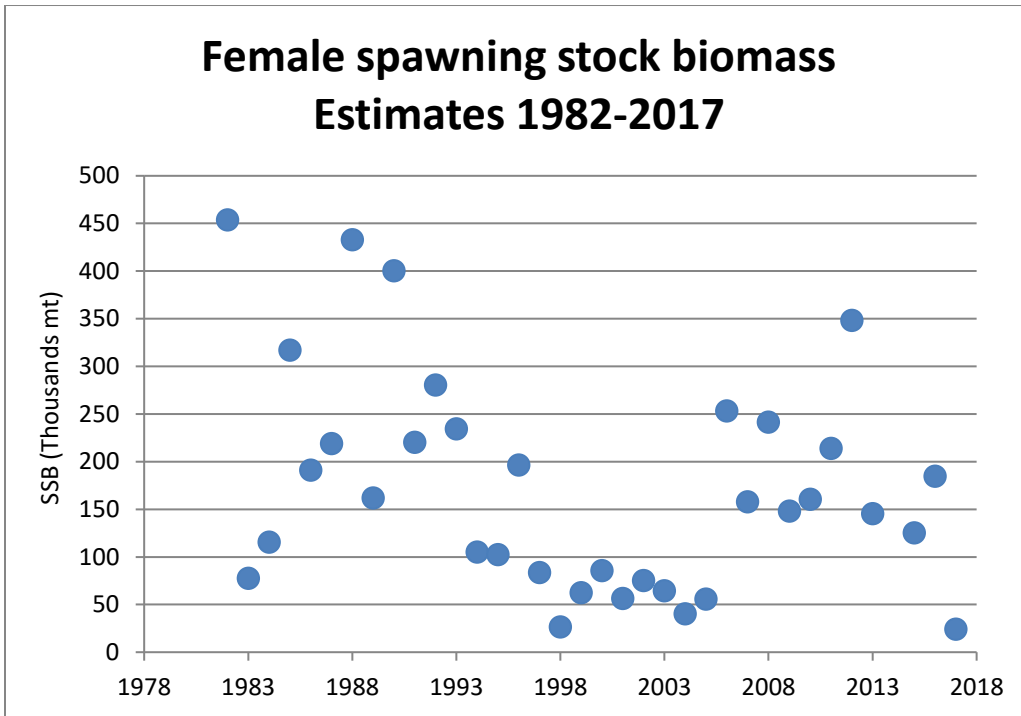


Figure 10. Swept area estimates of female mature biomass ( $\geq 80$  cm) from the NEFSC spring survey from 1980-2017.

**Appendix 1. Summary of total dead discards and standard errors for trawl, gill net and recreational discards for spiny dogfish by sex for 1990 to 2016.**

Year	Trawl Discards (mt)				Gill Net Discards (mt)				Recreational Discards (mt)			
	Male		Female		Male		Female		Male		Female	
	Total	SE	Total	SE	Total	SE	Total	SE	Total	SE	Total	SE
1990	7636.0	1918.5	9485.0	2382.9	256.0	65.1	1563.0	397.6	58.1	8.5	354.5	51.8
1991	4309.0	843.5	5352.0	1047.6	466.0	54.5	2843.0	332.9	56.4	7.6	344.4	46.5
1992	7274.0	1971.9	9034.0	2449.1	251.0	24.1	1535.0	147.1	58.9	6.2	359.5	38.1
1993	3855.0	993.1	4788.0	1233.5	414.0	78.2	2530.0	477.6	48.1	7.5	293.7	45.5
1994	3102.0	786.6	3852.0	976.9	122.0	36.7	744.0	224.3	49.0	7.4	299.0	45.4
1995	2275.0	444.9	6224.0	1217.3	957.0	314.9	1062.0	349.7	90.0	10.4	100.0	11.5
1996	1683.0	466.0	3018.0	835.9	599.0	181.6	568.0	172.4	53.4	6.8	50.7	6.5
1997	1716.0	566.4	1637.0	540.4	220.0	54.1	478.0	117.7	67.3	8.2	146.4	17.9
1998	1077.0	363.5	1558.0	525.9	239.0	69.7	351.0	102.5	65.1	8.6	95.8	12.6
1999	982.0	340.7	2860.0	992.3	117.0	31.2	485.0	129.4	30.9	3.6	128.3	14.9
2000	644.0	156.4	720.0	174.7	149.0	43.5	1256.0	367.4	13.3	2.2	112.1	18.5
2001	428.0	68.8	2031.0	326.2	185.0	55.8	1977.0	596.9	38.1	3.5	407.5	37.1
2002	533.0	168.9	2237.0	708.6	107.0	23.2	1392.0	301.1	40.5	4.3	524.5	55.6
2003	524.0	101.6	1402.0	272.0	172.0	22.4	1452.0	189.6	67.3	5.5	569.8	46.2
2004	1261.0	201.4	2888.0	461.3	127.0	11.9	1083.0	101.4	81.9	7.4	700.7	63.1
2005	994.5	111.8	2762.9	310.6	192.6	24.3	808.9	102.0	125.4	15.1	526.9	63.2
2006	790.8	88.9	2123.0	238.6	244.2	29.3	655.6	78.7	177.0	21.2	475.3	57.0
2007	704.2	84.5	3353.0	376.9	290.5	34.9	1383.3	166.0	155.9	18.7	742.1	89.1
2008	589.8	97.2	2212.2	364.6	307.1	55.1	1152.0	206.8	131.1	12.5	491.8	46.9
2009	883.0	90.4	2895.0	296.4	361.0	52.5	1185.0	172.3	134.0	16.5	439.7	54.1
2010	893.0	70.9	2036.0	161.6	234.0	23.2	533.0	52.9	118.0	13.1	268.7	30.0
2011	1143.0	110.5	2296.0	222.0	294.0	15.3	591.0	30.7	154.0	22.4	309.0	45.1
2012	859.0	77.8	2808.0	254.3	212.0	13.4	693.0	43.6	64.0	11.4	210.0	37.3
2013	825.9	59.2	2622.1	188.0	223.2	21.9	708.8	69.5	127.2	15.1	403.8	48.1
2014	1432.9	105.7	2602.3	192.0	254.4	24.0	462.1	43.6	336.8	176.8	611.8	321.2
2015	1202.7	106.7	1345.3	119.3	234.3	55.7	262.1	62.3	115.5	18.4	129.3	20.6
2016	1104.7	87.6	1437.6	114.0	253.0	58.1	329.2	75.7	271.8	47.0	353.7	61.2

## **Appendix 2. Spatial Distribution of Commercial Landings**



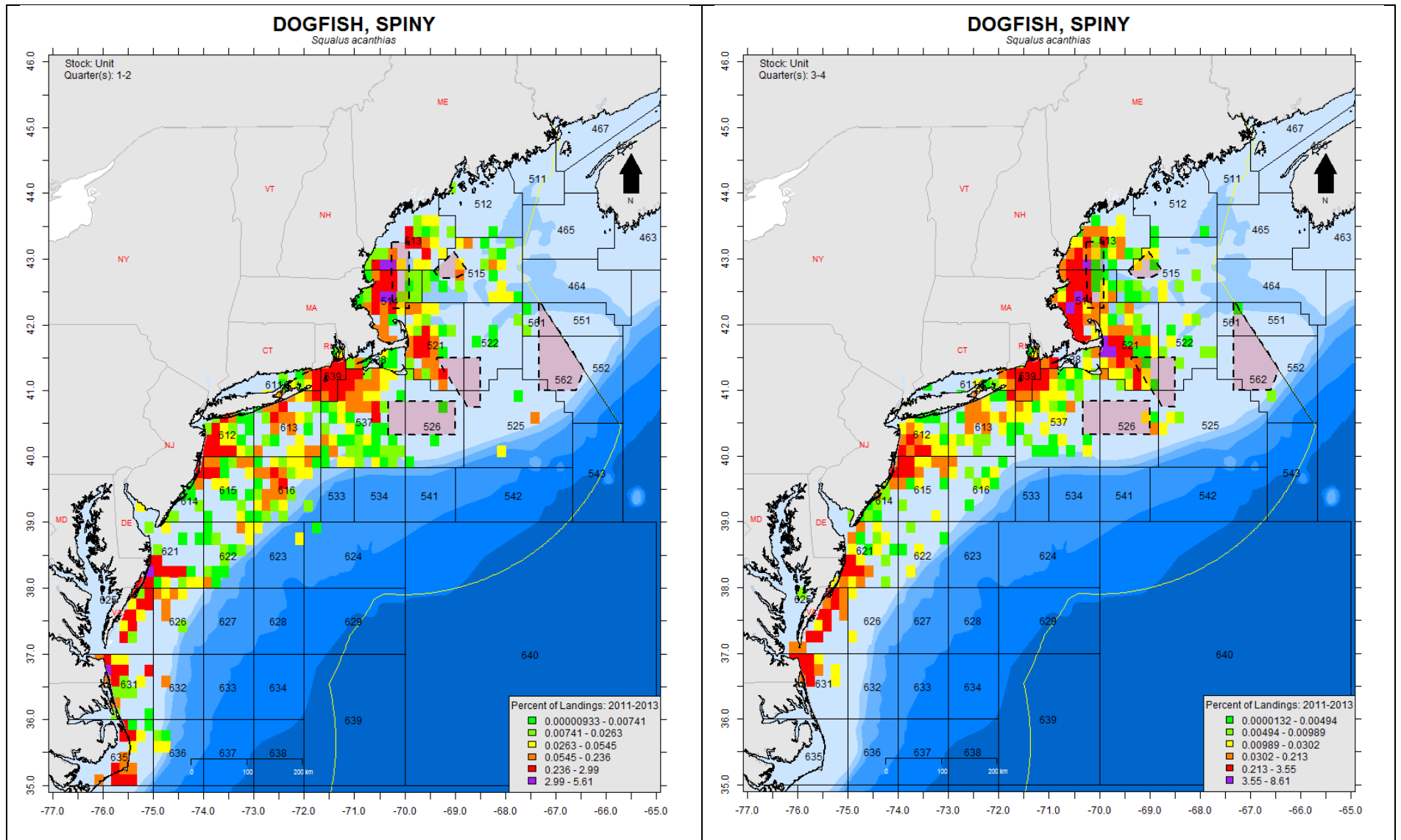


Fig 1. These maps represent commercial landings for DOGFISH, SPINY, *Squalus acanthias* from 2011-2013. Landings were reported via Dealer reports. Data have been restricted to dealer trips matched to a Vessel Trip Report (VTR) (ALEVEL=A) to ensure area information is as accurate as possible. Landings from quarters 1 and 2 are on the left (54.54% of total landings reported for these quarters) and landings from quarters 3 and 4 are in the right panel (71.36% of total landings reported for these quarters) Northeast Fisheries Science Center statistical areas are represented by numbered polygons and bathymetry is depicted in blue shading. Groundfish closed areas (dashed borders), and the Exclusive Economic Zone (yellow line) have been overlaid. Data queried on August 18, 2017.

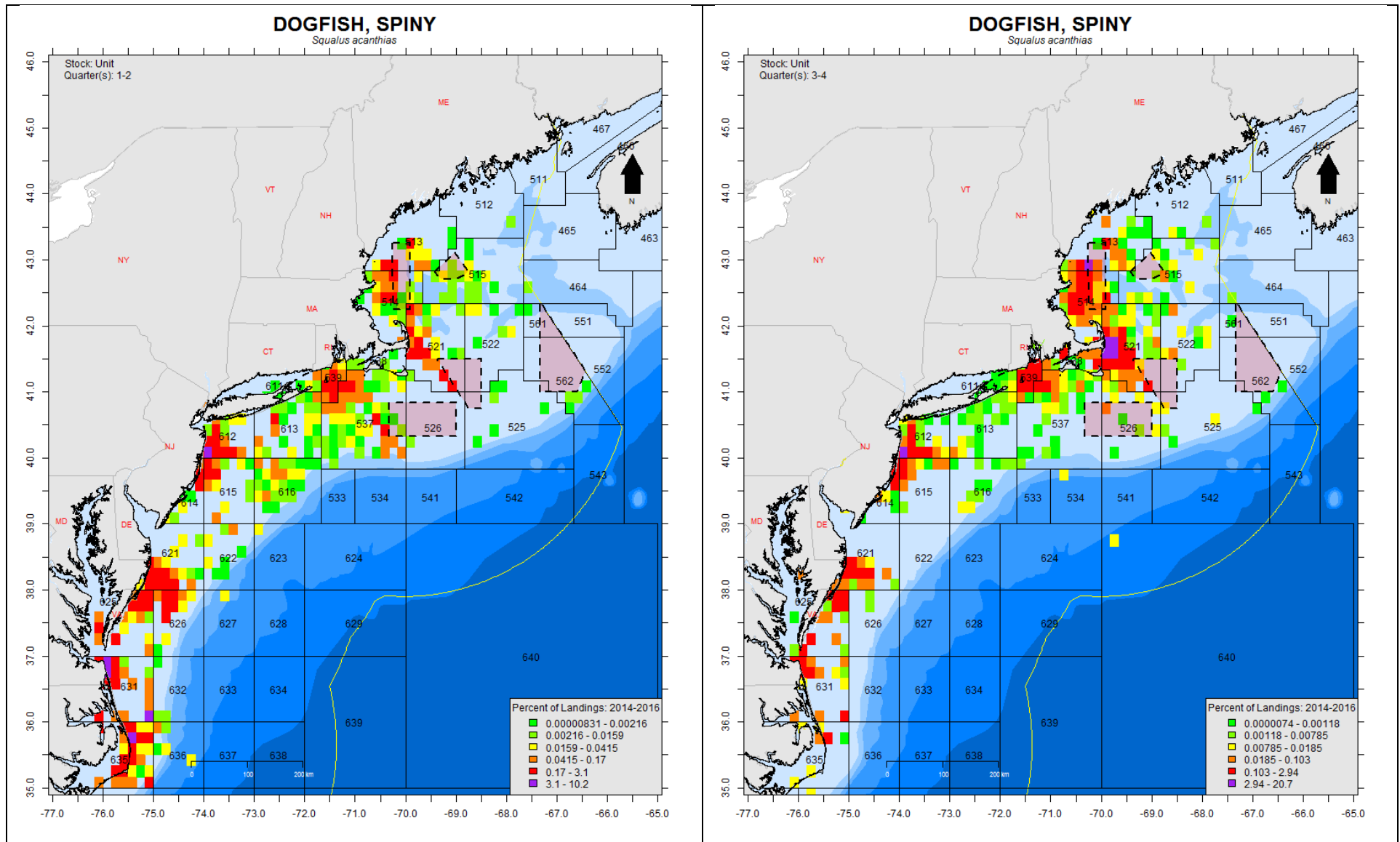
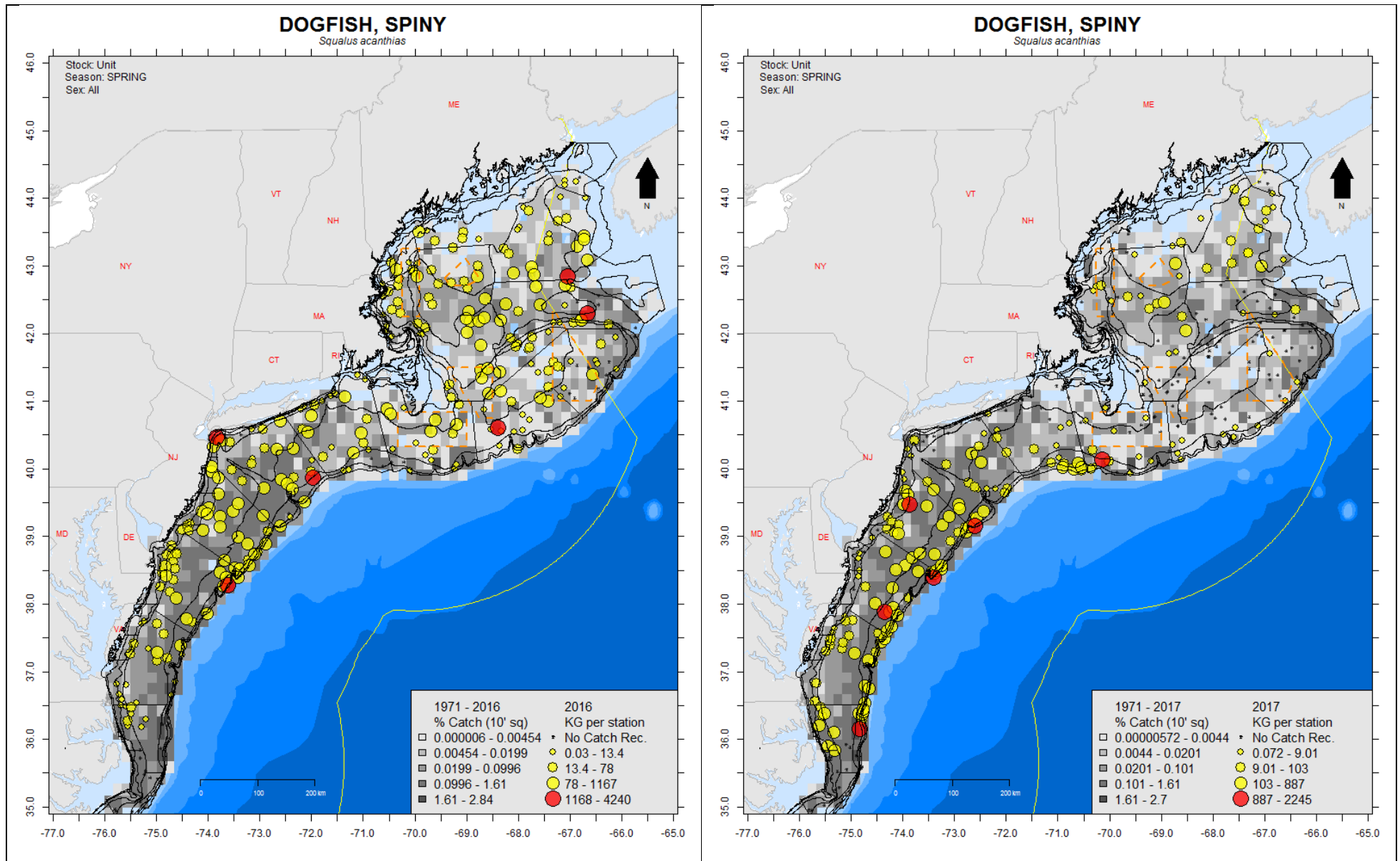


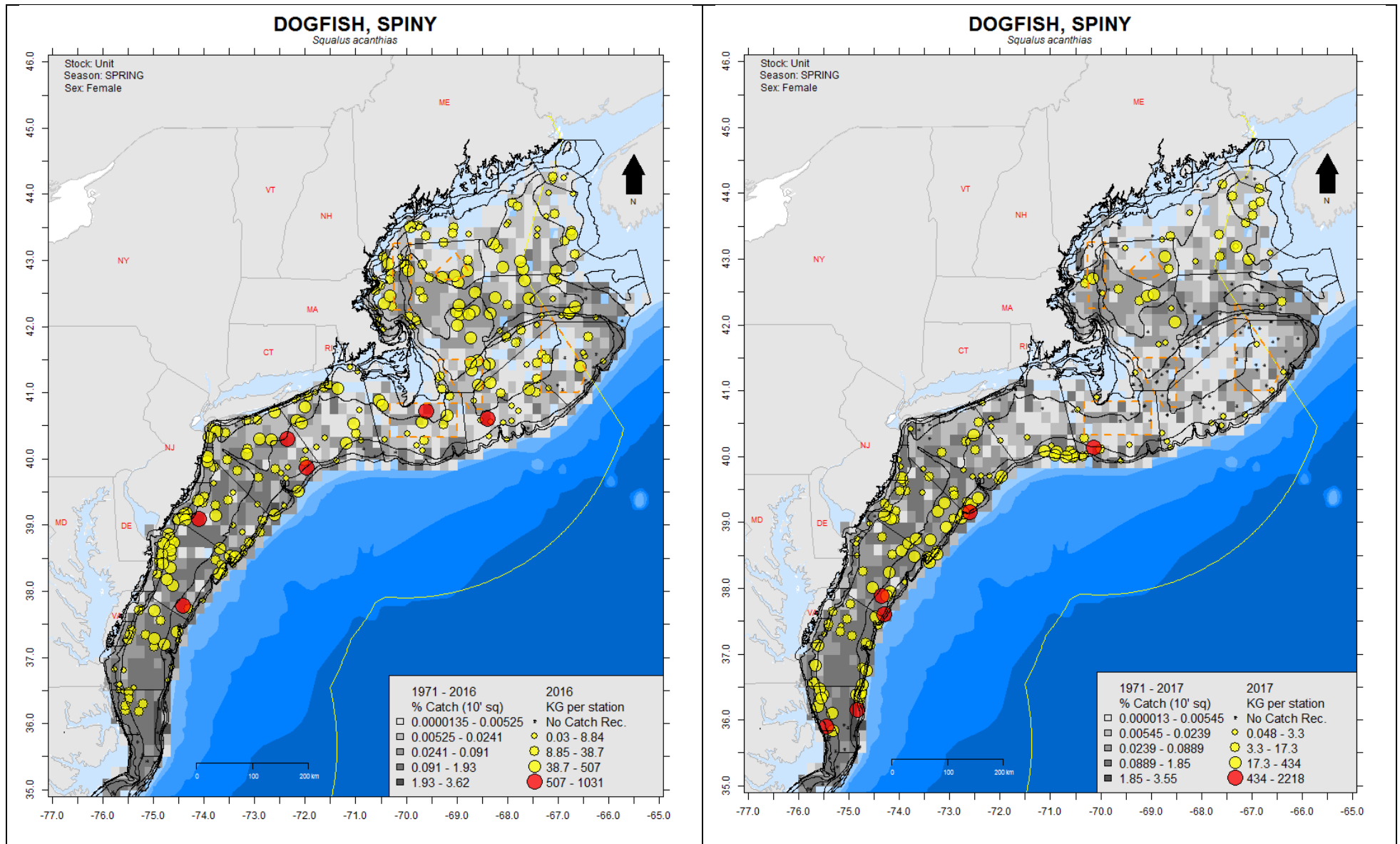
Fig 2. These maps represent commercial landings for DOGFISH, SPINY, *Squalus acanthias* from 2014-2016. Landings were reported via Dealer reports. Data have been restricted to dealer trips matched to a Vessel Trip Report (VTR) (ALEVEL=A) to ensure area information is as accurate as possible. Landings from quarters 1 and 2 are on the left (52.27% of total landings reported for these quarters) and landings from quarters 3 and 4 are in the right panel (84% of total landings reported for these quarters) Northeast Fisheries Science Center statistical areas are represented by numbered polygons and bathymetry is depicted in blue shading. Groundfish closed areas (dashed borders), and the Exclusive Economic Zone (yellow line) have been overlaid. Data queried on August 18, 2017.

### **Appendix 3. Spatial Distribution of Survey Catches**

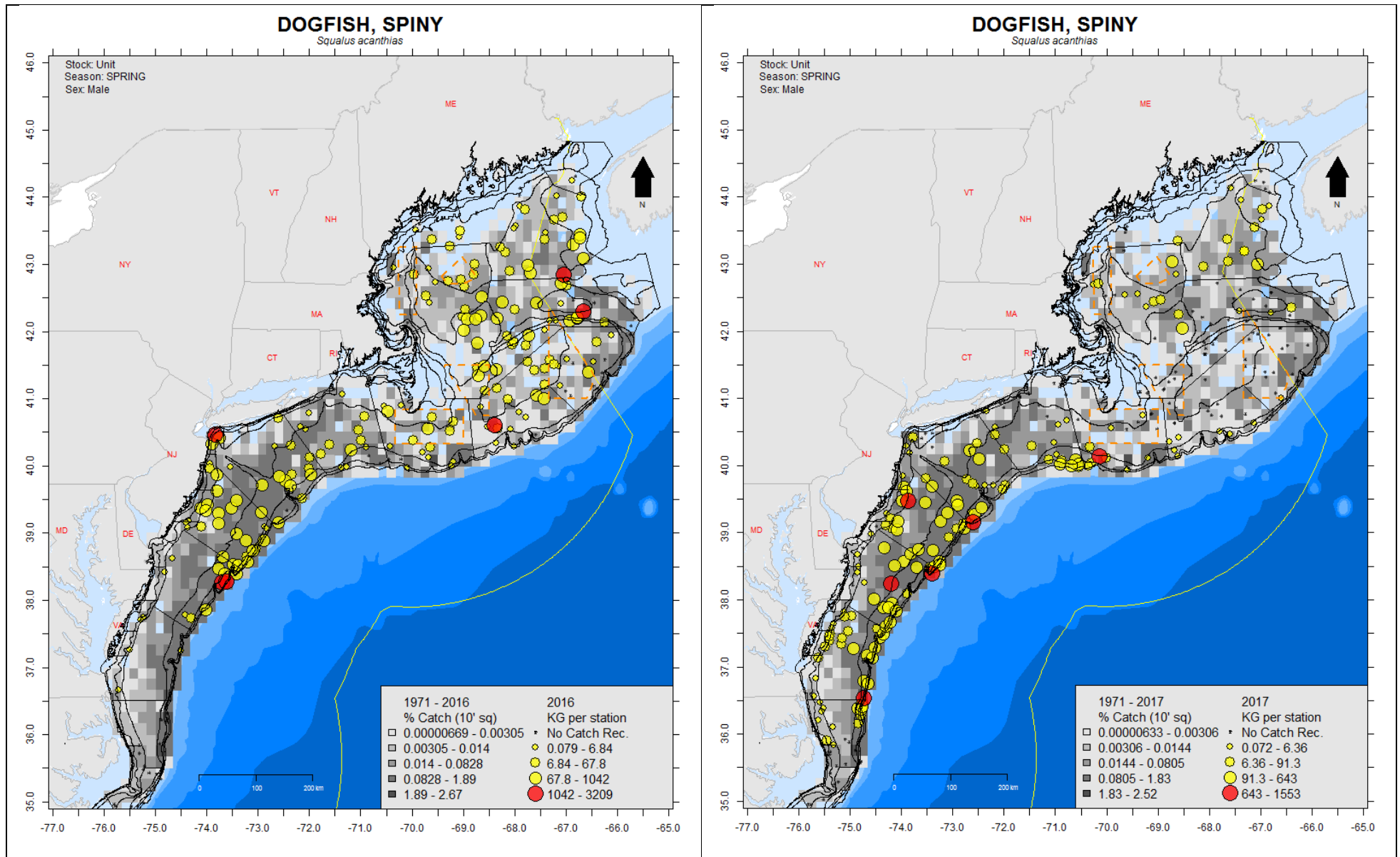


These maps represent survey catches for DOGFISH, SPINY, *Squalus acanthias*. Catch includes both sexes. The shaded cells represent the percentage of catch per ten minute square for the spring NMFS NEFSC BOTTOM TRAWL SURVEY time series, from 1971 - 2016. The points represent catch weights for 2016 (left panel) and 2017 (right panel) of the spring NMFS NEFSC BOTTOM TRAWL SURVEY. The RED points show the locations of the 6 largest tows in the set. Weights have not been calibrated. Bathymetry is depicted in blue shading. Groundfish closed areas (dashed borders), and the Exclusive Economic Zone (yellow line) have been overlaid. Data queried on August 08, 2017.

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These maps represent survey catches for DOGFISH, SPINY, *Squalus acanthias*. Only female catch is plotted. The shaded cells represent the percentage of catch per ten minute square for the spring NMFS NEFSC BOTTOM TRAWL SURVEY time series, from 1971 - 2016. The points represent catch weights for 2016 (left panel) and 2017 (right panel) of the spring NMFS NEFSC BOTTOM TRAWL SURVEY. The RED points show the locations of the 6 largest tows in the set. Weights have not been calibrated. Bathymetry is depicted in blue shading. Groundfish closed areas (dashed borders), and the Exclusive Economic Zone (yellow line) have been overlaid. Data queried on August 08, 2017.



These maps represent survey catches for DOGFISH, SPINY, *Squalus acanthias*. Only male catch is plotted. The shaded cells represent the percentage of catch per ten minute square for the spring NMFS NEFSC BOTTOM TRAWL SURVEY time series, from 1971 - 2016. The points represent catch weights for 2016 (left panel) and 2017 (right panel) of the spring NMFS NEFSC BOTTOM TRAWL SURVEY. The RED points show the locations of the 6 largest tows in the set. Weights have not been calibrated. Bathymetry is depicted in blue shading. Groundfish closed areas (dashed borders), and the Exclusive Economic Zone (yellow line) have been overlaid. Data queried on August 08, 2017.



## 2017 Spiny Dogfish Advisory Panel (AP) Fishery Performance Report (FPR)

The Spiny Dogfish Advisory Panel (AP) (<http://www.mafmc.org/advisory-panels/>) met August 24, 2017 to develop the Fishery Performance Report (FPR) below. The meeting was conducted via internet webinar and facilitated by Jason Didden, the Mid-Atlantic Fishery Management Council's Dogfish Fishery Management Plan (FMP) coordinator. The advisors who participated were:

James Fletcher  
Scott MacDonald  
Peter Moore

Jan McDowell  
Doug Feeney

Additional participants included:

Amanda Cousart  
John Boreman  
Katie Alemeida  
Fiona Hogan  
MJ DeBrosky  
Angel Willey

Cynthia (?)  
John Whiteside  
Kirby Rootes-Murdy  
Max Appleman  
Stew Michels

The fishery performance report's primary purpose is to contextualize catch histories for the Scientific and Statistical Committee (SSC) because of the potential importance of this and related information for determining Acceptable Biological Catches (ABCs). The goal is to allow comparing and contrasting of the most recent year's conditions and fishery characteristics with previous years. First an overview of recent fishery data was provided by Jason Didden, and then trigger questions were posed to the AP to generate discussion. The trigger questions were:

- \*What factors have influenced recent catch?
  - Markets/economy?      – Environment?
  - Fishery regulations?      – Other factors?
- \*Are the current fishery regulations appropriate? How could they be improved?
  - Gear regulations and exemptions?   -Trip Limits?   -Others?
- \*Where should the Council and Commission focus their research priorities?
- \*What else is important for the Council and Commission to know?
- \*Are there any recent major changes in this fishery?

The input from the AP begins on the following page. The information in this FPR does not represent a consensus, but rather a summary of the perspectives and ideas that were raised at the meeting.



## General

- Quality is critical for maintaining price and the existing market. Large trips may have trouble maintaining product quality.
- The regional differences in the fishery mean that any changes (e.g. trip limits) have the potential to differentially impact different areas.
- Flooding processors with lots of spiny dogfish will harm the market. The fishery has appeared stable up until recently, but there is currently (August 2017) a substantial drop in prices at least for some harvesters. See what happens with new rules (higher trip limits and rules allowing dual-targeting of monkfish and dogfish).
- A contrary, minority perspective was also voiced: Developing new markets (Asia/Africa, pet food) will require lower, not higher prices, and manipulating price (by limiting catch & trip limit) to address small boat concerns hinders the possibility of greater overseas markets.

## Factors Influencing Catch

- Markets are crucial to getting prices high enough to stimulate fishing activity. Low catches relative to the quota in recent years are due to low prices/effort. Some European markets constraints have been mitigated, others persist.
- Fishery needs help from other institutions (Council, NOAA, etc.) on building the market.
- A new processor entered the market in 2016, and their stocking of product and low prices selling into Europe is negatively impacting the market and current prices.
- There may be some spiny dogfish landings in Europe in the future related to retention rules, which may impact demand for imports.
- Abundance does not currently drive catches; boats have no problem obtaining their trip limits.
- There are relatively few boats willing to go out for dogfish at current prices, but a small price increase could change that (see Cape Cod info below)
- European markets are shifting away from sharks, limiting US dogfish exports to Europe.
  - o The Shark Alliance did not promote European boycotts of US spiny dogfish/other legally caught sharks (though other entities seek/have sought to do this).
  - o Europe seems to have the U.S. figured out in terms of pricing, while traditional European demand may be declining due to changing tastes.
- General sentiment about sharks and shark fins have hurt the market and created barriers to shipping (about 19 container lines have adopted internal policies to not carry any shark products and there are bans in several states). There is interest in purchasing spiny dogfish internationally but ENGO opposition as well, despite MSC certification and the sustainability of the U.S. East Coast spiny dogfish fishery.
- Market & regulatory issues discourage new processors. The one New York processor closed after Hurricane Sandy – market issues discouraged their re-entry.
- The web of federal, state, and international rules (on fishing and sales) discourage entry into the processing sector generally. The Council processes, and favoring of small boats and a few processors, have exacerbated and perpetuate these issues. A variety of factors are restricting development of the fishery in southern areas, including state regulations in

Virginia and North Carolina. The current regulations, especially trip limits, eliminate the possibility of developing an industrial (pet food applications) market.

- There is concern by others that large-scale landings could negatively impact the fresh market.
- Virginia had another mild winter and boats fished through the winter (including Jan & Feb), improving early 2017 landings (but possibility limiting N. Carolina landings)
- On Cape Cod:
  - 2015: 18-22 cents per pound; 2016: 20-24 cents, 30-34 cents if trucked to New Bedford. They have seen more vessels participating.
  - Prices are declining in mid-2017.

## Input on Regulations

- Some advisors would like to see a slow and steady approach that does not create large changes in catches and/or prices.
- Raising trip limits may collapse prices if additional markets are not developed.
- An occasional trip limit for trawlers (X/ month or quarter) around 20,000-40,000 pounds could help develop new markets and provide opportunity for different vessels
  - A double limit once a week was raised as an alternative possibility
  - Regarding different kinds of trip limits, enforcement/monitoring needs to be ensured.
  - In the past some in Massachusetts have been interested in a seasonal (October through December) trip limit increase that would not hurt smaller boats in the summer or crash the market.
  - There was concern that such adjustments could substantially hurt more southern ports, and more details would be needed to evaluate.
- At least one advisor is interested in allowances to harvest male dogfish in excess of the typical trip limit and possibly a separate quota (which is currently made up of mostly female dogfish). An advisor noted that males can be targeted currently. STAFF NOTE: A male only fishery would need an Amendment and/or benchmark assessment but recent research suggests it may be feasible.
- It would be useful to have a NE permit covering smooth dogfish to reduce regulatory burdens. The current process causes unnecessary frustration.

## Research Priority Ideas

- Domestic (human and/or animal food) and/or non-European markets.
  - o Lack of southern processor(s) is an issue restricting southern landings.
- Separation of spiny and smooth dogfish in NOAA trade database (buyers in particular may want to know) and ground-truthing of this database by NOAA Fisheries/Council, etc. NOAA cannot separate spiny and smooth dogfish – this is a code by another international trade agency – a petition could be made but may not be successful given the relatively low value of dogfish.
- Longer term tracking of export trends. <https://www.st.nmfs.noaa.gov/commercial-fisheries/foreign-trade/applications/trade-by-product>
- Better tracking of dogfish used/sold as fertilizer.
- Investigate ways to increase the quality of meat (i.e. how can it be processed on deck, etc.), which in turn would increase the price of the product. If we can get the price higher this would have a snow ball effect on the market.
- New benchmark assessment needed including:
  - o Exploration of how spiny dogfish recovered so much faster than predicted.
  - o Increased engagement with fishermen as part of scientific research.
  - o Better estimate of the population of male dogfish and availability of dogfish to the relevant surveys generally. Recent low datapoint not reflective of what AP members see on the water – the bottom survey is most likely missing most dogfish.
  - o Obtain reproductive and other biological information across the range of the species before the next assessment.
  - o Prioritize the biological information that needs updating before the next assessment.

## Other Issues Raised

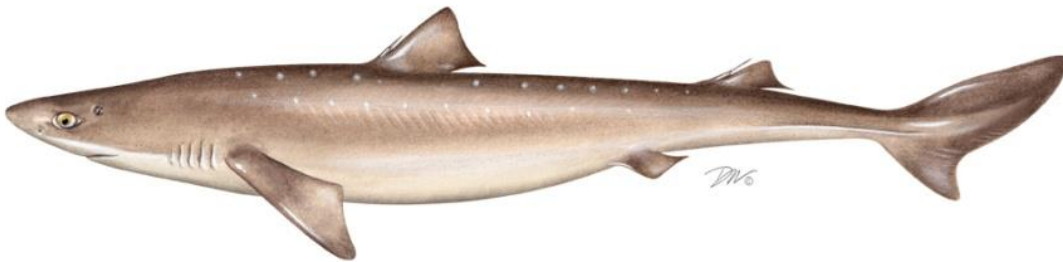
- There needs to be a clear division of male and female dogfish in terms of the assessment, catch limits, and monitoring.
- Consider having NAFO manage the fishery outside the EEZ to facilitate the creation of a male-only fishery.
- There was a concern voiced over the process previously used to change the trip limit on the ASMFC side of things in terms of public notice – this was passed along to ASMFC staff.
- A name change for spiny dogfish (“chipfish” has been suggested in addition to “cape shark”) could help the market, and could allow access to a prison protein market (<http://www.wsj.com/articles/SB122290720439096481>).
  - o Other advisers noted that “Cape Shark” is an approved market name ([http://www.accessdata.fda.gov/scripts/fdcc/?set=seafoodlist&id=Squalus\\_acanthias&sort=SLSN&order=ASC&startrow=1&type=basic&search=dogfish](http://www.accessdata.fda.gov/scripts/fdcc/?set=seafoodlist&id=Squalus_acanthias&sort=SLSN&order=ASC&startrow=1&type=basic&search=dogfish))

2017 REVIEW OF THE  
ATLANTIC STATES MARINE FISHERIES COMMISSION  
FISHERY MANAGEMENT PLAN FOR

**SPINY DOGFISH**  
**(*Squalus acanthias*)**

2016 FISHING YEAR

(U.S. Commercial Season, May 1, 2016 – April 30, 2017)



**Spiny Dogfish Plan Review Team**

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Developed September 2017

## Executive Summary

The Mid-Atlantic (MAFMC) and New England Fishery Management Councils (NEFMC) have managed spiny dogfish within the U.S. EEZ since 1999. The Atlantic States Marine Fisheries Commission (ASMFC) implemented a complementary Fishery Management Plan for state waters in 2002.

Spiny dogfish was declared rebuilt in 2008 when female SSB exceeded the target level for the first time since implementation of the Interstate FMP. Based on the results of the 2015 assessment update, spiny dogfish are not overfished and overfishing is not occurring (NEFSC 2015a and 2015b). Female SSB was estimated to be 168,207 metric tons (370.8 million pounds) in 2015. In 2015, F on exploitable females was estimated to be 0.210 and has remained below the target level since 2005.

In 2016, total spiny dogfish harvest (commercial landings and recreational harvest) along the Atlantic coast were estimated at 26.96 million pounds (12,231 metric tons). U.S. commercial landings were estimated at 26.67 million pounds (12,097 metric tons), landings from Canada were estimated at 81,571 pounds (37 metric tons), and landings from distant water fleets were estimated at 52,911 pounds (24 metric tons). U.S. recreational harvest (A + B1) on the Atlantic coast was estimated at 29,258 fish or an estimated 161,212 pounds (73 metric tons).

The U.S. commercial quota for the 2016/2017 season (May 1, 2016 – April 30, 2017) was 40,360,761 pounds (42,890,503 pounds after accounting for quota rollovers from the previous season). Commercial landings for the 2016/2017 season were estimated at 24,987,891 pounds. No regions or states exceeded their quota during the 2016/2017 season.

In 2016, all states implemented management programs consistent with the Interstate FMP for Spiny Dogfish and Addendum I-V. New York and Delaware requested and met the requirements for *de minimis* status for the 2017/2018 fishing season.

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**I. Status of the Fishery Management Plan**

<u>Date of FMP Approval:</u>	November 2002
<u>Amendments</u>	None
<u>Addenda</u>	Addendum I (November 2005) Addendum II (October 2008) Addendum III (April 2011) Addendum IV (August 2012) Addendum V (October 2014)
<u>Management Unit:</u>	Entire coastwide distribution of the resource from the estuaries eastward to the inshore boundary of the EEZ
<u>States with Declared Interest:</u>	Maine – North Carolina
<u>Active Boards/Committees:</u>	Spiny Dogfish Management Board, Advisory Panel, Technical Committee, and Plan Review Team

In 1998, NMFS declared spiny dogfish overfished and initiated the development of a joint fishery management plan (FMP) between the Mid-Atlantic (MAFMC) and New England Fishery Management Councils (NEFMC) in 1999. NMFS approved the Federal Fishery Management Plan (FMP) in September 1999, but implementation did not begin until May 2000 at the start of the 2000/2001 fishing year.

In August 2000, the Atlantic States Marine Fisheries Commission (Commission) took emergency action to close state waters to the commercial harvest, landing, and possession of spiny dogfish when the Federal waters closed in response to the quota being fully harvested. With the emergency action in place, the Commission had time to develop an interstate FMP, which prevented the undermining of the Federal FMP and further overharvest of the coastwide spiny dogfish population. Needing additional time to complete the interstate FMP, the Commission extended the emergency action twice through January 2003. During that time, the majority of spiny dogfish landings were from state waters because states had either no possession limits or less conservative possession limits than those of the Federal FMP.

The Commission approved the Interstate FMP for Spiny Dogfish in November 2002 (first implemented for the 2003-2004 fishing year). In general, the Interstate FMP (“FMP”) for spiny dogfish complements the Federal FMP. The goal of the FMP is “to promote stock rebuilding and management of the spiny dogfish fishery in a manner that is biologically, economically, socially, and ecologically sound.” In support of this goal, the FMP established the following objectives:

1. Reduce fishing mortality and rebuild the spawning stock biomass to prevent recruitment failure and support a more sustainable fishery.
2. Coordinate management activities between state, Federal and Canadian waters to ensure complementary regulations throughout the species range.
3. Minimize the regulatory discards and bycatch of spiny dogfish within state waters.
4. Allocate the available resource in [a] biologically sustainable manner that is equitable to all the fishers.
5. Obtain biological and fishery related data from state waters to improve the spiny dogfish stock assessment that currently depends upon data from the Federal bottom trawl survey.

The original Interstate and Federal FMPs established an annual quota that was allocated via fixed percentages between two seasonal periods; 57.9% to Period I (May 1<sup>st</sup> to October 31<sup>st</sup>) and 42.1% to Period II (November 1<sup>st</sup> to April 30<sup>th</sup>). When the quota allocated to a period is exceeded, the amount over the allocation is deducted from the same period in the subsequent fishing year. The periods could have separate possession limits that were specified on an annual basis. The FMPs also allowed for a five percent rollover of the annual coastwide quota once the stock is rebuilt, and allows each state to harvest up to 1,000 spiny dogfish for biomedical supply or scientific research.

In November 2005, the Spiny Dogfish and Coastal Sharks Management Board (Board) approved Addendum I to the Interstate FMP for Spiny Dogfish. Addendum I provides the Board with the flexibility to establish spiny dogfish specifications (quota and possession limits) for up to five years. The MAFMC and the NEFMC took similar action under Framework 1 (providing flexibility to adopt specifications for up to five years without the requirement of annual review and approval by NOAA Fisheries), which became effective February 2006.

In October 2008, the Board approved Addendum II which established regional quotas in place of the FMPs semi-annual period allocation<sup>1</sup>. Under the addendum, 58% of the annual quota was allocated to the states of Maine to Connecticut (Northern region), 26% was allocated to the states of New York to Virginia (Southern region), and the remaining 16% was allocated to North Carolina. The Board allocated a specific percentage to North Carolina because spiny dogfish are not available to their fishermen until late into the fishing season when most of the quota has already been harvested. The addendum also implemented accountability measures whereby any overage of a regional or state quota would be deducted from the corresponding region/state in the subsequent fishing year.

In March 2011, the Board approved Addendum III which was implemented prior to the 2011/2012 fishing year. The addendum divided the combined Southern region and the North Carolina quotas from Addendum II (i.e., 42% of the annual coastwide quota) into state-specific shares (Table 2) for those states of New York – North Carolina. Also, the addendum permits

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<sup>1</sup> The seasonal allocation scheme was eliminated from the Federal FMP in August, 2014.



those states to implement possession limits that best suits their needs, and allows for quota transfer (states in the Northern region continue to implement the Federal possession limit as well as continue to share 58% of the coastwide quota and thus do not have individual quotas necessary for transfers). Lastly, the addendum allows for rollovers of up to five percent of that state's or region's final allocation. The Board has continued to implement the allocation percentages described in Addendum III, and may revisit those allocations at any time through the adaptive management process (e.g., an addendum).

In August 2012, the Board approved Addendum IV. This Addendum addressed the differences in the definitions of overfishing between the NEFMC, MAFMC and the ASMFC. The Board adopted the fishing mortality (F) threshold to be consistent with the Federal plan. Overfishing is defined as an F rate that exceeds the  $F_{threshold}$ . The  $F_{threshold}$  is defined as  $F_{MSY}$  (or a reasonable proxy thereof) and based upon the best available science. The maximum fishing mortality threshold ( $F_{MSY}$ ) or a reasonable proxy may be defined as a function of (but not limited to): total stock biomass, spawning stock biomass (SSB), or total pup production, and may include males, females, both, or combinations and ratios thereof which provide the best measure of productive capacity for spiny dogfish. Currently  $F_{MSY} = 0.2439$  which is that level of F that allows for the production of 1.5 female pups per female that will recruit to the spawning stock biomass.

In October 2014, the Board<sup>2</sup> approved Addendum V. The addendum mandates that all spiny dogfish must be landed with fins-naturally-attached to the corresponding carcass (i.e., the removal of any fin of spiny dogfish at-sea in state waters is prohibited). The addendum modified the FMP to maintain consistency with the Shark Conservation Act of 2010, which prohibits the removal of all shark fins (except smooth dogfish) at-sea.

## II. Status of the Stocks

Stock size estimates (e.g., female SSB) for spiny dogfish rely heavily on fishery-independent data collected during the NEFSC spring bottom trawl survey. Due to mechanical problems, the 2014 survey was unable to sample strata in the mid-Atlantic region. As a result, the 2015 assessment update for spiny dogfish was unable to produce reliable estimates of stock size for 2014, as well as stock size projections utilized for annual specifications. Accordingly, at the direction of the MAFMC and the Science and Statistical Committee, the NEFSC examined alternative methods to smooth out the effects of the missing 2014 survey data on projected estimates of SSB, F, and other stock status indicators (NEFSC 2015b). A Kalman filter approach was ultimately chosen as the best method to smooth out the effects of the missing data, and to project SSB forward. In 2016, while all core survey strata were completed, the survey was

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<sup>2</sup> In May 2014, the Spiny Dogfish and Coastal Shark Management Board became two independent management boards. Accordingly, from this date forward, the "Board" only refers to the Spiny Dogfish Management Board. Also in 2014, the Board and Commission approved South Carolina's, Georgia's and Florida's request to be removed from the requirements of the FMP due to minimal reported catches of spiny dogfish and with the understanding that their interest in the FMP may be reconsidered if catch and/or landings increase.

delayed and the effects of the delay in survey timing on the abundance indices are unknown (NEFSC 2017). In 2017, the survey was completed on time and all core strata were surveyed.

Based on results of the most recent assessment, and in comparison to the biological reference points below, spiny dogfish are not overfished and overfishing is not occurring (NEFSC 2015a and 2015b). Spiny dogfish was declared rebuilt in 2008 when female SSB exceeded the target level for the first time since implementation of the Interstate FMP. Female SSB has remained above the target level and was estimated to be 168,207<sup>3</sup> metric tons (370.8 million pounds) in 2015 (Table 1 and Figure 1). In 2015, F on exploitable females was estimated to be 0.210 and has remained below the target level since 2005 (Table 1 and Figure 2).

	Female Spawning Stock Biomass (SSB)	Fishing Mortality (F)
Target	$B_{msy} Proxy = SSB_{max}$ (the biomass that results in the maximum projected recruitment) = 159,288 metric tons	There is no F target defined for management use at this time
Threshold	$\frac{1}{2}$ of $SSB_{max}$ = 79,644 metric tons	$F_{msy} Proxy = 0.244$

The next stock assessment for spiny dogfish is tentatively scheduled for 2018. In the interim, in order to inform fishery specifications, the NEFSC has conducted annual data updates to summarize the most recent information on the status of spiny dogfish. The 2017 data update utilizes catch and landings data from 1982-2016, and NEFSC spring survey data from 1968-2017 (as noted, the survey was incomplete in 2014 and the 2016 survey was delayed). From 2009-2015, female SSB estimates based on area swept by NEFSC bottom trawl during spring surveys were above the target-level (NEFSC 2017). The 2016 estimate increased, while the 2017 estimate decreased to the lowest in the time series. However, the data update report (2017) notes that all size and sex classes decreased also which likely indicates a year-specific availability effect rather than a decrease in abundance. The spatial distribution of spiny dogfish catches in the 2017 survey were very different than the 2016 survey (e.g., in 2017, there were almost no dogfish caught on Georges Bank), further supporting this hypothesis. Results from state-directed fishery-independent monitoring efforts support this as well (Table 5). It is important to note that these estimates are not based on outputs of the stochastic assessment model and cannot be directly compared to the SSB targets and thresholds.

### III. Status of the Fishery

In the U.S., the majority of spiny dogfish commercial fisheries operate in state waters targeting aggregations of large females. As a result, an estimated 94% of the commercial landings (2014) are comprised of females which is consistent with the long term pattern (NEFSC 2015a).

In 2016, total spiny dogfish harvest (commercial landings and recreational harvest) along the Atlantic coast was estimated at 26.96 million pounds (12,231 metric tons) which is a 40%

<sup>3</sup> 2015 female SSB estimated via a Kalman filter approach. The Kalman filter was not applied to pre-2015 estimates.

increase relative to 2015 and above average for the time series (Table 2). In 2016, U.S. commercial landings were estimated at 26.67 million pounds (12,097 metric tons). Atlantic coast landings from Canada were significant from the early 1990s to the mid-late 2000s (hovering around 4.5 million pounds or 2,000 metric tons). In 2016, landings from Canada were estimated at 81,571 pounds (37 metric tons) which is more in line with the short term trend (Table 2). In 2016, landings from distant water fleets were estimated at 52,911 pounds (24 metric tons). Recreational harvest is estimated via the Marine Recreational Information Program (MRIP). In 2016, recreational harvest (A + B1) of spiny dogfish on the Atlantic coast was estimated at 29,258 fish or an estimated 161,212 pounds<sup>4</sup> (73 metric tons) which is an 86% increase relative to 2015 (Table 2). Landings estimates for the U.S. commercial and recreational sectors, Canada, and distant water fleets are detailed in Table 2.

In 2016, total dead discards from the U.S. commercial and recreational sectors were estimated at 8.50 million pounds (3,856 metric tons) which is a 16% increase relative to 2015 (Table 3). Recreational releases (B2, or fish caught by recreational anglers and released back to the water) were estimated at 6.89 million pounds (3,127 metric tons). Applying a 20% post-release mortality rate (NEFSC 2015a), 2016 recreational dead discards were estimated at 1.38 million pounds (625 metric tons) which is a 1.5-fold increase relative to 2015 but is in line with the most recent 10-year average. Commercial dead discards for U.S. fisheries are estimated by multiplying total discards by gear-specific mortality rates (NEFSC 2017). In 2016, U.S. commercial dead discards were estimated at 7.12 million pounds (3,231 metric tons), with the largest proportion attributed to otter trawls (79%).

#### **IV. Status of Management Measures and Issues**

##### *Specifications*

The spiny dogfish commercial fishery runs from May 1-April 30. The coastwide quota for the 2016/2017 season was set at 40,360,761 pounds. For the northern region, the maximum possession limit was set at 5,000 pounds and increased to 6,000 pounds effective August 15, 2016. Most states in the northern region implemented the increased possession limit, however implementation dates varied by state. Possession limits for states of New York-North Carolina vary by state and are detailed in Table 6.

##### *Quotas*

Per Addendum III, 58% of the annual quota is allocated to the northern region (states from Maine-Connecticut), and the remaining 42% is allocated to the states of New York-North Carolina via fixed percentages. Table 4 details 2016/2017 commercial quotas by region and state. Addendum III also specifies that when the quota allocated to a region or state is exceeded in a fishing season, the amount over the allocation will be deducted from the corresponding region or state in the subsequent fishing season. All regions and states harvested within their quota the previous fishing year, therefore no deductions were applied to 2016/2017 quotas. Additionally, per Addendum III, all states and regions were able to roll over

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<sup>4</sup> Assuming the average weight of landed and discarded spiny dogfish is 5.12 pounds or 2.5 kilograms.

5% of its allocation from the previous fishing year for an effective coastwide quota of 42,890,503 pounds for the 2016/2017 fishing year (Table 4).

According to the Atlantic Coastal Cooperative Statistics Program's (ACCSP) Standard Atlantic Fishery Information System (SAFIS), commercial landings from the 2016/2017 fishing year were estimated at 24,987,891 pounds (11,334 metric tons) which is 58% of the coastwide quota and a 13.5% increase relative to the previous season (Table 4). Massachusetts (57%), Virginia (14%), New Jersey (11%) and Maryland (10%) accounted for the majority of commercial landings by weight (Table 4).

From 2000-2011, the U.S. spiny dogfish commercial fishery, for the most part, had fully utilized its quota (MAFMC 2017a). However, in recent years (2012-present), the commercial fishery has significantly underutilized its quota. The MAFMC Advisory Panel (2017b) noted that markets are critical for stimulating fishing activity and that the low level of harvest relative to the quota in recent years is primarily due to low prices and effort, not biomass. Vessels generally have no problem catching their limits. Being such a low value fishery (hovering around \$0.20/pound in most recent 10-years; MAFMC 2017a), even a small increase in price could stimulate fishing activity. Participation in the fishery has been further discouraged due to general public sentiment regarding sharks and shark fins which has created regulatory issues (e.g., foreign and domestic import and shipping bans) and other barriers to the market (e.g., the species common name dissuades many consumers).

## **V. Status of Research and Monitoring**

Under the Interstate FMP for Spiny Dogfish, the states are not required to conduct any fishery dependent or independent studies. The Interstate FMP requires an annual review of recruitment, spawning stock biomass, and fishing mortality which relies heavily on the NEFSC's spring trawl survey data. However, states are encouraged to submit any spiny dogfish information collected while surveying for other species. Table 5 details state implemented fishery-independent monitoring information relative to spiny dogfish compiled from annual state compliance reports. Please see individual reports for more information.

### *Exempted Fishing Permits (scientific/education permits)*

States may issue exempted fishing permits for the purpose of biomedical supply, educational, or other scientific purposes. In 2016, North Carolina issued 55 exempted fishing permits. Of these permits, six reported catches and two reported catches of spiny dogfish totaling 17 fish (all but one were released alive).

## **VI. Annual State Compliance**

The following lists the specific compliance criteria that a state or jurisdiction must implement in order to be in compliance with the Interstate FMP for Spiny Dogfish (*Section 5.1*):

1. States are required to close state waters to the commercial landing, harvest and possession of spiny dogfish for the duration of the seasonal period when the commercial quota is projected to be harvested in their state or region.
2. States are required to report landings weekly to NOAA Fisheries
3. Dealer permits issued pursuant to state regulations must submit weekly reports showing at least the quantity of spiny dogfish purchased (in pounds), the name, and permit number of the individuals from whom the spiny dogfish were purchased.
4. States in the northern region are required to implement possession limits as determined through the annual specification process.
5. States may issue exempted fishing permits for the purpose of biomedical supply not to exceed 1,000 spiny dogfish per year.
6. State regulations must prohibit “finning” as described in Addendum V.

Additionally, each state must submit a compliance report detailing its spiny dogfish fisheries and management program for the previous fishing year. Compliance reports are due annually on July 1<sup>st</sup> (Table 6) and must include at a minimum:

1. the previous fishing 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 fishing year summarizing regulations that will be in effect and monitoring programs that will be performed, highlighting any changes from the previous year; and
3. the number of spiny dogfish exempted fishing permits issued in the previous fishing year, the actual amount (in numbers of fish and pounds) collected under each exempted fishing permit, as well as any other pertinent information (i.e. sex, when and how the spiny dogfish were collected). The report should also indicate the number of exempted fishing permits issued for the current fishing year.

Under the Spiny Dogfish FMP, a state may request *de minimis* status if its commercial landings of spiny dogfish are less than 1% of the coastwide commercial total. If granted, the state is exempt from the monitoring requirements of the commercial spiny dogfish fishery for the following fishing year. However, all states, including those granted *de minimis* status, must continue to report any spiny dogfish commercial or recreational landings within their jurisdiction via annual state compliance reports. New York and Delaware have requested *de minimis* status for the 2017/2018 fishing season (Table 6).

## **VII. Plan Review Team Recommendations**

Based on annual state compliance reports, the PRT determined that all states have implemented regulations that meet the requirements of the Interstate FMP for Spiny Dogfish and Addenda I-V. Also, New York and Delaware meet the requirements for *de minimis* status in the 2017/2018 fishing year.

## VIII. Research Recommendations

The following research priorities pertaining to spiny dogfish were identified in Special Report No. 89 (2013):

### *Fishery-Dependent Priorities*

#### *High*

- Determine area, season, and gear specific discard mortality estimates coastwide in the recreational, commercial, and non-directed (bycatch) fisheries.
- Characterize and quantify bycatch of spiny dogfish in other fisheries.
- Increase the biological sampling of dogfish in the commercial fishery and on research trawl surveys.
- Further analyses of the commercial fisheries is also warranted, especially with respect to the effects of gear types, mesh sizes, and market acceptability on the mean size of landed spiny dogfish.

### *Fishery-Independent Priorities*

- Conduct experimental work on NEFSC trawl survey gear performance, with focus on video work to study the fish herding properties of the gear for species like dogfish and other demersal groundfish.
- Investigate the distribution of spiny dogfish beyond the depth range of current NEFSC trawl surveys, possibly using experimental research or supplemental surveys.
- Continue to analyze the effects of environmental conditions on survey catch rates.

### *Modeling / Quantitative Priorities*

- Continue work on the change-in-ratio estimators for mortality rates and suggest several options for analyses.
- Examine observer data to calculate a weighted average discard mortality rate based on an assumption that the rate increased with catch size.

### *Life History, Biological, and Habitat Priorities*

- Conduct a coastwide tagging study to explore stock structure, migration, and mixing rates.
- Standardize age determination along the entire East Coast. Conduct an ageing workshop for spiny dogfish, encouraging participation by NEFSC, NCDMF, Canada DFO, other interested agencies, academia, and other international investigators with an interest in dogfish ageing.
- Identify how spiny dogfish abundance and movement affect other organisms.

### *Management, Law Enforcement, and Socioeconomic Priorities*

- Monitor the changes to the foreign export markets for spiny dogfish, and evaluate the potential to recover lost markets or expand existing ones.
- Update on a regular basis the characterization of fishing communities involved in the spiny dogfish fishery, including the processing and harvesting sectors, based upon Hall-Arber et al. (2001) and McCay and Cieri (2000).

- Characterize the value and demand for spiny dogfish in the biomedical industry on a state by state basis.
- Characterize the spiny dogfish processing sector

**IX. References**

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Special Report No. 89 of the Atlantic States Marine Fisheries Commission. 2013. Research priorities and recommendations to support interjurisdictional fisheries management.

## X. Tables

**Table 1: Spiny dogfish female spawning stock biomass (SSB) in millions of pounds and fishing mortality (F) point estimates, 1991-2015.** A Kalman Filter was applied to the 2015 point-estimate. Point-estimates from 1991-2014 via the Kalman filter were not available at the time of this report. Although the absolute values will change after the Kalman filter is applied, the time series trend is similar. Source: NEFSC 2015a and 2015b.

Year	Female SSB	F
1991	516	0.082
1992	594	0.177
1993	485	0.327
1994	410	0.465
1995	294	0.418
1996	266	0.355
1997	252	0.234
1998	202	0.306
1999	114	0.289
2000	116	0.152
2001	136	0.109
2002	143	0.165
2003	129	0.168
2004	118	0.474
2005	105	0.128
2006	234	0.088
2007	312	0.090
2008	429	0.110
2009	360	0.113
2010	362	0.093
2011	373	0.114
2012	476	0.149
2013	466	NA
2014	NA	0.214
2015	371	0.210



**Table 2: Landings estimates (pounds) of spiny dogfish off the Atlantic coast by commercial fisheries of the United States, Canada, and foreign fleets, and U.S. recreational harvest, 1981-2016.** All values in pounds. Source: NEFSC 2017 and MRIP.

Year	Canada	Distant Water Fleets	U.S. Commercial	U.S. Recreational	Total Landings
1981	1,243,406	2,147,300	15,134,716	3,290,809	21,816,231
1982	857,597	802,482	11,928,240	155,228	13,743,546
1983		1,022,944	10,794,944	147,828	11,965,715
1984	4,409	862,006	9,811,419	201,247	10,879,082
1985	28,660	2,231,075	8,880,246	196,525	11,336,507
1986	44,092	811,300	6,057,436	403,806	7,316,634
1987	619,498	306,442	5,959,859	674,738	7,560,538
1988	2,205	1,426,389	6,845,658	793,826	9,068,078
1989	368,172	564,383	9,903,197	923,156	11,758,908
1990	2,885,848	866,416	32,475,331	393,464	36,621,058
1991	676,818	515,881	29,049,484	288,410	30,530,593
1992	1,913,610	147,710	37,165,286	535,770	39,762,376
1993	3,163,630	59,525	45,509,707	263,846	48,996,708
1994	4,012,408	4,409	41,441,357	341,311	45,799,486
1995	2,107,617	30,865	49,775,493	148,935	52,062,910
1996	950,191	520,290	59,823,640	56,990	61,351,111
1997	983,261	471,789	40,457,417	146,560	42,059,027
1998	2,325,874	1,338,204	45,476,080	133,761	49,273,919
1999	4,609,860	1,221,359	32,748,858	119,595	38,699,673
2000	6,042,863	886,257	20,407,500	11,262	27,347,883
2001	8,421,648	1,492,528	5,056,497	61,877	15,032,551
2002	7,901,358	1,044,990	4,847,674	451,666	14,245,687
2003	2,870,415	1,417,571	2,579,437	87,466	6,954,888
2004	5,207,312	727,525	2,164,011	264,970	8,363,819
2005	5,004,487	727,525	2,528,114	77,823	8,337,949
2006	5,377,068	22,046	4,957,360	175,290	10,531,764
2007	5,255,814	68,343	7,723,004	190,018	13,237,179
2008	3,466,368	288,805	9,057,020	251,427	13,063,620
2009	249,122	180,779	11,854,242	94,133	12,378,275
2010	13,228	279,987	11,993,133	35,418	12,321,766
2011	273,373	315,261	20,899,798	70,556	21,558,987
2012	143,300	302,033	23,501,249	41,413	23,987,996
2013		134,482	16,120,181	80,859	16,335,523
2014	119,049	68,343	23,481,408	68,996	23,737,797
2015	2,205	50,706	19,098,623	86,832	19,238,366
2016	81,571	52,911	26,669,288	161,212	26,964,982

**Table 3: Total dead discards estimates (pounds) from the U.S. Atlantic coast spiny dogfish fishery by sector, 1981-2016.** Commercial dead discards estimated via applying gear-specific mortality rates to discard estimates. Source: MRIP and NEFSC 2017.

Year	Commercial	Recreational (20% B2)	Total Dead Discards
1981	43,625,021	130,521	43,755,541
1982	50,245,935	153,982	50,399,918
1983	49,177,576	238,002	49,415,579
1984	46,931,730	186,871	47,118,601
1985	39,768,479	425,091	40,193,570
1986	38,222,379	523,373	38,745,752
1987	35,239,087	465,470	35,704,557
1988	35,307,210	386,152	35,693,362
1989	34,724,970	594,784	35,319,753
1990	41,754,621	515,830	42,270,451
1991	28,668,217	594,951	29,263,168
1992	41,401,992	449,048	41,851,040
1993	25,898,443	489,373	26,387,816
1994	18,435,804	426,776	18,862,580
1995	23,812,762	288,134	24,100,896
1996	13,136,779	145,103	13,281,882
1997	9,255,656	371,849	9,627,505
1998	7,305,008	268,875	7,573,883
1999	9,865,123	236,901	10,102,025
2000	6,128,182	304,436	6,432,619
2001	10,236,492	928,526	11,165,018
2002	10,392,799	737,755	11,130,554
2003	7,998,031	1,321,838	9,319,869
2004	12,011,321	1,450,007	13,461,328
2005	10,775,411	1,476,032	12,251,443
2006	10,847,557	1,565,462	12,413,019
2007	12,456,478	1,715,901	14,172,379
2008	9,843,805	1,188,294	11,032,099
2009	11,735,909	1,137,116	12,873,025
2010	8,146,291	871,034	9,017,325
2011	9,533,163	1,019,230	10,552,393
2012	10,081,275	605,902	10,687,177
2013	9,875,386	1,169,360	11,044,746
2014	10,657,861	2,090,825	12,748,685
2015	6,783,726	539,757	7,323,483
2016	7,122,686	1,378,769	8,501,456

**Table 4: Commercial quotas and landings estimates in pounds for May 1, 2016 - April 30, 2017 by region and state.** Adjusted quota reflects a 5% rollover from 2015/2016 season. Due to confidentiality, NY-NC landings estimates have been redacted. Source: ACCSP/SAFIS and validated by the states, August 15, 2017.

State	Fixed Percent Allocation	Preliminary Quota	Effective Quota (includes 5% roll over from previous season)	Estimated Landings
<b>Northern Region</b>	58.00%	23,409,241	24,876,989	15,756,920
<b>NY</b>	2.71%	1,092,566	1,161,069	
<b>NJ</b>	7.64%	3,085,177	3,278,616	
<b>DE</b>	0.90%	361,632	384,307	
<b>MD</b>	5.92%	2,389,357	2,539,169	
<b>VA</b>	10.80%	4,356,944	4,630,122	
<b>NC</b>	14.04%	5,665,036	6,020,231	
<b>Total</b>	<b>100%</b>	<b>40,360,761</b>	<b>42,890,503</b>	<b>24,987,891</b>
<b>% of quota harvested</b>				<b>58.3%</b>
<b>% diff. relative to previous fishing year (2015/2016 landings = 22,023,902 lbs.)</b>				<b>+13.5%</b>

**Table 5: State implemented fishery-independent monitoring programs that encounter spiny dogfish.** Source: annual state compliance reports, 2017. Note: this list is not comprehensive.

Fishery-Independent Monitoring Programs That Encounter Spiny Dogfish	Number of Spiny Dogfish Encountered	Comments
ME-NH Inshore Trawl survey	235 (spring), 479 (fall)	large increase from 2015
RI DFW, Monthly and seasonal trawl survey	2	down from 4 in 2015
CT Long Island Sound Trawl Survey	8	Spring; down from 2015
NJ Ocean Stock Assessment (trawl) Survey	13,463 lbs	> 1.5-fold increase from 2015
DE Bay Bottom Trawl (30- and 16-foot)	98 (30-ft)	down from 2015, majority caught in April
NC DMF Gill Net Survey	6	decrease from 2016

**Table 6: State-by-state compliance with the Interstate Fishery Management Plan for Spiny Dogfish, 2016 reporting period (2016/2017 commercial fishing season).** Source: annual state compliance reports, 2017. 'C' is compliant; 'NC' is noncompliant.

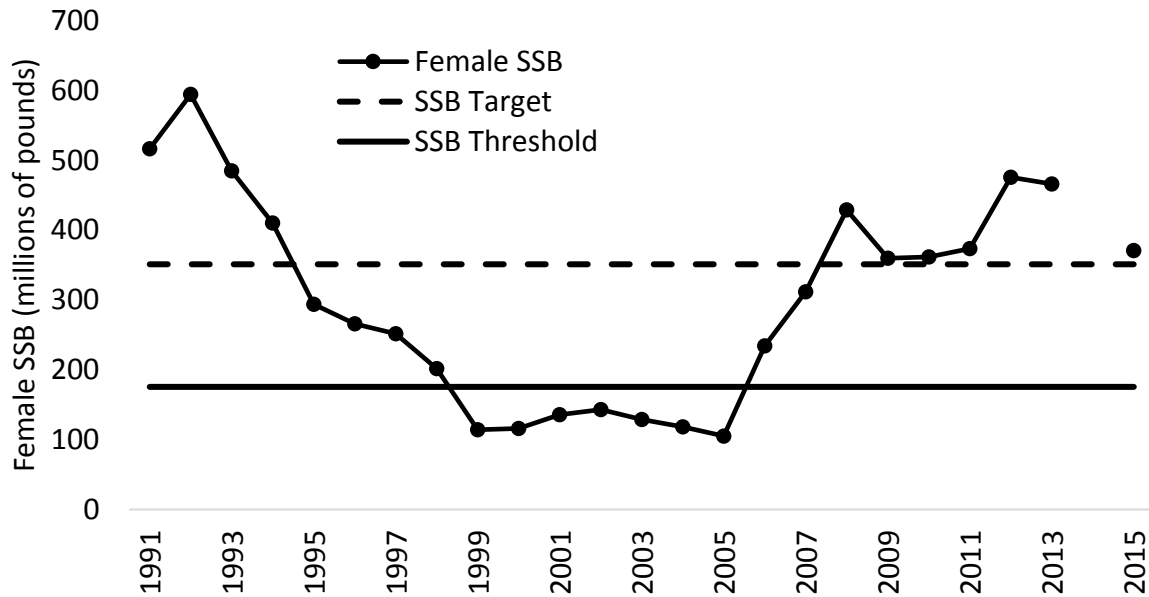
State	Report Submitted (Due July 1)	De Minimis Request	Biomedical <sup>^</sup> Permit Harvest	Finning Prohibition	Possession limit (pounds per trip)
Maine	C	No	No	C	5,000
New Hampshire	C	No	No	C	5,000 <sup>^</sup>
Massachusetts	C	No	No	C	5,000 <sup>^</sup>
Rhode Island	C	No	No	C	5,000 <sup>^</sup>
Connecticut	C	No	No	C	5,000 <sup>^</sup>
New York	C	Yes	No	C	5,000
New Jersey	C	No	No	C	6,000
Delaware	C	Yes	No	C	10,000
Maryland	C	No	No	C	up to 10,000 <sup>*</sup>
Virginia	C	No	No	C	5,250 <sup>^</sup>
North Carolina	C	No	Yes	C	20,000

<sup>^</sup> Maximum trip limit increased to 6,000 lbs following notification of the Federal trip limit increase. Specific implementation dates vary by state.

<sup>\*</sup> MD – possession limits range from 1,000 lbs to 10,000 lbs depending on permit category; VA – the possession limit increased to 6,000 lbs on February 16th (VA)

**XI. Figures**

**Figure 1: Spiny dogfish spawning stock biomass, 1990 – 2015.** Point-estimate for 2015 was derived via application of a Kalman filter. Estimates from 1991-2014 via the Kalman filter were not available at the time of this report. Although the absolute values will change after the Kalman filter is applied, the time series trend should be similar. NEFSC 2015a and 2015b.



**Figure 2: Fishing mortality rates in the spiny dogfish fishery, 1990 – 2015.** 2013 point-estimate not available at time of this report. Source: NEFSC 2015a and 2015b.

