Atlantic States Marine Fisheries Commission

Spiny Dogfish Management Board

October 23, 2018
1:30 - 2:30 p.m.
New York, New York

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 *(R. O'Reilly)* 1:30 p.m.
2. Board Consent 1:30 p.m.
   - Approval of Agenda
   - Approval of Proceedings from October 2017
3. Public Comment 1:35 p.m.
4. Review 2018 Stock Assessment Update (*J. Didden*) 1:45 p.m.
5. Discuss Adjustments to Federal Commercial Trip Limit (*K. Rootes-Murdy*) 2:00 p.m.
6. Review and Set 2019-2021 Specifications **Final Action** 2:10 p.m.
   - Review Mid-Atlantic Fishery Management Council's Recommended 2019-2021 Specifications (*K. Rootes-Murdy*)
   - Set 2019-2021 Specifications (*R. O'Reilly*)
7. Review and Populate Advisory Panel Membership *(T. Berger)* **Action** 2:20 p.m.
8. Elect Vice-Chair **Action** 2:25 p.m.
9. Other Business/Adjourn 2:30 p.m.

The meeting will be held at the Roosevelt Hotel, 45 East 45th Street & Madison Avenue, New York, NY; 212.661.9600

MEETING OVERVIEW

Spiny Dogfish Management Board
October 23, 2018
1:30 – 2:30 p.m.
New York, New York

Chair: Rob O'Reilly (VA) Assumed Chairmanship: 10/17	Vice Chair: VACANT	Law Enforcement Committee Representative: Moran
Spiny Dogfish Technical Committee Chair: Scott Newlin	Spiny Dogfish Advisory Panel Chair: VACANT	Previous Board Meeting: October 16, 2017
Voting Members: ME, NH, MA, RI, CT, NY, NJ, DE, MD, VA, NC, NMFS (12 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from October 2017

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 2018 Stock Assessment Update (1:45 – 2:00 p.m.)

Background

- An update of the 2006 benchmark stock assessment was completed in September. The assessment update includes several methods of data smoothing to address recent missing or variable annual NEFSC survey information. A three year averaging approach was applied to generate swept area biomass estimate. Based on the results, the stock is not overfished and overfishing is not occurring **(Briefing Materials)**

Presentations

- Review 2018 Stock Assessment Update by J. Didden

5. Discuss Adjustments to Federal Commercial Trip Limit (2:00 – 2:10 p.m.)

Background

- In September, a request was made for the Board to consider eliminating the commercial federal trip limit. **(Briefing Materials)**
- In October, the Mid-Atlantic Council voted to maintain the federal trip limit at 6,000 pounds for 2019-2021 and consider adding an action to change the federal trip limit as part of the Council's 2019 priorities

Presentations

- Discuss Adjustments to Federal Commercial Trip Limit by K. Rootes-Murdy

6. Review and Set 2019-2021 Specifications (2:20 – 2:25 p.m.) Final Action

Background

- In October, based on the advice of the Mid-Atlantic Council's Scientific and Statistical Committee, Advisory Panel, and Spiny Dogfish Committee, the Council voted to set the 2019 commercial quota at 20.5 million pounds, a 46% reduction from the current quota of 38.2 million pounds. **(Briefing Materials)**

Presentations

- Review MAFMC Recommended 2019-2012 Specifications by K. Rootes-Murdy

Board Actions for Consideration at this Meeting

- Set the 2019-2021 Spiny Dogfish Specifications

7. Spiny Dogfish Advisory Panel Membership (2:20 – 2:25 p.m.) Action

Background

- Thomas Lyons from New Hampshire, Doug Feeney and John Whiteside from Massachusetts, and Scott McDonald from Virginia have been nominated to the Spiny Dogfish Advisory Panel.

Presentations

- Nominations by T. Berger **(Briefing Materials)**

Board Actions for Consideration at this Meeting

- Approve Spiny Dogfish Advisory Panel nominations

8. Elect Vice Chair

9. Other Business/Adjourn

Spiny Dogfish

Activity level: Low

Committee Overlap Score: low (some overlaps with Coastal Sharks)

Committee Task List
• TC – July 1st: Annual compliance reports due

TC Members: Scott Newlin (DE, TC Chair), Tobey Curtis (NOAA), Jason Didden (MAFMC),Lewis Gillingham (VA), Greg Skomal (MA), Mike Frisk (NY), Lisa Hollensead (NC), Eric Schneider (RI), Greg Hinks (NJ), Angel Willey (MD), Matt Gates (CT), Kathy Sosobee (NOAA), Michael Frisk (NY), Kirby Rootes-Murdy (ASMFC)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

SPINY DOGFISH MANAGEMENT BOARD

The Marriott Norfolk Waterside
Norfolk, Virginia
October 16, 2017

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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ATTENDANCE

Board Members

Sen. Brian Langley, ME (LA)
Doug Grout, NH (AA)
Dennis Abbott, NH, proxy for Sen. Watters (LA)
G. Ritchie White, NH (GA)
Rep. Sarah Peake, MA (LA)
David Pierce, MA (AA)
Raymond Kane, MA (GA)
Jason McNamee, RI, proxy for J. Coit (AA)
David Borden, RI (GA)
Eric Reid, RI, proxy for S. Sosnowski (LA)
Colleen Giannini, CT, proxy for M. Alexander (AA)
Sen. Phil Boyle, NY (LA)
Emerson Hasbrouck, NY (GA)
Jim Gilmore, NY (AA)
Adam Nowalsky, NJ, proxy for Asm. R. Andrzejczak (LA)
Tom Baum, NJ, proxy for L. Herrighty (AA)
Tom Fote, NJ (GA)
John Clark, DE, proxy for D. Saveikis (AA)
Roy Miller, DE (GA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Rachel Dean, MD (GA)
Ed O'Brien, MD, proxy for Del. Stein (LA)
Mike Luisi, MD, proxy for D. Blazer (AA)
Rob O'Reilly, VA, proxy for J. Bull (AA)
Cathy Davenport, VA (GA)
Kyle Schick, VA, proxy for R. Stuart (LA)
Chris Batsavage, NC, proxy for B. Davis (AA)
David Bush, NC, proxy for Rep. Steinburg (LA)
Sherry White, USFWS
Peter Burns, NMFS

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

Ex-Officio Members

Robert Beal
Max Appelman
Toni Kerns

Guests

The Spiny Dogfish Management Board of the Atlantic States Marine Fisheries Commission convened in the Hampton Roads Ballroom V of the Marriott Waterside Hotel, Norfolk, Virginia, October 16, 2017, and was called to order at 3:04 o'clock p.m. by Chairman David V. Borden.

CALL TO ORDER

CHAIRMAN DAVID V. BORDEN: My name is David Borden; I'm the Chair of the Dogfish Board, and welcome to the meeting.

APPROVAL OF AGENDA

CHAIRMAN BORDEN: We have an agenda that has been distributed. Are there any changes, additions, deletions to the agenda? No hands up; anyone in the audience with comments on the agenda?

No hands up. Okay so we'll take the items in the order that they appear.

APPROVAL OF PROCEEDINGS

CHAIRMAN BORDEN: We have the proceedings of the last meeting. They are available; any comments on those? No comments; the proceedings stand approved.

PUBLIC COMMENT

CHAIRMAN BORDEN: Public comments, we afford the public the opportunity to comment on issues not on the agenda.

Does anyone in the public, no one signed up I would point out, but is there anyone in attendance here who would like to address the Board? No hands up.

REVIEW AND SET SPECIFICATIONS FOR 2018 AND 2019

CHAIRMAN BORDEN: The next issue is the Review and Set Specifications for 2018 and '19. The first thing we're going to do is review the Mid-Atlantic Council action. Max.

REVIEW MID-ATLANTIC COUNCIL ACTION

MR. MAX APPELMAN: I'm going to give a very brief bit of background; touch on to the AP Fishery Performance Report. We'll move into the data update, and then wrap up with recommendations of the SSC, the Monitoring Committee, and the Mid-Atlantic Council. If you listened in to the Council meeting last week, or participated in any level with the SSC or the Monitoring Committee, you'll realize this presentation is somewhat familiar.

Just a reminder, spiny dogfish is a jointly managed species. The interstate FMP is complementary to the joint Mid-Atlantic and New England Council management plan. Currently in federal waters, they're in the third year of a three-year-specification cycle. It goes from May 1, 2016 to April 30, 2019.

The ASMFC Management Board had gone one year at a time with these specifications; so today we'll be considering specs for the 2018 fishing season, which is May 1, 2018 to April 30, 2019. This is a look at the current federal three-year-specifications package; 2016 to 2018. It starts with your OFL and ABCs up at the top there, and you work your way down to the commercial quota.

You'll notice that there is a slight dip in the commercial quota through the course of these specifications; not by much, roughly a million pounds each year. The 2018 federal quota is 38.2 million pounds. The federal trip limit is set at 6,000 pounds. Moving on to the AP Performance Report, first off it is very similar to the last few years. It's pretty clear the market issues, market and demand issues are the big ticket items there. Domestic and foreign markets appear to be shifting away from shark products, and industry continues to look for new markets, new opportunities. This year in particular, Council staff has received a handful of phone calls from industry members seeking marketing help.

Those individuals have been directed to marketing assistant opportunities that exist; some state and other federal programs, Sea Grant being a good example of that. The AP has also discussed this year that processors are having a significant impact on price. To summarize that discussion very briefly, it seems that a lot of the processors bought a lot of dogfish product early in the season.

They held onto that product hoping that the price would go up; and that never really happened. As a result the price remained relatively low; which effectively reduced the amount of landings coming in. Another note from the AP Performance Report was discussion about the trip limit. There continues to be very differing opinions amongst Advisory Panel members.

Some feel that a substantial increase would stimulate other markets or fishing opportunities. Others are happy at the 6,000 pound limit, and fear that large increases would flood the market, flood processors. Then still some even favored slightly reduced trip limits. It seems that in the end, if any changes to the trip limits are considered, a small change would be sort of a compromise there.

Lastly, the Advisory Panel expressed a sense that the survey and assessment information that they've been seeing doesn't really reflect what they're seeing out on the water. There was a strong desire for a new benchmark assessment. I will note that this was echoed by the Monitoring Committee and partially by the SSC as well.

Moving on to the data update, this is a look at landings relative to the quota through time. You can see at the early part of the time series landings increasing steadily; along with the quota, up until about 2011, where they start to diverge. The quota continued to increase, and landings remained pretty flat.

It seems to be general understanding that this trend is due to market conditions; not so much abundance or availability. Taking another look at landings, this is the rate of landings through time, so this is a screenshot from the GARFO quota monitoring page; this was taken just last week. I think it goes through the end of September.

The orange line here is the previous year, so May 1, 2016 through April of 2017, and then blue would be the current fishing year, May 1, 2017 and ending at the end of September. You can see they tracked pretty well; up until early August, at which point the landings rate seemed to drop off relative to last year. This is what I was mentioning earlier; the talk about the processors starting to affect the price of dogfish, and thus you can see landings starting to drop off with low prices.

This is a couple figures from the data update as well. This is a heat map; looking at where landings are coming from. This is based on matched dealer and VTR data; so it's only a portion of landings. But it gives us some insight as to whether or not there are any substantial changes in where dogfish landings are coming from in the most recent past. This is the first half of the year; January through June, the left hand figure is 2011 to 2013, compared to 2014 through 2016 on the right. The take home here is that not much has changed between those two periods of time. The hot spots are in the same relative areas off of Maryland it looks like there, up in the New York Bight, off of Jersey, southern Long Island, and then a couple hot spots off of Rhode Island and then Massachusetts.

This is the same figures. Now we're just looking at July through December. Again, 2011 to 2013 on the left, 2014 to 2016 on the right, and the same take-home message really, no substantial changes in where these landings are coming from during those two time periods. This is a look at the swept area biomass of mature females from the Spring Bottom Trawl Survey through time.

I'm going to direct you to the 2017 value, the last value there. It is pretty low; it's actually the lowest in the time series. That is concerning, but there are a few caveats to keep in mind here. First off is that this is a raw data value. It is not an output of an assessment model; which incorporates other information when estimating spawning stock biomass.

Then secondly, after reviewing this same information, the SSC and the Monitoring Committee appear to be under the understanding that this is more likely a change in availability rather than abundance; particularly given the life history of spiny dogfish, not really lending itself to rapid changes in biomass from one year to the next, and when we also consider the moderate amount of catches that have been coming in, in recent years.

To add to this what they are alluding to, this is a figure from the data update. It's showing long term density of survey catch relative to more recent, so the gray in both of these figures are the long term density of survey catches. Then the yellow and red on the left is 2016, and on the right is 2017. The takeaway from here is if you look at 2017, if you look off of Georges Bank you don't see any of that yellow and red, and you see a lot of it in 2016.

This seems to be a year-specific-availability issue. This is also seen in this anomaly, it was also seen in the NEMAP spring 2017 data as well. Lowest point in the time series, but the SSC and Monitoring Committee really want to see more investigation before jumping to any conclusions with that terminal year estimate.

It is my understanding that there is some preliminary work being done by the SSC; to look at some index standardization techniques that incorporate environmental data as well, some other habitat covariates to shed some light onto whether this survey really does track the availability or is it a good abundance index?

After reviewing that information, the data update, the AP report, the SSC recommended no changes to the 2018 specifications. They further requested an assessment update this time next year to inform the next round of specifications. The Monitoring Committee similarly recommended no changes to the 2018 specs, further stating that a benchmark would be very helpful in the near future.

Just last week the Mid-Atlantic Council heard the same information that I just presented, and similarly recommended no changes. They further supported the SSC and Monitoring Committee's request regarding the urgency of an assessment update and a benchmark assessment in the near future. The 2018 specs as of now in federal waters we'll be looking for a motion to approve specs. For state waters, our 38.2 million pounds, a little shy of 38.2 million pounds, and this is the state-specific and regional-specific breakdown. I'm going to leave this slide up on the screen. I'll take any questions, thank you, Mr. Chair.

CHAIRMAN BORDEN: Questions for Max? Are there any questions? Rob.

MR. ROB O'REILLY: Thank you, Max. I guess the information was flowing pretty freely there at the Council. Back when Dr. Pierce made a recommendation on how to sort of smooth over the problem that the survey had in 2015, I think it was. It ended up they used the Kalman Filter, do you happen to know if that is still the approach that they're using? I guess I'm asking, because you had a slide up there that indicated that the benchmark was preferred. But I think what was said ultimately was probably it may be an update. Can you confirm either of those points?

MR. APPELMAN: Yes, so the Kalman Filter was used. The last update was in 2015, and then the early 2016 the Science Center used that Kalman Filter with the newest year of data. That has not been used since the 2016 data point. There is talk, to the best of my knowledge there is talk of an assessment

update next year, but nothing is set in stone. Then further down the road there is communications with NRCC to get a benchmark on the 2019 schedule, I believe.

CHAIRMAN BORDEN: Rob.

MR. O'REILLY: I wanted to ask too. There were suggestions on a male-only fishery with the idea that the male dogfish will segregate, not completely, but they will segregate from the female dogfish. This has been sort of an ongoing situation for a couple of years at least. I think there was a paper.

I haven't looked at it yet. We got it Thursday. But I do remember Toby Curtis from National Marine Fisheries Service had provided information that yes, there was a possibility for that. But my understanding is that would have to go through the same, like a benchmark for that to be something to look forward to. I don't think that was explicitly stated last week, but maybe you know more about that Max.

MR. APPELMAN: My two cents is that the impacts of what a male-only fishery would be to the whole population would require deep investigation during a benchmark. But I haven't heard much coming. I think there are split opinions amongst the industry itself about whether a male-only fishery would benefit the market or anything of that nature. But as far as biologically speaking, biomass related, I think yes. We need to go through a benchmark for that.

CHAIRMAN BORDEN: Is there anyone else? No hands up. Are there any questions from anyone in the audience? If not, no hands up. Okay so we'll move on to the specifications. You basically heard what the Mid-Atlantic Council and the Mid-Atlantic SSC did. Would someone care to make a motion on this issue? Eric.

MR. ERIC REID: I would make a motion to move to adopt the 2018 quota of 38,195,822 pounds, which is consistent with the commercial quota recommended by the Mid-Atlantic Fisheries Management Council to NOAA Fisheries, and a 6,000 pound trip limit for the northern region.

CHAIRMAN BORDEN: Do we have a second? Seconded by Emerson, discussion, any discussion? No discussion. **This normally requires a roll call vote, but if there is no objection we can do it by unanimous consent. Are there any objections? There are no objections; the motion stands approved without objection.** Okay so we're into the Fishery Management Plan Review.

DR. DAVID PIERCE: Mr. Chairman, David.

CHAIRMAN BORDEN: Dr. Pierce.

DR. PIERCE: Yes we did hear a summary of what the Mid-Atlantic Council did at the last meeting regarding the update and the benchmark assessment. Would you be looking for a motion that would provide our support for similar action?

CHAIRMAN BORDEN: I think that would be helpful. If you would like to do that make a motion.

DR. PIERCE: I'll do that. I'll make a motion that the Board supports the SSC and Mid-Atlantic Council request for a dogfish assessment update, and then a benchmark assessment.

CHAIRMAN BORDEN: Is there a second? Seconded by Rob, is there any discussion on the motion? **No hands up, any objections? The motion stands approved without objection**.

FISHERY MANAGEMENT PLAN REVIEW AND STATE COMPLIANCE

CHAIRMAN BORDEN: Move on to the Fishery Management Plan Review. Toni.

MS. TONI KERNS: I guess you would really make a recommendation to the Policy Board to do this. But I'm not sure we fully need, I mean we

can do a motion which tells the Policy Board that that is how you would like the timing, or this Board would like the timing for the stock assessment process to go.

It's also something that Bob, Pat and I can also reiterate at the NRCC; because this isn't just a Commission decision on when these assessments get done, it is a group decision that we make with the NRCC, we would bring that to them. It makes it a little bit different than our normal process. Normally anything for the assessment process would go to the Policy Board, but we aren't the final say on when this will be, since it's a group effort.

CHAIRMAN BORDEN: Toni is your suggestion we just add in that the Board recommend at the Policy Board? Is that the recommendation? Let me rephrase that. What are you recommending specifically?

MS. KERNS: Just recommend that Commission leadership support a spiny dogfish benchmark stock assessment at the NRCC. I think timing would be helpful of when you want this to be on the schedule.

CHAIRMAN BORDEN: Question then to Dr. Pierce and Rob. Your thoughts, is this change acceptable, David?

DR. PIERCE: My motion was to recommend that we support the SSC and Mid-Atlantic Council request for an assessment update, and then a benchmark assessment, so not just the benchmark assessment. That's my preference. But at least an update, because the last update I believe was in 2015, I think you said, so at least an update. The Northeast Fisheries Science Center is hard pressed to do stock assessment benchmarks, so at the minimum the update and then let's make sure they understand that we really would like that benchmark assessment ASAP.

Now if this is formality, the Board recommends Commission support. I'm not sure if this is the language that Toni was suggesting. Well this is mine, except it's missing the update. The Board recommends the Commission support a spiny dogfish assessment update, and then a benchmark stock assessment. That was my motion, Mr. Chairman, so it's not reflected on the screen.

MS. KERNS: We want an update this coming year is what you're telling me.

CHAIRMAN BORDEN: We already approved the motion, the original motion. Unless we get the concurrence of the maker of the motion or the seconder on perfection, I'm reluctant to; I don't think we can change it, Rob, any comments?

MR. O'REILLY: Just that anything that can be done to ensure that that is followed. I think it was very tentative as to whether there would be a benchmark, and then the feeling was no, it's going to be an update. I think anyone who can push this forward so that the update is followed by the benchmark. I think that's really the point here.

CHAIRMAN BORDEN: Mike.

MR. MICHAEL LUISI: I'll speak as the Chair of the Mid-Atlantic Council. The NRCC meets on November 15, and that's when based on our meeting last week I'll be taking to the NRCC for our Council, the interest in doing an update. The update, in my opinion it's needed, because we need to get the next three-year specifications set.

I don't see there being a problem at all in the update. It's when that benchmark gets schedule. Those larger benchmark type updates or assessments are preplanned for the next few years. From the Council's perspective I'm going to go in and ask to have that put on the schedule as soon as possible; so it would be helpful to have the Commission thinking the same way.

PLAN REVIEW TEAM REPORT

CHAIRMAN BORDEN: All right, does anyone else want to propose anything on this? Then we're going to move on with the report, Plan Review Team report. Max.

MR. APPELMAN: This is a 2017 FMP Review for Spiny Dogfish. A lot of the information in this report was included in the previous presentation. To keep this short, I'll just be focusing on the compliance component. All the other stock status and fishery status information you can find in the report itself; it was provided in your meeting materials.

Just very briefly, the latest stock status information as we now know comes from the 2015 stock assessment update; which was updated again in 2016 using that Kalman Filter. That is what gives us our latest stock status information. Based on that in 2015, spiny dogfish is not overfished and overfishing is not occurring.

SSB is estimated at just over 168,000 metric tons, which is above the target. Fishing mortality estimated at 0.21, which is below the target. Moving on to the commercial quota and landings, so again the fishing season for this reporting period is May 1, 2016 to April 30, 2017. The base quota during that season was just over 40 million pounds, 40.4 million pounds. After accounting for eligible rollovers from the previous season, the effective quota was closer to 42.9 million pounds.

The trip limit for the northern region was set at 5,000 pounds; this increased to 6,000 pounds on August 15, following the notification of the federal trip limit increase. Commercial landings were just shy of 25 million pounds; which is actually a 13 percent increase relative to 2015. Dead discards also increased, as you would expect with an increase in landings.

Recreational landings increased as well; 161,000 pounds landed, and 1.4 million estimated dead discards. Combined this is a 1.5 fold increase relative to 2015, but when we look at the proportion to the total it's really a small number, especially when we think about the quota, so no red flags there.

State compliance and *de minimis*, the Review Team reviewed all the state compliance reports. In 2016 all regions and states harvested within their quotas, and all states implemented regulations consistent with the requirements of the management plan. Additionally, under the spiny dog FMP, a state may be granted *de minimis* upon request if its landings are less than 1 percent of the coastwide landings. New York and Delaware both requested *de minimis* and met those requirements for 2017. That concludes the FMP Review. I'll take any questions.

CHAIRMAN BORDEN: **All right, questions on the report, are there any questions? Is there any objection to approving the report as submitted? No objections; the report stands approved.** The last item is Other Business. Does anybody have anything to raise? Can't do it without unanimous consent?

MS. KERNS: I just need to see the motion on the board really quick, just so the Board knows that that was the motion. All right, does someone care to make this motion; Doug, and then John? Doug.

MR. DOUGLAS E. GROUT: **Move to approve the 2017 FMP Review, State Compliance and *de minimis* status requests from New York and Delaware.**

CHAIRMAN BORDEN: **Seconded by John Clark; discussion on the motion. Any objections to the motion, the motion stands approved without objection**.

OTHER BUSINESS

CHAIRMAN BORDEN: We're on to Other Business. Does anyone have anything under other business? I have one item; it will only take like one minute. I talked Rob O'Reilly

assumes the Chairmanship of the Committee, and that will start at the next meeting.

One thing that I've been a little bit uncomfortable with about the proceedings of the Board, kind of over the last two years is we have a tendency to not discuss dogfish all year, and then come to this meeting and basically listen to the AP report, which usually comes from the Mid-Atlantic Council.

Whatever input we get from our individual state representatives. But we really don't get into a discussion of the pros and cons of different strategies that we might use to alter the dogfish regulations. My suggestion is rather than just keep repeating this, and I think Rob agrees with this. He can speak to it if he does not. It would be beneficial to add dogfish to the winter meeting, and then have each of the states basically go out between now and then, talk to your own industry. Ask them what works, what doesn't work, what we might change and so forth? Then carry on maybe on an hour discussion at the winter meeting; to see whether or not there are some common ideas that we might foster along during the period between now and a year from now.

Just so everyone is clear, a lot of the suggestions have been made about issues like trip limit being higher. Some people have suggested the trip limit ought to be lower. Having multiple trip limits. There are area-specific needs. In other words, if you look at the needs of a Chatham dog fisherman, they might be very different than the needs of a Virginia fisherman or a Maine fisherman, because of the transportation cost to get to the processing facilities.

We talked about marketing issues, product quality issues, and we can go back. We can have the staff go back and look at what the AP has said over the years, and kind of summarize those comments and circulate those if that would help. Let me just ask, is there any objection to doing that?

Does anyone around the table object to it? If you don't object to it then what we'll do is we'll send out a memo, and basically kind of summarize that in a memo. Then we'll put it on the agenda, and there will be a discussion. There won't be any proposed action. This is just for discussion purposes. Toni.

MS. KERNS: No objection, David, just if the winter meeting ends up being quite full, it's only a three-day meeting right now. If we hold off for that meeting until May, we would still have the ability to make recommendations for the SSC and the Monitoring Committee to explore any recommendations that would come out of the Board. Would it be okay if the timing were either the winter or the spring meeting?

CHAIRMAN BORDEN: Chairman elect, is that agreeable to the Chairman elect?

MR. O'REILLY: I don't know how much interest there would be, Mr. Chair. But it would be good to have a working group in advance of the May meeting to just have, even if it's a phone conversation that we could have with several who would be interested; because what you outlined are the types of events and issues and problems that I've listened to over the last several years.

I do think that we can probably avail ourselves of more of that information to make decisions. I'm hoping there would be a workgroup that would get together in the wintertime, and maybe even get here early before the meeting starts and flesh out some of this information.

CHAIRMAN BORDEN: Is there any objections to Rob's suggestion? If not the next Chairman of the Dogfish Committee is going to convene a working group to develop this. We look forward to your actions on this, Rob. Is there any other business to come before the Board? Yes. David Pierce.

DR. PIERCE: Well, on that particular initiative. Mr. Chairman, I certainly don't object to it. However, we do get a lot of input from the

spiny dogfish industry in Massachusetts before we come to this meeting; to get a better understanding as to what is going on, what's happening, what's going right, what's not going right. Frankly, I've been doing this now for quite a few years, and every year it seems to be the same thing in terms of what's missing, such as price. The dogfish are there in large numbers, but price is just not there so catch is down.

I'm not exactly sure what the working group is going to come up with. We've heard these discussions about increasing the limits or weekly limits. It's nothing new there. If a working group is going to be established to delve deeper into how to improve dogfish management that's okay.

I just wish that there were more processors for dogfish in other states and that the price would be reasonable. Otherwise, if those things don't change more processors and a better price, I think we're going to see the same situation year in and year out regarding spiny dogfish that is landings much lower than they could be or should be. I guess we'll be part of that working group, Mr. Chairman when it's set up.

ADJOURNMENT

CHAIRMAN BORDEN: Thanks David. Is there any other business to come before the Board? If not, meeting adjourned.

(Whereupon the meeting adjourned at 3:38 o'clock p.m. on October 16, 2017)

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Update on the Status of Spiny Dogfish in 2018 and Projected Harvests at the Fmsy Proxy and Pstar of 40%

Katherine Sosebee and Paul Rago
Northeast Fisheries Science Center
National Marine Fisheries Service

Mid Atlantic Fishery Management Council
Scientific and Statistical Committee
August 31, 2017

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Executive Summary

The purpose of this report is to summarize the most recent information on the status of spiny dogfish (*Squalus acanthias*) in 2018. Information on the NEFSC spring bottom trawl survey trends and total removals are provided along with an analysis of estimated stock size, fishing mortality rates, and projections of stock size under varying fishing mortality rates. Four implementations of the stochastic estimator were evaluated and the two that were adjusted for the Kalman smoother were rejected because they gave unrealistic estimates. Including 2017 in the starting conditions was chosen because there is no a priori reason (i.e. late or partial survey) to omit the survey index in the three-year average. The recommended spiny dogfish population status is therefore not overfished and overfishing is not occurring based on stochastic estimates for 2016-2018, not Kalman adjusted. The SSB estimate is 106.8 kt compared to an SSBthreshold of 79.6 kt while the fishing mortality estimate is 0.202 compared to an Fmsy proxy of 0.2439.

US commercial landings decreased by 9% from 12,097 in 2016 to 10,949 mt in 2017. Canadian landings were <50 mt per year for 2016 and 2017. The recreational, Canadian and foreign fleets in 2017 collectively accounted for only 130 mt. Total landings since 2011 have averaged 10,125 mt.

Total discards in 2017 of 7,508 mt were the lowest in the time series. Total dead discards in 2017 of 3,247 mt were the lowest since 2000 and the second lowest value in the time series. The ratio of dead discards to landings over the last three years has been about 0.33, suggesting a general improvement in the utilization of the spiny dogfish resource (ie. landings/catch).

Overall survey abundance, measured as a 3 yr moving average of NEFSC spring bottom trawl survey indices increased 26% between 2017 and 2018 (Table 7). The 2017 survey abundance index may have been anomalously low since all size groups and sexes decreased by average of 63%. Such decreases are unlikely in a population subject to relatively low fishing mortality and exhibiting relatively slow growth and recruitment, irrespective of fishing intensity. The 3-yr average of the mature female swept area biomass estimates was 112 kt in 2017 and decreased to 102 kt in 2018 because the 2018 value, although higher than 2017, replaced the higher 2015 value in the three-year average.

The female SSB estimates for 2018 range from 77.2 kt with 2017, Kalman adjusted, included and 181.1 without 2017, Kalman adjusted. Both values without the Kalman adjustment are above the $SSB_{threshold}$. The application of the Kalman filter including 2017 followed the 2017 index down and was probably not realistic. The application of the Kalman without 2017 ignores the 2017 data point and results in a smoother trend. However,

the biomass estimates from this may be overly optimistic. Estimated fishing mortality rates in 2017 for females ranged from 0.124 without 2017, Kalman adjusted, and 0.302 with 2017, Kalman adjusted.

This report examines harvest scenarios using 4 starting conditions and two control rules. The first set of projections, using the 4 starting conditions, is based on fishing mortality rates at the Fmsy proxy (0.2439) while the second set is based on iterative application of the Pstar control rule. The Pstar method assumes that the OFL is lognormally distributed with a CV of 100%. The probability of exceeding the target F is set at 40% when the stock is above B_{msy} and declines linearly as the ratio of current SSB to target SSB declines. Median projected catches for 2019 to 2022 increase under all scenarios and the female SSB is expected to increase under all scenarios during this period.

Background

This report draws heavily on the results of the last peer-reviewed stock assessment vetted at SARC 43 in 2006, assessment model described in Rago and Sosebee (2009), and a revision of the biological reference points for spiny dogfish described in Rago and Sosebee (2010). The revised biomass reference points were peer-reviewed by the Transboundary Resource Assessment Committee in April 2010. The revised biological reference points required an update of the size and sex-based selectivity estimates of the fishery. Previous biomass reference points for spiny dogfish were based on a Ricker stock-recruitment model derived from Northeast Fishery Science Center trawl survey data. SSB_{max}, the biomass that results in the maximum projected recruitment, was the proxy for B_{MSY}. The revised biomass reference point incorporated additional information on the average size of the recruits as an important explanatory variable. A hierarchical AIC-based model building approach was used to identify the best model. Comparisons of maximum likelihood and robust nonlinear least squares regression models suggested that the robust estimator had the lowest AIC and highest precision for the estimate of SSB_{max}.

The revised target reference point, expressed in terms of average weight (kg)/tow of female spiny dogfish greater than 80 cm, is estimated as 30.343 kg/tow. Conversion of this metric to swept area biomass depends on the average swept area per tow, i.e., the trawl footprint. Using a value for the footprint based on gear mensuration suggested that a footprint of 0.0119 nm2 is more appropriate. The swept area biomass target (SSB_{max}) corresponding to this footprint is 159,288 mt. Applying the convention defined in the current control rule in the Spiny Dogfish Fishery Management Plan, the threshold biomass is one half of the target or 79,644 mt. Based on this biomass reference point and using the trawl footprint of 0.0119 nm2, the US spiny dogfish resource was rebuilt in 2008 when the swept area female spawning stock biomass was 194,616 mt.

The fishing mortality rate of 0.2439 was estimated using the projection model and finding the fishing mortality that results in the SSB_{max} described above at equilibrium (Rago 2011). These analyses and results were reviewed and approved on August 19, 2011 by the SSC.

Commercial Data

This document summarizes the most recent catch data through 2017. 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. These recreational

catches were not updated with the new MRIP numbers. 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.

US commercial landings in 2017 decreased 9% from 12,231 mt in 2016 to 11,079 mt in 2017 (Table 1, Fig. 1). Recreational landings and distant water fleet landings were negligible, totaling only 49 mt. Canadian landings have been less than 100 tons since 2011.

The precision of the recreational landings (catch types A and B1) in 2017 was relatively poor with Proportional Standard Errors of 28.9 and 52.2% respectively, although better than in 2016 (67.3 and 73.4%) (Table 2). The precision of the discarded dogfish estimates (B2) was much better at 16.6%.

The primary sources of commercial discards are otter trawls (5,451 mt; CV=7.6%) and sink gill nets (881 mt; CV=13.6%). Discards of spiny dogfish by scallop dredges (75 mt; CV=12.0%) and long lines (185 mt; CV=26.6%) 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 2017 of 7,508 mt were 28% less than the 10,437 in 2016 (Table 4, Fig. 2). Similar patterns were observed for dead discards. The ratio of dead discards to landings of 29% in 2017 was the lowest value since 2000. 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 2017 of 14,326 mt (Table 4) was about 62% of the 2017 ABC of 23,045 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 2017 to about 4%. 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 dogfish landed in 2017 were similar to recent averages compared to the average weight in 2015 while the female average weight declined to a value similar to 2015.

About 4.2 million spiny dogfish were landed in 2017. This was a decrease of about 9% in total numbers landed (Table 5). This was the same decrease observed in the total weight of landings.

The sex ratios of discarded fish are dominated by females, but represent only 60% of total discards by weight in 2017 (Table 6, Fig. 4). This difference, compared to landings, is likely due to the much higher rate of discarding of male fish. On a numerical basis, about 79% of the female dogfish caught in 2017 were landed (Tables 5 and 6). In contrast, only about 23% of male dogfish caught were landed.

Survey Data

The Northeast Fisheries Science Center (NEFSC) bottom trawl survey was completed on time in 2017 and 2018 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, using a three-point moving average, exceeded the female spawning stock biomass target (159,288 mt; Rago and Sosebee 2015) from 2009 to 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, Fig. 5). The female SSB estimate for 2017 of 24.4 kt was 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 distribution in 2018 is similar to that of 2017, however, the total catch was higher (Table 7). The 3-yr average of the mature female swept area biomass estimates was 112 kt in 2017 and decreased to102 kt in 2018 because the 2018 value, although higher than the 2017 value, replaced the higher 2015 value in the three-year average.

Pup production (Fig. 6) in 2017 was below both the long term mean and median values but increased to near the median value in 2018. The ratio of mature males to mature females increased five-fold (Fig. 7) in 2017 but decreased to values similar to that of 2013 in 2018. The increase in 2017 may have been a year specific effect. The mean length of mature females has been relatively stable since 2011 above the average of 1997-2003 when recruitment was low (Fig. 8). The mean length of pups (Fig. 9) in 2017 and 2018 was above the long term mean and median values and well above the average of 1997-2003 when recruitment was low.

Stochastic Estimates of Biomass and Fishing Mortality

The simple arithmetic average of stock size does not incorporate sampling variations in the underlying survey data or uncertainty in the size of the footprint of the average trawl tow. A stochastic estimator of spawning stock biomass and fishing mortality for female dogfish was described in SARC 43. Computational details on this estimator may be found in Rago and Sosebee (2009). The stochastic estimator incorporates uncertainty in the sampling observation (ie. the variance of the relative abundance index) of a 3 yr average and variation in the survey footprint (Appendix 1). Additionally, the Kalman filter was applied to smooth the survey biomass estimates as described in Rago (2015) and accepted by the SSC in 2015. Two different filters were applied for the 2016-2018 estimate. The Kalman was run with the 2017 survey index included and without the 2017 survey index (Figure 10). When the 2017 survey index was included, the smoother followed the low value for 2017 (adjustment of 0.72). Without the 2017 value included, the trend was much smoother and appeared more realistic for a long-lived species like spiny dogfish (adjustment of 1.22).

The estimator for fishing mortality is based on the ratio of total catch and swept area biomass. Ostensibly this assumes that the trawl is 100% efficient in capturing dogfish between the wings. Alternatively, it implies that the trawl is about 50% efficient in capturing dogfish between the doors. Dogfish in schools are known to herd between trawl doors. An external mass balance model was first applied at SARC 43 and was updated in Rago and Sosebee (2009). The mass balance model supported the biomass estimates based on simple swept area concepts. However, it is acknowledged that this is a source of uncertainty in the assessment and subject to change at a future benchmark assessment. Importantly, information provided by Sagarese et al. (2014, 2015) will be helpful for refining estimates of relative abundance and incorporating covariates that may elucidate the

role of environmental fluctuations on abundance estimates. The fishing mortality estimates incorporate uncertainty in the biomass as well as landings and discards. Variance estimates of discards by gear type and sex are computed for trawls, gillnets and recreational catch (Appendix 1).

The female SSB estimates for 2018 range from 77.2 kt with 2017, Kalman adjusted, included and 181.1 without 2017, Kalman adjusted (Tables 8a and 8b). Both values without the Kalman adjustment are above the $SSB_{threshold}$. The application of the Kalmn filter including 2017 followed the 2017 index down and was probably not realistic. The application of the Kalman without 2017 ignores the 2017 data point and results in a smoother trend. However, the biomass estimates from this may be overly optimistic. The variability of the biomass estimates for 2015-2017 (2016-2018 as terminal year of average) have decreased from 2015 to 2017 (Fig. 11a). If 2017 is not included, the variability is increased for both 2016 and 2017 (Fig. 11b). The application of the Kalman for 2017 increases the variability more both including and excluding 2017 (Fig. 11c). Comparison of female spawning stock biomass estimates for the raw data, 3 yr average and stochastic estimators (Fig. 12) show how the observation error in the surveys tends to smooth the inter-annual changes compared to the simple 3 point moving average, particularly if 2017 is omitted from the estimate. Three of the four estimates are above the $SSB_{threshold}$ value of 79.644 kt. The application of the Kalman with 2017 is just below the SSBthreshold.

Inclusion of the 2017 biomass estimate increased the variability in both the stochastic biomass estimate and the stochastic estimate of F in both 2016 and 2017 (Fig. 13). Estimated fishing mortality rates in 2017 for females ranged from 0.124 without 2017, Kalman adjusted, and 0.302 with 2017, Kalman adjusted (Table 9). Three of the four estimates are below the Fmsy proxy of 0.2439. The application of the Kalman including 2017 is above the Fmsy proxy.

In the mid 1990's F on fully recruited spiny dogfish was about 2 to 3 times greater than contemporary rates and a greater fraction of the mature female population was vulnerable to fishing mortality (Fig. 14). The reduced rate of fishing mortality and shift in selectivity led to major reductions in the overall force of mortality on the population. Fishing mortality rates on male dogfish are negligible (<0.01).

Harvest Scenarios

Stock projections are based on a stochastic model that incorporates uncertainty in initial population size. Uncertainty in population size is derived by consideration of sampling variability of a 3 year average abundance, and uncertainty in the average area swept per tow. The effects of harvest policies are estimated using length-based sex-specific projection model that has been used for catch and status projections since 2003. (See Rago and Sosebee, 2009 for a summary and example. Other examples in NEFSC 2003, and 2006).

In addition to specifying target fishing mortality rates and/or quotas, it is necessary to specify a number of key assumptions about future fisheries. The key assumptions include:

- All life history parameters, especially those related to reproduction are effectively constant
- Selectivity patterns in the fishery remain the same over time.
- Discard patterns and proportions of total catch remain constant over time
- Recent recruitment trends will continue and that the low recruitment period from earlier will not return
- The relationship between male and female fishing mortality rates scales directly with the magnitude of female fishing mortality. When Fs are increased to the Fmsy proxy (0.2439) it is assumed that the F on males would increase proportionally.

Commercial landings in 2018 were prorated to the commercial landings for the same time period (as of August 7) in 2017 which gave an estimate of 4,506 mt. Recreational landings were assumed to be the same as in 2017 (80 mt) and added to the commercial. If the ratio of landings to discards was assumed to be the same as in 2017, this would give a catch of 5,955 mt. This value seemed a bit low and gives an estimate of discards of less than 2000 mt, so the assumption was made that discards were the same magnitude as in 2017 (3,247). This gave a total catch of 7,833 mt for 2018.

Starting conditions were based on the three-year average length frequencies using the same four assumptions regarding 2017 described in the stochastic estimates section. The implications of these assumption are illustrated in Table 10, which demonstrates that there is less than a 25% chance that the fishing mortality rate would exceed the Fmsy proxy in 2018 with a less than 1% for three of the options (all except inclusion of 2017, Kalman adjusted). However there is between <1% and about 70% chance that the population would exceed the Bmsy proxy of 159 kt, depending on the starting conditions. If 2017 in included, there is about a 10% chance that the SSB in 2018 will be below the SSBthreshold if the Kalman is not used and a >50% chance if the Kalman adjustment is made. Starting with values including 2017 but not adjusted for the Kalman gives less than 1% chance of exceeding the Bmsy proxy. The scenario planning horizon was 20 years (2018-2037). The longer term projections should be viewed as informative of potential trends, but the absolute values are less reliable. Longer term trends are useful for comparing the likely state of the resource after a sustained harvest period.

F-based scenarios with F= Fmsy proxy =0.2439 were used to create sampling distributions of catch (Fig. 15a-d top left), total landings (Fig. 15a-d top right), female SSB (Fg. 15 a-d bottom left) and fraction of the SSB target (Fig. 15a-d bottom right) for the four starting conditions. The mean fishing mortalities, catches, landings, discards, female SSB and probabilities of being below the target and threshold SSB and over the fishing mortality threshold and target are given in Tables 11a-d. The percentiles of the total catch, landings, discards and female SSB for 2019-2022 are given in Tables 12a-d.

The ABC projections based on the application of the Pstar risk strategy were run for each of the starting conditions described above. The Fmsy proxy was used to estimate the OFL in year t=2019 by assuming that the catch in 2018 was 7,833 mt. A Pstar value was estimated based on the SSC's control rule for typical stocks, adjusted for the relative fraction of the population biomass to Bmsy. The OFL was assumed to be distributed lognormally with a 100% CV. The resulting ABC was substituted back into the projection model as a quota, and the OFL for the next year was computed. The OFL was then used to derive a new ABC and the process was repeated. The same assumptions about 2018 fishery were used to initialize these projections. Details on the iterative estimation of ABCs using the OFLs estimated from the iterative procedure are summarized in the text tables below.

Starting with 2016-2018 survey, no Kalman adjustment

				ABC				
Year	OFL(F)	B/Bmsy	Pstar	Total	Males	Females	frac_Male	frac_Fem
2018				7,833	964	6,869	0.1231	0.8769
2019	21,549	0.7059	0.2693	12,914	1,589	11,325		
2020	23,309	0.7159	0.2737	14,126	1,739	12,387		
2021	25,077	0.7656	0.2958	16,043	1,975	14,068		
2022	26,777	0.9498	0.3777	20,660	2,543	18,117		

Starting with 2016 and 2018 survey, no Kalman adjustment

				ABC				
Year	OFL(F)	B/Bmsy	Pstar	Total	Males	Females	frac_Male	frac_Fem
2018				7,833	964	6,869	0.1231	0.8769
2019	26,933	0.9717	0.3874	21,226	2,613	18,614		
2020	28,366	0.9481	0.3769	21,850	2,689	19,160		
2021	29,741	0.9718	0.3875	23,441	2,885	20,556		
2022	30,989	1.1284	0.4000	25,096	3,089	22,007		

Starting with 2016-2018 survey, Kalman adjustment

				ABC				
Year	OFL(F)	B/Bmsy	Pstar	Total	Males	Females	frac_Male	frac_Fem
2018				7,833	964	6,869	0.1231	0.8769
2019	16,405	0.4995	0.1775	7,596	935	6,661		
2020	17,833	0.5157	0.1847	8,448	1,040	7,408		
2021	19,290	0.5609	0.2049	9,711	1,195	8,516		
2022	20,725	0.7060	0.2694	12,423	1,529	10,894		

Starting with 2016 and 2018 survey, Kalman adjustment

				ABC				
Year	OFL(F)	B/Bmsy	Pstar	Total	Males	Females	frac_Male	frac_Fem
2018				7,833	964	6,869	0.1231	0.8769
2019	33,609	1.2093	0.4000	27,218	3,350	23,868		
2020	35,283	1.1748	0.4000	28,573	3,517	25,057		
2021	36,805	1.1957	0.4000	29,806	3,668	26,138		
2022	38,230	1.3834	0.4000	30,960	3,810	27,149		

The ABC values in the text tables vary both from the means in Table 13 and the medians in Table 14 because they are the values input into the projections while the outputs include some variance around them. Figures 15 and 16 illustrate the expected increases in uncertainty over time. The expectations for SSB (bottom panels) are particularly instructive for selection of harvest policies. In the short term, under the Fmsy scenarios, the SSB will be stable through 2021, increase through 2024 followed by a decline. The last four columns of Tables 11 and 13 include important information for the comparison of alternative harvest scenarios. Estimates of the probability of falling below the target and below the threshold biomass targets can be used to evaluate the risk of initiating a rebuilding program in future years or other management measures. The last two columns provide estimates of the probabilities of F exceeding the overfishing limit and the target F. These considerations are

relevant only for quota based policies. Decrease in stock size may occur from 2024 to 2031 but current runs suggest the stock, once it has increased, has a low probability of declining below the threshold biomass.

The Pstar harvest based policy is evaluated in Tables 13 and 14. Median projected catches for 2019 to 2022 increase under all scenarios (Table 14). The female SSB is expected to increase by 2022 under all scenarios during this period.

A summary of the pertinent statistics for the eight projection is given in Table 15.

Conclusions

The SSC accepted the use of the Kalman for smoothing the survey data for input into the projections in 2015. With the update of the assessment, it is clear that the application of the Kalman has had some unexpected consequences, both positive and negative. If 2017 is included, the status of dogfish becomes overfished, because there is a large adjustment factor. Excluding 2017 and adjusting suggests the stock is above SSBtarget. These two scenarios should be eliminated from consideration. In addition, omitting 2017 does not seem to be justified, given the distribution in 2018 seems to be very similar (Appendix 3). Therefore, the set of projections that should be recommended are those with 2017 and not Kalman adjusted.

Sources of Uncertainty

1. The long term dynamics of spiny dogfish are an important guide for structuring harvest scenarios. The current size structure and sex ratio of the population have important implications for stock dynamics over the next decade. However, it should also be noted that long-term forecasts are inherently uncertain. The history of this resource during periods of high exploitation is informative about the magnitudes of likely fishing mortality rates. Changes in average size in both the surveys and landings suggest that the magnitude of population biomass from the swept area computations is approximately correct.

2. Scientific advice on catch levels for spiny dogfish needs to be carefully crafted. A longer term perspective is necessary to ensure that the transient effects of the current population size and sex structure are considered over a period of several decades. At the same time, such longer term projections become increasingly uncertain and are driven by the assumptions used to model the stock dynamics. It is imprudent to look at short term changes in harvest levels without considering the longer-term implications.

3. Recent changes in survey-based abundance suggest that changes in availability play an important role in abundance indices. As the male population is largely unexploited, it may offer additional insights into changes in availability to the survey since inter-annual changes in the male component of the stock should be less variable. The sharp decrease in survey abundance in 2017 may represent decreased availability to the survey area or concentrations of the resource in smaller offshore strata. Such changes in resource allocation are, in theory, not expected to alter abundance indices. However, even slight changes in catchability among strata and high sampling variability could lead to very high or low abundance estimates in a given year. Publications by Sagarese et al. (2014) are relevant to the issues of changing distributions.

4. Changes in discard patterns could become extremely important. In 2017, discard mortality presently constitutes 77% of fishing mortality by number on male dogfish and 23% by number on females. The male population is at or near historic highs, but its low marketability and offshore distribution reduce the chances of male dogfish contributing significantly to future landings. All of the projections described herein assume that there will not be major increases in male dogfish landings. While the sex ratio of mature male to mature female dogfish declined through 2007, it appears to be increasing slightly since then and is higher than expected (Fig. 6). A targeted fishery to land male dogfish would not be detrimental to the population in the short run but the consequences for changes in selectivity for co-occurring female populations should be evaluated.

5. The landings in 2018 overall are assumed to be much lower than 2017 with the same magnitude of discards. If this changes with more landings or more discards occurring during the rest of the year, the projections will be overly optimistic.

Other important source of uncertainty include

a. Potential changes in fishery selectivity. Large increases in catches could induce changes in the overall selectivity pattern in the fishery.
b. Implications of changing selectivity on estimation of biological reference points
c. Potential inconsistency between the life history based estimates of fishing mortality rates and the biomass reference points derived from the Ricker stock recruitment curve.
d. Total discard estimates AND estimated mortality of discarded dogfish.

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Table 1. Total spiny dogfish landings (mt, live) in NAFO Areas 2 to 6, 1962-2017.

	United States				
Year	Commercial	Recreational	Canada	Distant Water Fleets	Total Landings
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
2017	10,949	81	49	0	11,079

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.

	Catch in Numbers								Numbers		Weight		
Year	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	44.0	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	18.0	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	13.0	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	34.0	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	9.0	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	8.0	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	38.0	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.

	Catch in Numbers								Numbers		Weight		
Year	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	17.0	29,258	1,250,842	73	3127	625
2017	7,185	28.9	25,250	52.2	366,533	16.6	398,968	15.6	32,435	366,533	81	916	183

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	3127	10,437		2,542	582	90	17	625	3,856
2017	5451	881	75	185	916	7,508		2,726	264	56	19	183	3,247

Table 4. Total landings, discards and total catch for spiny dogfish, 1989-2017.

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
2017	7,508	3,247	11,079	0.29	0.68	14,326

Table 5. Summary of estimated landings of US, Canadian and foreign fisheries by sex, 1982-2017. 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.

	NMFS Biological Samples from Ports								Prorated Landings by Sex				
Year	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
2017	398	609.9	1.532	5,178	13930.7	2.690	0.9581	11,079	465	10,614	303	3,945	4,249
formula	*A*	*B*	*C=B/A*	*D*	*E*	*F=E/D*	*G=E/(E+B)*	*H*	*I=(1-G)*H*	*J=G*H*	*K=I/C*	*L=J/F*	*M=K+L*

Table 6. Summary of estimated discards of combined US fleets by sex, 1991-2017. 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.

	NMFS Biological Samples from Observers								Prorated Discards by Sex				
Year	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
2017	1,271	1,653	1.301	1535	2481	1.616	0.6001	3,247	1,299	1,949	998	1,206	2,204
formula	*A*	*B*	*C=B/A*	*D*	*E*	*F=E/D*	*G=E/(E+B)*	*H*	*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, 1968-2018. Estimate for 2014 not included as survey coverage was incomplete. Estimate for 2017 is included but may not be representative of the population.

	Lengths >= 80 cm				Lengths 36 to 79 cm				Length <= 35 cm					
	Females	Males	Total		Females	Males	Total		Females	Males	Total		All Lengths	3-pt Average Female SSB
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 >= 80 cm				Lengths 36 to 79 cm				Length <= 35 cm					
	Females	Males	Total		Females	Males	Total		Females	Males	Total		All Lengths	3-pt Average Female SSB
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	350.0	44.7	394.7		94.5	617.7	712.2		4.03	5.02	9.05		1116.0	241.0
2013	143.8	56.5	200.3		131.5	439.0	570.4		5.19	6.40	11.59		782.3	235.9
2014	NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA
2015	123.9	22.1	145.9		40.0	276.8	316.8		1.06	1.33	2.39		465.1	135.5
2016	184.9	29.5	214.4		119.9	429.4	549.3		1.30	1.81	3.11		766.8	155.1
2017	24.4	12.7	37.1		92.5	284.8	377.3		0.23	0.31	0.53		414.9	111.6
2018	97.7	23.7	121.4		134.4	306.3	440.6		0.72	0.77	1.51		563.6	102.3

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. Averages for 2017 and 2018 are as years prior to 2014.

Table 8a. Summary of mean swept area biomass estimates (mt) based on stochastic population estimator, 1991-2018, including 2017. Swept area estimates not available for 2014. Exploitable biomasses are based on year-specific selectivity functions based on 3 year moving averages. Female spawning stock biomass is based on sum of female spiny dogfish above 80 cm TL. The target spawning stock biomass is 30.343 kg/tow or 159,288 mt (using the 0.0119 nm^2 trawl footprint). The threshold spawning stock biomass is 79,644 mt.

Terminal Year	Mid Year	Total Exploitable Biomass	Exploitable Female Biomass	Exploitable Male Biomass	Tot Biomass	Female Spawning Stock Biomass
1991	1990	570,113	339,405	230,208	582,274	234,229
1992	1991	532,641	278,419	253,722	664,850	269,624
1993	1992	379,501	169,227	209,773	553,731	220,002
1994	1993	322,345	93,716	228,128	544,415	186,132
1995	1994	261,387	55,102	205,785	460,932	133,264
1996	1995	329,048	77,600	250,948	519,920	120,664
1997	1996	316,075	81,413	234,162	520,782	114,091
1998	1997	319,828	69,005	250,323	489,233	91,458
1999	1998	185,468	77,142	107,825	406,287	51,821
2000	1999	167,483	66,023	100,960	358,185	52,562
2001	2000	286,458	96,233	189,725	343,602	61,552
2002	2001	291,695	107,026	184,169	337,686	64,844
2003	2002	278,283	63,794	213,989	371,200	58,376
2004	2003	241,697	39,745	201,452	347,176	53,625
2005	2004	237,536	17,432	219,604	338,170	47,719
2006	2005	327,077	54,587	271,991	453,881	106,180
2007	2006	233,662	90,651	142,511	524,205	141,351
2008	2007	423,273	123,742	299,031	586,413	194,616
2009	2008	361,040	89,151	271,390	505,116	163,256
2010	2009	377,034	87,984	288,549	521,494	164,066
2011	2010	410,490	88,702	321,288	557,059	169,415
2012	2011	518,504	111,692	406,311	688,632	215,744
2013	2012	567,696	110,296	456,899	766,064	211,372
2014	2013	NA	NA	NA	NA	NA
2015	2014	473,278	75,061	397,717	648,989	138,997
2016	2015	510,532	86,116	423,916	699,189	156,788
2017	2016	431,608	66,573	364,535	573,096	116,876
2018	2017	440,460	64,724	375,236	606,273	106,753

Table 8b. Summary of mean swept area biomass estimates (mt) based on stochastic population estimator, 2017-2018, omitting 2017 from the three-year average. Exploitable biomasses are based on year-specific selectivity functions based on 3 year moving averages. Female spawning stock biomass is based on sum of female spiny dogfish above 80 cm TL. The target spawning stock biomass is 30.343 kg/tow or 159,288 mt (using the 0.0119 nm^2 trawl footprint). The threshold spawning stock biomass is 79,644 mt. An alternative estimate for 2018 is also provided using the Kalman smoother with and without 2017.

Terminal Year	Mid Year	Total Exploitable Biomass	Exploitable Female Biomass	Exploitable Male Biomass	Tot Biomass	Female Spawning Stock Biomass
2017	2016	480,650	87,697	392,453	641,132	160,351
2018	2017	495,102	86,134	408,468	692,428	146,738
2018Kalman with 2017	2017	319,082	46,764	271,817	439,236	77,220
2018 Kalman without 2017	2017	610,671	106,362	503,809	854,068	181,115

Table 9a. Summary of stochastic fishing mortality rates expressed as the mean of full F on the exploitable biomass of female and male spiny dogfish, 1990-2017. Estimates for 2013 are not available. Year represents the year of the catch (landings plus dead discards). Estimates for 2016 are based on survey biomass from 2015 - 2017. Estimates for 2017 are based on biomass estimates from 2016- 2018. Sampling distribution of F estimates for females are given in Figure 11a,b. Fthreshold for females is 0.2439.

Year	F1: Female Catch on exploitable female biomass	F2: Male Catch on exploitable male biomass
1990	0.088	0.044
1991	0.082	0.026
1992	0.177	0.040
1993	0.327	0.021
1994	0.465	0.018
1995	0.418	0.014
1996	0.355	0.031
1997	0.234	0.038
1998	0.306	0.025
1999	0.289	0.043
2000	0.152	0.007
2001	0.109	0.005
2002	0.165	0.003
2003	0.168	0.004
2004	0.474	0.008
2005	0.128	0.007
2006	0.088	0.012
2007	0.090	0.005
2008	0.110	0.004
2009	0.113	0.006
2010	0.093	0.005
2011	0.114	0.006
2012	0.149	0.003
2013	NA	NA
2014	0.214	0.007
2015	0.126	0.007
2016	0.211	0.007
2017	0.202	0.004

Table 9b. Summary of stochastic fishing mortality rates expressed as the mean of full F on the exploitable biomass of female and male spiny dogfish, 2016-2017. Year represents the year of the catch (landings plus dead discards). Estimates for 2017 are based on biomass estimates from 2016 and 2018. An alternative estimate for 2017 is also provided using the Kalman smoother with and without 2017. Sampling distribution of F estimates for females are given in Figure 11a,b. Fthreshold for females is 0.2439.

Year	F1: Female Catch on exploitable female biomass	F2: Male Catch on exploitable male biomass
2016	0.160	0.006
2017	0.152	0.004
2017 Kalman with 2017	0.302	0.007
2017 Kalman without 2017	0.124	0.003

Table 10a. Projected percentiles of fishing mortality rate on females, total catch, landings, discards, female spawning stock and exploitable biomass in 2018. Catches in 2018 were estimated based on year to date commercial landings through August 7, 2018 prorated to the end of the year plus 2017 recreational catches and 2017 discards=7,833 mt. The starting conditions were based on the three-year average length frequencies, not adjusted for the Kalman and including 2017. Discard rates were estimated using the rate calculated for 2018.

2018						
Percentile	F	Catch (mt)	Landings (mt)	Discards (mt)	Female SSB (mt)	Exploitable Female Biomass (mt)
1	0.237	7,899	4,897	3,003	59,221	31,808
2	0.225	7,900	4,897	3,003	62,165	33,389
3	0.216	7,883	4,885	2,998	64,633	34,714
4	0.208	7,880	4,883	2,997	66,774	35,865
5	0.203	7,884	4,886	2,998	68,677	36,887
10	0.182	7,881	4,884	2,997	76,076	40,860
15	0.170	7,893	4,892	3,001	81,600	43,827
20	0.160	7,884	4,886	2,998	86,181	46,288
25	0.153	7,885	4,887	2,999	90,203	48,448
30	0.147	7,898	4,896	3,002	93,865	50,415
35	0.141	7,872	4,878	2,995	97,289	52,254
40	0.137	7,888	4,889	2,999	100,556	54,009
45	0.132	7,883	4,885	2,998	103,728	55,712
50	0.129	7,899	4,896	3,003	106,854	57,391
55	0.125	7,903	4,899	3,004	109,980	59,070
60	0.121	7,899	4,896	3,003	113,152	60,774
65	0.118	7,889	4,889	3,000	116,419	62,529
70	0.114	7,876	4,880	2,996	119,843	64,368
80	0.107	7,902	4,899	3,004	127,527	68,495
95	0.094	7,904	4,900	3,004	145,031	77,896
96	0.093	7,888	4,888	2,999	146,934	78,918
97	0.091	7,880	4,883	2,997	149,075	80,068
98	0.090	7,883	4,885	2,998	151,543	81,394
99	0.088	7,904	4,900	3,004	154,487	82,975

Table 10b. Projected percentiles of fishing mortality rate on females, total catch, landings, discards, female spawning stock and exploitable biomass in 2018. Catches in 2018 were estimated based on year to date commercial landings through August 7, 2018 prorated to the end of the year plus 2017 recreational catches and 2017 discards=7,833 mt. The starting conditions were based on the three-year average length frequencies, not adjusted for the Kalman and not including 2017. Discard rates were estimated using the rate calculated for 2018.

2018						
Percentile	F	Catch (mt)	Landings (mt)	Discards (mt)	Female SSB (mt)	Exploitable Female Biomass (mt)
1	0.173	7,966	4,895	3,071	82,536	42,891
2	0.165	7,972	4,899	3,072	86,501	44,951
3	0.159	7,960	4,891	3,069	89,825	46,679
4	0.154	7,959	4,890	3,068	92,709	48,178
5	0.150	7,985	4,909	3,077	95,272	49,510
10	0.135	7,982	4,906	3,076	105,237	54,688
15	0.126	7,963	4,893	3,070	112,678	58,555
20	0.119	7,968	4,897	3,071	118,849	61,762
25	0.114	7,979	4,904	3,075	124,266	64,577
30	0.110	7,982	4,907	3,076	129,198	67,140
35	0.106	7,995	4,915	3,080	133,810	69,536
40	0.102	7,980	4,905	3,075	138,210	71,823
45	0.099	7,994	4,915	3,079	142,482	74,043
50	0.096	7,992	4,913	3,079	146,693	76,231
55	0.093	7,979	4,904	3,075	150,904	78,420
60	0.091	7,956	4,888	3,068	155,176	80,639
65	0.088	7,982	4,906	3,076	159,576	82,926
70	0.085	7,950	4,884	3,066	164,188	85,323
80	0.080	7,952	4,886	3,066	174,537	90,701
95	0.071	7,968	4,897	3,071	198,113	102,953
96	0.070	7,986	4,909	3,077	200,677	104,285
97	0.069	7,941	4,878	3,063	203,561	105,784
98	0.068	7,979	4,905	3,075	206,885	107,511
99	0.066	7,962	4,893	3,069	210,850	109,572

Table 10c. Projected percentiles of fishing mortality rate on females, total catch, landings, discards, female spawning stock and exploitable biomass in 2018. Catches in 2018 were estimated based on year to date commercial landings through August 7, 2018 prorated to the end of the year plus 2017 recreational catches and 2017 discards=7,833 mt. The starting conditions were based on the three-year average length frequencies, adjusted for the Kalman and including 2017. Discard rates were estimated using the rate calculated for 2018.

2018						
Percentile	F	Catch (mt)	Landings (mt)	Discards (mt)	Female SSB (mt)	Exploitable Female Biomass (mt)
1	0.762	7,768	4,875	2,892	20,292	10,899
2	0.634	7,765	4,873	2,891	23,820	12,794
3	0.556	7,762	4,871	2,890	26,778	14,382
4	0.502	7,764	4,873	2,891	29,345	15,761
5	0.463	7,765	4,874	2,892	31,625	16,986
10	0.354	7,769	4,877	2,893	40,493	21,749
15	0.301	7,771	4,878	2,893	47,114	25,305
20	0.268	7,759	4,869	2,890	52,605	28,254
25	0.244	7,763	4,872	2,891	57,425	30,843
30	0.226	7,758	4,869	2,889	61,814	33,201
35	0.211	7,758	4,869	2,889	65,918	35,405
40	0.199	7,754	4,866	2,888	69,834	37,508
45	0.189	7,769	4,876	2,893	73,635	39,549
50	0.179	7,766	4,875	2,892	77,382	41,562
55	0.170	7,757	4,868	2,889	81,129	43,574
60	0.163	7,780	4,884	2,896	84,930	45,616
65	0.155	7,752	4,865	2,887	88,846	47,719
70	0.148	7,773	4,879	2,894	92,950	49,923
80	0.134	7,764	4,873	2,891	102,159	54,870
95	0.111	7,763	4,872	2,891	123,139	66,138
96	0.109	7,755	4,866	2,888	125,419	67,363
97	0.107	7,757	4,868	2,889	127,986	68,741
98	0.104	7,773	4,880	2,894	130,944	70,330
99	0.102	7,765	4,873	2,891	134,472	72,225

Table 10d. Projected percentiles of fishing mortality rate on females, total catch, landings, discards, female spawning stock and exploitable biomass in 2018. Catches in 2018 were estimated based on year to date commercial landings through August 7, 2018 prorated to the end of the year plus 2017 recreational catches and 2017 discards=7,833 mt. The starting conditions were based on the three-year average length frequencies, adjusted for the Kalman and not including 2017. Discard rates were estimated using the rate calculated for 2018.

2018						
Percentile	F	Catch (mt)	Landings (mt)	Discards (mt)	Female SSB (mt)	Exploitable Female Biomass (mt)
1	0.148	7,738	4,873	2,865	96,549	50,173
2	0.140	7,724	4,864	2,861	101,764	52,883
3	0.134	7,727	4,865	2,862	106,136	55,155
4	0.129	7,745	4,878	2,867	109,930	57,127
5	0.125	7,721	4,861	2,860	113,301	58,879
10	0.112	7,725	4,864	2,861	126,407	65,690
15	0.104	7,734	4,871	2,864	136,194	70,775
20	0.098	7,741	4,875	2,866	144,310	74,993
25	0.093	7,709	4,853	2,856	151,435	78,695
30	0.089	7,726	4,864	2,861	157,922	82,067
35	0.086	7,759	4,887	2,871	163,987	85,219
40	0.082	7,704	4,849	2,854	169,775	88,226
45	0.080	7,745	4,878	2,867	175,394	91,146
50	0.077	7,707	4,852	2,855	180,932	94,024
55	0.075	7,719	4,860	2,859	186,470	96,902
60	0.073	7,722	4,862	2,860	192,089	99,822
65	0.071	7,719	4,860	2,859	197,876	102,830
70	0.069	7,713	4,856	2,857	203,942	105,981
80	0.064	7,708	4,852	2,856	217,554	113,055
95	0.056	7,713	4,856	2,857	248,563	129,169
96	0.055	7,716	4,858	2,858	251,934	130,921
97	0.055	7,729	4,867	2,862	255,728	132,893
98	0.054	7,754	4,884	2,870	260,100	135,165
99	0.052	7,703	4,849	2,854	265,314	137,875

Table 11a. Summary of stochastic projections of F, SSB, catch (=OFL), landings and discards by sex, and comparisons with biomass reference points for spiny dogfish under a constant F harvest strategy equal to the target F=Fmsy proxy = 0.2439 for 2019 to 2037. Table entries are means of predicted values. Catches in 2018 are assumed to be Year-to-date adjusted landings plus recreational catches and commercial discards from 2017 =7,833 mt. Starting conditions were based on the three-year average length frequencies, not adjusted for the Kalman and including 2017. Discard rates were estimated using the rate calculated for 2018.

	Average											Probability			
Year	F on females	F on males	SSB (mt)	Total Catch (mt)	Total Landings (mt)	Female Landings (mt)	Male Landings (mt)	Total Discards (mt)	Female Discards (mt)	Male Discards (mt)	SSB(t)/ SSB_{target}	SSB< SSB $_{target}$	SSB< SSB_{thresh}	$F>=F_{thresh}$	$F>=F_{target}$
2018	0.1352851	0.00193	106,957	7,890	4,890	4,758	132	3,000	2,111	889	0.671	1.000	0.130	0.004	0.096
2019	0.2439	0.01258	112,444	21,549	11,202	10,350	852	10,346	4,592	5,755	0.706	0.968	0.112	1.000	1.000
2020	0.2439	0.01258	110,571	22,808	12,167	11,336	831	10,641	5,029	5,612	0.694	0.978	0.122	1.000	1.000
2021	0.2439	0.01258	114,638	23,990	13,097	12,291	806	10,894	5,452	5,441	0.720	0.958	0.098	1.000	1.000
2022	0.2439	0.01258	139,534	25,098	13,983	13,205	779	11,114	5,858	5,256	0.876	0.722	0.022	1.000	1.000
2023	0.2439	0.01258	184,810	25,904	14,666	13,916	750	11,238	6,174	5,064	1.160	0.282	0.000	1.000	1.000
2024	0.2439	0.01258	192,264	26,229	15,019	14,298	721	11,209	6,343	4,866	1.207	0.234	0.000	1.000	1.000
2025	0.2439	0.01258	178,219	26,135	15,087	14,397	690	11,048	6,387	4,661	1.119	0.328	0.000	1.000	1.000
2026	0.2439	0.01258	159,756	25,516	14,792	14,132	660	10,724	6,269	4,454	1.003	0.496	0.000	1.000	1.000
2027	0.2439	0.01258	145,325	24,700	14,347	13,714	632	10,353	6,084	4,269	0.912	0.658	0.010	1.000	1.000
2028	0.2439	0.01258	138,346	23,940	13,921	13,312	609	10,018	5,906	4,113	0.869	0.740	0.020	1.000	1.000
2029	0.2439	0.01258	133,626	23,297	13,564	12,975	589	9,734	5,756	3,978	0.839	0.794	0.030	1.000	1.000
2030	0.2439	0.01258	129,294	22,734	13,254	12,684	571	9,480	5,627	3,853	0.812	0.840	0.040	1.000	1.000
2031	0.2439	0.01258	125,521	22,269	13,012	12,459	552	9,257	5,527	3,730	0.788	0.876	0.050	1.000	1.000
2032	0.2439	0.01258	124,769	22,039	12,931	12,396	535	9,108	5,499	3,609	0.783	0.882	0.054	1.000	1.000
2033	0.2439	0.01258	129,928	22,060	13,020	12,503	517	9,040	5,547	3,493	0.816	0.830	0.040	1.000	1.000
2034	0.2439	0.01258	138,014	22,256	13,227	12,726	501	9,029	5,646	3,384	0.866	0.742	0.022	1.000	1.000
2035	0.2439	0.01258	145,547	22,520	13,476	12,990	486	9,044	5,763	3,282	0.914	0.654	0.012	1.000	1.000
2036	0.2439	0.01258	150,304	22,744	13,692	13,220	472	9,052	5,865	3,187	0.944	0.600	0.006	1.000	1.000
2037	0.2439	0.01258	152,214	22,869	13,834	13,375	459	9,035	5,933	3,102	0.956	0.578	0.004	1.000	1.000
Average	0.2385	0.01205	140,604	22,827	13,159	12,552	607	9,668	5,568	4,100	0.883	0.708	0.039	0.950	0.955

September 6, 2018

Dr. Christopher M. Moore
Executive Director
Mid-Atlantic Fishery Management Council
800 North State Street, Suite 201
Dover, Delaware 19901

Mr. Robert O'Reilly
ASMFC Spiny Dogfish Management Board Chair
Virginia Marine Resources Commission
2600 Washington Ave, 3rd Floor
Newport News, Virginia 23607

Dear Chris and Rob,

I recently listened to the Mid-Atlantic Fishery Management Council's Spiny Dogfish Advisory Panel (AP) deliberations and would like to offer a few conceptual thoughts and a request for your consideration. For the past 6 years the spiny dogfish commercial quota has been substantially underutilized, and some AP members have expressed continuing concerns that the federal trip limit constrains their ability to catch the quota, as well as supply enough product to attract buyers and develop new markets (e.g. bait market). This is a problem. My request is that the Atlantic State Marine Fisheries Commission's Spiny Dogfish Management Board and the Council's Monitoring Committee (MC) discuss the concept of eliminating the federal dogfish trip limit. In addition, I request the Commission discuss the development of a program that would replace the federal trip limit. There are a few reasons for this request and I offer comments on a few aspects of the current problem.

One difficulty we confront under the existing system is that the States have different views on the 'right' commercial trip limit for their respective jurisdictions, and the current 'one size fits all' federal trip limit has proven limiting for many states leading to a substantial under-harvesting of the coastwide quota. Equally problematic, there are significant discards- from 2014-2016, 44% of removals (combined commercial landings and discards) were commercial discards, with a portion of these discards likely attributed to the federal trip limit. Eliminating the federal trip limit would allow the States more flexibility to tailor their regulations to meet the individual needs of their respective constituents. This concept is used in the summer flounder and black seas bass fishery, where federal moratorium permit holders and state permitted individuals are restricted to their state's commercial trip limit, and I can envision such a concept working well with the spiny dogfish fishery, if structured properly.

This issue is further complicated by the seasonal and regional distribution of the resource. Spiny dogfish are found in state waters for part of the year and then in federal waters at other times of the year, largely in response to changes in water temperature. While states in the Mid-Atlantic region (New York through North Carolina) have the flexibly to tailor their state trip limits to meet their individual needs, that flexibility ends when the resource moves into

federal waters. This make little sense since the southern states operate under state allocations, and must close their fishery when they've met their allocation, thus the federal trip limit acts as a further deterrent, preventing many from achieving their state allocation. By comparison, the New England states of Maine through Connecticut operate under a regional quota, so a different approach would be needed in that area. As always the devil is in the details which would need to be developed.

I acknowledge that if the federal trip limit is removed, a process would need to be developed to determine how and when states modify their regulations and the extent of any changes. I also understand that aside from the Board and MC review of this concept, this proposal may require an adjustment to the federal FMP; if so, there may be the need for a similar action by the Commission. Notwithstanding those points, I think it would be useful to have both groups initiate a discussion on this concept, discuss the pros and cons of the strategy and offer suggestions on other approaches that may address some of the problems noted during the AP discussion.

In summary, I am requesting the Board and MC initiate a discussion of the concept of removing the federal trip limit, allow the Mid-Atlantic states of New York through North Carolina to develop state-specific trip limits or other strategies to achieve their commercial quotas, and the states of Maine through Connecticut to develop trip limits or other alternatives to collectively achieve their regional quota and reduce discards.

Thank you for your consideration of this concept, and if you have any further questions, please do not hesitate to contact me.

Sincerely,

David Borden
RI Commissioner, ASMFC

cc: ASMFC Spiny Dogfish Board

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

MEMORANDUM

Date: September 25, 2018

To: Council

From: Jason Didden

Subject: Spiny Dogfish Committee Meeting Summary

The Spiny Dogfish Committee (Committee) met on September 21, 2018 to consider making recommendations to the Councils on spiny dogfish specifications for the 2019-2021 fishing years.

Committee members in attendance: Stew Michels (Chair), Melanie Griffin (for David Pierce), Dewey Hemilright, Joe Cimino, Ward Slacum, Rob O'Reilly, Terry Stockwell, Rick Bellavance, Chris Batsavage, Mike Ruccio (for Mike Pentony), and Michael Luisi (ex-officio).

Others in attendance: Jason Didden, Fiona Hogan, Pete Burns, Kirby Rootes-Murdy, Cynthia Hanson, James Fletcher, and June Lewis.

Jason Didden, the Mid-Atlantic Fishery Management Council's spiny dogfish staff lead provided an overview of the recent spiny dogfish assessment update, the Scientific and Statistical Committee's recommendations, and the Monitoring Committee's recommendations.

The Committee discussed several aspects of spiny dogfish management including the specifications and trip limits. Discussion of trip limits centered around what the appropriate regulatory vehicle would be for considering changes to the federal trip limit. NMFS and Council staff communicated that a framework or amendment appeared most appropriate for making substantial changes to trip limits beyond simple and moderate increases or decreases.

The Committee also discussed the question of availability versus abundance regarding the NMFS trawl survey and how these issues may impact stock status and catch limits. Public comments on the call reinforced this concern. Council staff noted that there are a number of recent and ongoing studies that consider the issue of dogfish availability for the fishery and/or survey, and those studies will be considered and likely incorporated into the next benchmark assessment, currently scheduled for 2021.

Based on a public comment, there was also discussion of whether the Council should support an Exempted Fishing Permit (EFP) that would allow a fishery for male dogfish. No motions were made, and the Council could decide to provide support for such a project once details were available, or the Council could allow such a fishery through the normal Council processes. Staff

note: the possibility of a male fishery/quota was investigated in a recent master's degree project and could also be considered during the upcoming benchmark.

The motions made by the Committee included:

1. I move that the Committee recommend the ABCs and other specifications associated with the staff/SSC/Monitoring Committee recommendation:

Specifications	Basis	2019 (pounds)	2019 (mt)	2020 (pounds)	2020 (mt)	2021 (pounds)	2021 (mt)
OFL (from SSC)	Projected Catch at Fmsy	0	0	na	na	na	na
ABC (from SSC)	Council Risk Policy	28,470,497	12,914	31,142,499	14,126	35,368,761	16,043
Canadian Landings	= 2017 estimate	108,027	49	108,027	49	108,027	49
Domestic ABC	= ABC – Canadian Landings	28,362,470	12,865	31,034,473	14,077	35,260,734	15,994
ACL	= Domestic ABC	28,362,470	12,865	31,034,473	14,077	35,260,734	15,994
Mgmt Uncert Buffer	Ave pct overage since 2011	0	0	0	0	0	0
ACT	= ACL - mgmt uncert buffer	28,362,470	12,865	31,034,473	14,077	35,260,734	15,994
U.S. Discards	=3 year average 15-16-17	7,661,064	3,475	7,661,064	3,475	7,661,064	3,475
TAL	ACT – Discards	20,701,406	9,390	23,373,409	10,602	27,599,671	12,519
U.S. Rec Landings	= 2017 estimate	178,574	81	178,574	81	178,574	81
Comm Quota	TAL – Rec Landings	20,522,832	9,309	23,194,835	10,521	27,421,096	12,438

O'Reilly/Hemilright, 8/1/0

2. I move that the Committee recommend to the Council that an action be considered as soon as possible regarding trip limits that includes removing the federal trip limit (no changes to the federal trip limit of 6,000 pounds would be made via this specification action). Hemilright/Batsavage, 9-0-0

[Staff note: the intent of this motion was to recommend that the Council consider a separate, future action (framework or amendment) to consider changes to the federal trip limit that were deemed to be outside of the scope of the annual specifications process.]

3. I move that the Committee recommend for the Council to recommend to the NMFS Science Center that a proactive approach for the planned spiny dogfish assessment be taken, similar to the butterfish/mackerel assessments. Hemilright/O'Reilly, no objections

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M E M O R A N D U M

Date: 17 September 2018

To: Michael P. Luisi, Chairman, MAFMC

From: John Boreman, Ph.D., Chair, MAFMC Scientific and Statistical Committee

Subject: Report of the September 2018 SSC Meeting

The SSC met in Baltimore on the 11th of September 2018. The main objectives of the meeting were to develop new ABC specifications for Spiny Dogfish and, at the request of the Council, revisit the SSC's ABC recommendations for *Illex* squid for the 2019 and 2020 fishing years (Attachment 1). The agenda also included a discussion of progress being made by the NRCC in developing an assessment scheduling protocol for the GARFO region; however, there was not enough time to address this topic due to the extended amount of discussion (and debate) on Spiny Dogfish and *Illex*.

A total of 14 SSC members were in attendance (Attachment 2), which constituted a quorum. Also attending, in addition to yourself, were MAFMC staff and Council members, NEFSC staff (via webinar), ASMFC staff, and representatives from the fishing industry. Documents referenced in the report can be accessed via the SSC's meeting website (http://www.mafmc.org/council-events/2018/september-2018-ssc-meeting).

Spiny Dogfish

Jason Didden (MAFMC staff) briefed the SSC on the updated assessment prepared by the Northeast Fisheries Science Center (NEFSC) and the latest fishery performance report. Since SSC member Paul Rago is listed as a co-author of the updated assessment, he recused himself from any discussion related to the SSC's OFL and ABC recommendations other than answering questions and helping to identify sources of scientific uncertainty and research needs. Yan Jiao, as the SSC lead for Spiny Dogfish, led the SSC's discussion and development of OFL and ABC recommendations.

The SSC spent a considerable amount of time debating two issues raised in the updated assessment: (1) whether the Kalman filter method should still be applied to the time series of stock biomass estimates or return to the pre-2014 approved method of using a three-year running average; and (2) whether or not to include the low 2017 biomass estimate in the time series.

These issues were eventually resolved by the SSC as noted in the following responses to the Council's terms of reference (in *italics*).

For Spiny Dogfish, the SSC will provide a written report that identifies the following for the 2019 - 2021 fishing years:

1) *The level of uncertainty that the SSC deems most appropriate for the information content of the most recent stock assessment, based on criteria listed in the Omnibus Amendment.*

   The SSC determined that the level of uncertainty of OFL in the assessment update requires an SSC-specified coefficient of variation (CV).

2) *If possible, the level of catch (in weight) associated with the overfishing limit (OFL) based on the maximum fishing mortality rate threshold or, if appropriate, an OFL proxy.*

   Development of the OFL for Spiny Dogfish is based on an index-based estimate of biomass multiplied by an estimate of F_{msy} from a stochastic model. Thus, the indices of biomass and how they are calculated are important to the OFL values calculated.

   Data from the NEFSC spring survey in 2014 are not used because of missing survey coverage. This necessitated an approach in 2015 to estimate the biomass index value for 2014.

   In 2015, the SSC was asked to provide a three-year ABC specification. The SSC accepted application of the Kalman filter to the dogfish time series to overcome a data gap in the time series for 2014. The Kalman filter was chosen as the approach to filling the gap because it had improved performance over other approaches (the Council *ad hoc* approach and a three-year average) since it uses observation error from the survey data, and that it does not allow the estimates to increase rapidly, although they may decline rapidly.

   The SSC discussed extensively the justification for returning to the approved SAW/SARC 43 method (pre-2014) or maintaining the Kalman filter. The SSC determined that the extent to which the observation error uncertainty from the NEFSC spring survey provides a reliable indicator of biomass or an index of availability of dogfish is unknown. Thus, the SSC determined that, because the initial reason for adopting the Kalman filter approach is no longer needed and there was insufficient time to fully evaluate alternative approaches, it was appropriate to return to the three-year average approach.

   Data from the NEFSC spring survey in 2017 indicates a low biomass of large females in that year. After extensive discussion, the SSC determined that there is no reason not to use the 2017 survey value in calculations. The SSC heard that concerns remain over the reliability of this index value from stakeholders.

   Accordingly, the F_{msy} proxy for Spiny Dogfish is 0.2439, which is calculated from a projection model for which the finite rate of population increase is equal to 1.0. The updated NEFSC assessment recommends an OFL of **21,549 mt (47.5 million pounds)** for 2019,

which is also recommended by Council staff. Future OFLs assume that ABC-level catches are achieved.

3) *The level of catch (in weight) and the probability of overfishing associated with the acceptable biological catch (ABC) for the stock, the number of fishing years for which the ABC specification applies and, if possible, interim metrics that can be examined to determine if multi-year specifications need reconsideration prior to their expiration.*

The SSC made the determination of the CV of the OFL by considering the nine factors identified in the recently proposed OFL CV framework. The SSCs evaluation of each criterion was as follows:

1. Data quality (moderate uncertainty): For Spiny Dogfish the NEFSC spring survey is a low accuracy synoptic survey; however, catch and discard data are of high quality and have been thoroughly evaluated.
2. Model identification process (moderate – high uncertainty): The assessment uses a single model within which many parameter sensitivities have been explored. The application of the three-year smoothing and the Kalman filter produced divergent results.
3. Retrospective adjustment (high uncertainty): No retrospective analysis was applied.
4. Comparison with empirical scale (NA): The OFL is based on an empirical estimate of population biomass and a stochastic estimate of F_{msy}; a full model-based estimate is lacking.
5. Ecosystem factors accounted (high uncertainty): No formal accounting was made in the assessment for environmental factors; however, there are possible environmental effects on availability of dogfish to the survey that were discussed extensively, but cannot be included in the current assessment approach.
6. Trend in recruitment (moderate uncertainty): The consequence of the female size structure was included in the stochastic resampling of empirical data in the projection model, and the consequences of this were included in the model output.
7. Prediction error (high uncertainty): No estimate of prediction error was available.
8. Assessment accuracy under different fishing pressures (moderate uncertainty): There has been historical variation in fishing pressure that provides moderate contrast in survey indices.
9. MSE Simulations (NA): No MSE simulations have been performed for Spiny Dogfish.

Collectively, the attributes of the Spiny Dogfish assessment update suggest a moderate degree of uncertainty in the results. The SSC notes ongoing concern over the timing and completeness of the survey and potential issues for variable and possibly temporally correlated patterns in availability of dogfish to the survey. This has important consequences for our understanding of stock biomass and therefore management reference points.

Based on these criteria, the SSC calculated the ABCs based on a lognormally-distributed OFL with a CV of 100%. The SSC applied the Council's risk policy for a typical life history

and an estimated B_{201x}/B_{msy} ratio < 1 for all three years. Using these parameters, the P* values and the associated ABCs are as follows:

Year	P*	ABC (mt)
2019	0.269	12,914
2020	0.274	14,126
2021	0.296	16,043

The SSC will examine Spiny Dogfish discard rates, survey abundance trends (size composition, sex ratio, and pup size), average size and sex in commercial landings, agreement between observed and predicted catch and survey forecasts, changes in Canadian landings, and the spatial distributions of catch and survey abundances each year of the specification to determine if the multiyear ABC recommendations should be maintained.

4) *The most significant sources of scientific uncertainty associated with determination of OFL and ABC.*

The SSC concurs with the list of sources of scientific uncertainty provided in the 2018 Spiny Dogfish Assessment Update, which are:

- Large changes in interannual abundance are most likely driven by poorly understood changes in availability rather than true changes in abundance or the short-term effects of fishing activity. Even small changes in resource availability in the small offshore strata could have large implications for abundance estimates. Further studies on the effects of environmental factors are recommended.
- The long-term dynamics of Spiny Dogfish are an important guide for structuring harvest scenarios given their life history; current size structure has important implications for informing harvest strategies.
- The size- and sex-specific selectivity of the fishery landings and discards may change with market conditions and availability. Changes in selectivity have important implications for the definition of exploitable biomass, the estimation of fishing mortality rates, and biological reference points for fishing mortality.
- Uncertainty in the estimated survival of discarded dogfish is not currently incorporated in the assessment.
- Uncertainty in the biomass and pup abundance estimates may alter the biomass reference points derived from the Ricker stock recruitment curve.

In addition, the SSC notes:

- The disagreement for recent year estimates among different analysis methods is unresolved. This is a substantial source of uncertainty as it affects the status of the stock with respect to management reference points.
- The current assessment method does not include other surveys (e.g., NEAMAP) in the region.

5) *Ecosystem considerations accounted for in the stock assessment, and any additional ecosystem considerations that the SSC considered in selecting the ABC, including the basis for those additional considerations.*

No specific, additional ecosystem information was provided to the SSC for consideration in forming its ABC recommendations. However, there are possible environmental effects on availability of dogfish to the survey that were discussed extensively, but cannot be included in the current assessment approach.

6) *Prioritized research or monitoring recommendations that would reduce the scientific uncertainty in the ABC recommendation and/or improve the assessment level.*

1. Revise the assessment model to investigate the effects of stock structure, distribution, sex ratio, and size of pups on birth rate and first year survival of pups.
2. Explore model-based methods to derive survey indices for Spiny Dogfish.
3. Consider development of a state-space assessment model.
4. Continue large scale (international) tagging programs, including conventional external tags, data storage tags, and satellite pop-up tags, to help clarify movement patterns and migration rates.
5. Investigate the distribution of Spiny Dogfish beyond the depth range of current NEFSC trawl surveys, possibly by using experimental research or supplemental surveys.
6. Continue aging studies for Spiny Dogfish age structures (e.g., fins, spines) obtained from all sampling programs (include additional age validation and age structure exchanges), and conduct an aging workshop for Spiny Dogfish, encouraging participation by NEFSC, Canada DFO, other interested state agencies, academia, and other international investigators with an interest in dogfish aging (US and Canada Pacific Coast, ICES).
7. Evaluate ecosystem effects on Spiny Dogfish acting through changes in dogfish vital rates.

7) *The materials considered in reaching its recommendations.*

- Staff Memo: 2019-2021 Spiny Dogfish ABCs
- Spiny Dogfish AP Fishery Performance Report
- AP Fishery Information Document
- 2018 Spiny Dogfish Stock Assessment Update
- Report of the 2015 SSC meeting
- NEAMAP survey indices

8) *A certification that the recommendations provided by the SSC represent the best scientific information available.*

To the best of the SSC's knowledge, these recommendations are based on the best available scientific information.

2018 Spiny Dogfish Advisory Panel (AP)
Fishery Performance Report (FPR)

The Spiny Dogfish Advisory Panel (AP) (http://www.mafmc.org/advisory-panels/) met August 27, 2018 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:

Bonnie Brady, Kevin Wark, Dewayne Fox, James Fletcher, Tim O'Brien, John Whiteside, Doug Zemeckis, June Lewis, Scott Curatolo-Wagemann, Scott MacDonald, Sonja Fordham, and Ted Platz

Additional participants included:

Emerson Hasbrouck, David Borden, Stew Michels, Fiona Hogan, Wendy Gabriel, Cynthia Hanson, Amanda Cousart, and Kirby Rootes-Murdy

The fishery performance report's primary purpose is to contextualize catch histories for the Scientific and Statistical Committee (SSC) related to 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.

Note: Scott MacDonald noted that the state landings data for Virginia in the fishery information document appears to be too high. Staff is investigating.

General

- Quality is critical for maintaining price and the existing market.
- 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 and large trips may have difficulty maintaining high product quality. The fishery seems stable but there was a price drop in August 2017 for some harvesters. See what happens with recent higher trip limits and rules allowing dual-targeting of monkfish and dogfish.
- Try to sustain the fishery and keep things stable overall – there's not that much interest given the prices.
- 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. If the fish are there open it up and let the price be what it becomes.
- The trip limit means only the small scale operations can profitably participate.
- Need to understand male fish biomass – the data coming from the Bigelow is not useful for understanding the true size of this stock.
- There's interest in better understanding the NAFO process and role of NAFO as it relates to spiny dogfish.

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. There are relatively few boats willing to go out for dogfish at current prices, but a small price increase could change that.
- Market issues discourage new and/or previous processors, which limits vessel opportunities.
- Dogfish prices don't seem to follow traditional supply and demand – there appears to be an external constraint on prices that you don't see with other fish…Markets are weak.
- This fishery needs help from other institutions (Council, NOAA, etc.) on building the market.
- Abundance does not currently drive catches; boats have no problem obtaining their trip limits.
- 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.
- European markets are shifting away from sharks, limiting US dogfish exports to Europe.
    - The Shark Alliance did not promote European boycotts of US spiny dogfish/other legally caught sharks (though other entities have sought to do this).
    - Europe seems to have the U.S. figured out in terms of pricing
    - Traditional European demand may be declining due to changing tastes.

    - There may be some spiny dogfish landings in Europe in the future related to retention rules, which may impact demand for imports.
- Virginia landings were down this year primarily due to weather – was hard for boats to get out to fish from December 2017-April 2018 (primary Virginia season) and the low prices don't stimulate interest in fishing in poor weather.
- Rhode Island: Key is price and how close you can catch them given small profit margins – Cape Cod guys don't have to travel as far.
- Shoaling issues with Oregon Inlet prohibit large-scale landings in North Carolina.

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. Uncertainty about future trip limits is negatively affecting capital investment in vessels and gear.
- An occasional higher trip limit for trawlers (some per month or quarter) around 20,000-40,000 pounds could help develop new markets and provide opportunity for different vessels…Would like to change the situation from where trawlers have to always avoid dogfish to getting where they can target them.
    - A double limit once a week was raised as an alternative possibility
    - Regarding different kinds of trip limits, consider enforcement/monitoring issues.
    - 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 the regional impacts. Virginia would be negatively impacted by changes in December trip limits
- 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 NOTES: A male only fishery would need an Amendment and/or benchmark assessment but recent research suggests it may be feasible. A benchmark assessment is scheduled for 2021.
- It would be useful to have a NE permit covering smooth dogfish to reduce regulatory burdens. The current process causes unnecessary frustration.
- The 165 foot processor limit prevents fishery development and/or exploration of a beyond-the-EEZ (200 nm) fishery. There are transfer-at-sea provisions for other sharks that discourage transfers-at-sea.
- 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 market (fertilizer or pet food applications). Is it possible there could there be a declaration for fertilizer/larger scale applications where those products did not flood the

food market. VMS could be used for monitoring. There is general concern by some that large-scale landings could negatively impact the fresh market. The use of dogfish in a larger scale operation may impact fresh market indirectly and it was noted that gurry plants already exist.

Research Priority Ideas

- Develop new domestic (human and/or animal food) and/or non-European markets.
- Encourage a mid-Atlantic and/or southern processor.
- 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. Staff note: 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.
- Research/track export trends. https://www.st.nmfs.noaa.gov/commercial-fisheries/foreign-trade/applications/trade-by-product
- 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.
- The new benchmark assessment planned for fall 2021 should consider:
    - Exploration of how spiny dogfish recovered so much faster than predicted.
    - Increased engagement with fishermen as part of scientific research.
    - The population of male dogfish and availability of dogfish to the relevant surveys generally. Low 2017 datapoint was not reflective of what AP members see on the water – the bottom survey is most likely missing most dogfish.
    - Obtaining reproductive and other biological information across the range of the species before the next assessment.
    - How to prioritize the biological information that needs updating before the next assessment.
- Investigate dogfish as a source of squalamine.

Other Issues Raised

- Consider having NAFO manage the fishery outside the EEZ for a male-only fishery.
- Concern was previously voiced that sufficient notice be given prior to ASMFC consideration of trip limit changes.
- The environmental impact of high dogfish populations on other species is not known/considered.
- Tariffs create disadvantages for US fishermen.
- 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/SB122907204390964 81).
    - 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)

An Economic Analysis of Spiny Dogfish: Historical Trends, Future Markets, and Implications for Management Action

Prepared for:

Massachusetts Division of Marine Fisheries and its Seafood Marketing Program Steering Committee

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2018

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Executive Summary

This analysis examines the history of global trade in spiny dogfish over the last 20 years to show changes in buyers and sellers, changes in price, the differences between key countries, and the differences between the frozen and fresh markets. To ground truth this data and expand upon the underlying market dynamics, we also present interviews of key dogfish stakeholders (processors and fishermen) to better understand determinants of price, constraints in the local supply chain (transportation, processing and harvesting), recommendations and advice for management, and directions for future work and market development.

Over the last 20 years, the US has become the major supplier of spiny dogfish to the EU; this includes both fresh and frozen supply, which are two separate markets. The US accounts over 90% of the global supply of dogfish, and the European Union represents over 90% of the global demand. The total exports of frozen dogfish have increased significantly since 2010, but total exports of fresh dogfish have been trending down since 2010, and now only represent about 25 percent of total sales (in 2001 fresh dogfish represented ~50% o total sales). Currently, the fresh dogfish market is supported primarily by two countries—France and Italy.

Prices of both fresh and frozen dogfish exports have been trending up over the last decade, with the price of fresh dogfish rising to an all time high in 2014-2016. Higher prices encourage more supply, but over supply of frozen dogfish in both 2011 and 2016 resulted in about 40% market correction 2012 and 2017. The ex-vessel price has remained relatively flat over the last 20 years, and has averaged around 18 -20 cents per lbs. Although spiny dogfish quota has significantly increased in recent years, according to interviewees, it is not the right time to increase trip limits. The net effect of increasing trip limits before new markets are created would be a dedicated effort by off-loaders and processors to slow fishing activity by telling boats they are not accepting fish on certain days, or significantly lowering ex-vessel price. The size of the market is currently constrained by the local processing capacity and the total maximum global demand, which was estimated at approximately 20 million lbs (whole fish).

Other changes to regulation, such as male only harvest for draggers were discussed, but would require significant upfront costs, management changes, and the development of entirely new markets to funnel supply. Regarding new markets, both fishermen and processor mentioned the interest in exploring government markets, such as prison systems or the military as potential outlets. Overall, there was more confidence that new markets would materialize here in the United States (as opposed to globally), given all the work that has been done marketing, promoting, and developing new value-added products with dogfish over the years. There might also be potential to improve existing fresh fish markets by changing to a weekly vessel limit over the course of the fresh fish season (Sept 1-April 30). This would allow vessels to increase harvests to coincide with the days that fresh fish is sold (Mondays and Fridays), and avoid days in the middle of the week when processors can't sell it, and instead, freeze it. It could also save operating and transportation costs for the vessel and off-loader if boats could catch more fish on fewer days.

INTRODUCTION:

This analysis is intended to inform the Massachusetts Division of Marine Fisheries and its Seafood Marketing Program Steering Committee about market trends and limitations affecting spiny dogfish fisheries. This information may be useful to DMF in its contributions to spiny dogfish management at the federal and interstate level. The Mid-Atlantic Council's Spiny Dogfish Advisory Panel (AP) annually addresses issues pertaining to overall quotas and daily trip limits.

This analysis concerns global market dynamics of Spiny dogfish over the last 20 years with focus on current markets and limitations. Specifically, we examine trends in export price and quantity (per lbs.) of both fresh and frozen dogfish products over time, discuss the relationship and differences between countries, evaluate the potential to recover lost markets or create new ones, and explain how management changes and changes in consumer preferences have impacted global trends. We use this information to draw conclusions about the maximum sustainable size of the global dogfish (export) market, and to make recommendations for future growth.

In addition to this analysis, we also interviewed key fishermen and processors of dogfish in New England[2] to better understand important questions raised by the Dogfish AP and the MAFMC over the last few years[3], and to update the characterization of fishing communities involved in the spiny dogfish fishery. We were particularly interested in factors that influence prices and catch rates; the relationship between different regions (e.g. the seasonality of catch); the potential benefits and costs of proposed regulations (e.g. changes in trip limits, or male only harvest); the flow of product within the domestic supply chain (from vessel to truck to processor); the constraints and costs of processing; ways to increase domestic consumption and improve value added activities; and ideas for different research or management changes.

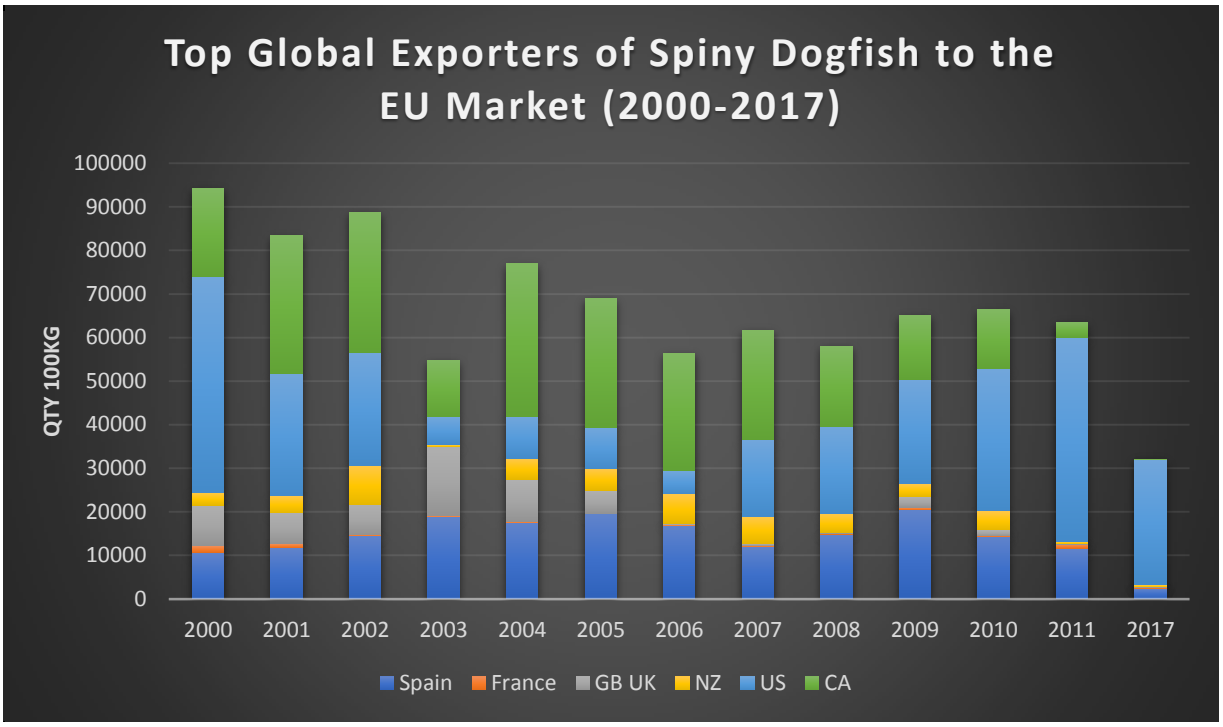
ANALYSIS OF GLOBAL CATCH AND TRADE IN SPINY DOGFISH

The main catches of spiny dogfish have historically been in the Northeast Atlantic and the Northwest Atlantic. Between 1950 and 1972, catch from the Northeast Atlantic (Norway, France, UK, Iceland) accounted for between 97 and 100% of the global reported catch (with a peak of 50,000 mt in 1972). Since that time the region's share has dramatically declined, especially over the last 20 years. By 2005, catch from that stock accounted for only 39% of the global catch, and by 2010 it accounted for just 7% of the global catch. Decades of overfishing in the Northeast Atlantic had reduced the spiny dogfish biomass by 95%[4], and eventually in 2011, the EU Council followed the advice of the EU Commission and ended fishing completely for dogfish in the Northeast Atlantic (Council Regulation 57/11)[5].

[2] Interviewees Included: Fishermen Doug Feeney; Fishermen; Fishermen Jamie Hayward; Processor Red's Best; Primary Processor Marder Trawling Inc.; Primary Processor Seatrade International; Secondary Processor Highliner.
[3] 2017 Spiny Dogfish Advisory Panel (AP) Fishery Performance Report (FPR) https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/59a6eb60893fc02cee00ad2c/1504111457029/2017-Dogfish-FPR.pdf
[4] Lack, Mary 2006. CONSERVATION OF SPINY DOGFISH SQUALUS ACANTHIAS: A ROLE FOR CITES? https://www.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/FINAL_Spiny_Dogfish_ImplementationRepDez06.pdf
[5] Dell'Appa, A., J. Johnson, D. Kimmel., R. Rulifson. 2013. The international trade and fishery management of spiny dogfish: A social network analysis. Journal of Ocean and Coastal Management. (80) https://www.researchgate.net/publication/267896648_International_Trade_in_Spiny_Dogfish_A_Network_Analysis_for_the_Fishery_Management

However, 95% of the global consumer market for spiny dogfish is in the EU. So, the decline of the European stocks meant opportunity for other regions to the fill that void. In the 1990's, the United States stepped up to the plate, and rapidly expanded its domestic fishery. However, it didn't take long for the Northwest Atlantic stock of Spiny Dogfish to also become overfished. With the decline of more traditional groundfish resources in the late 80s and early 90s, the directed fishing for dogfish resulted in a nearly ten-fold increase in landings from 1987-2001. This led to a 75% decline in female spawning stock biomass, which prompted the Mid-Atlantic and New England Fishery Management Councils (Councils) to develop a fisheries management plan (FMP) for the species. With the FMP in place by 2002 (which included total allowable catch and strict trip limits), total US catch (and export) of Spiny Dogfish declined by 75% from 2000-2003.

Figure 1. Top Global Exporters of Spiny Dogfish (2000-2017)



(http://epp.eurostat.ec.europa.eu/newxtweb/)

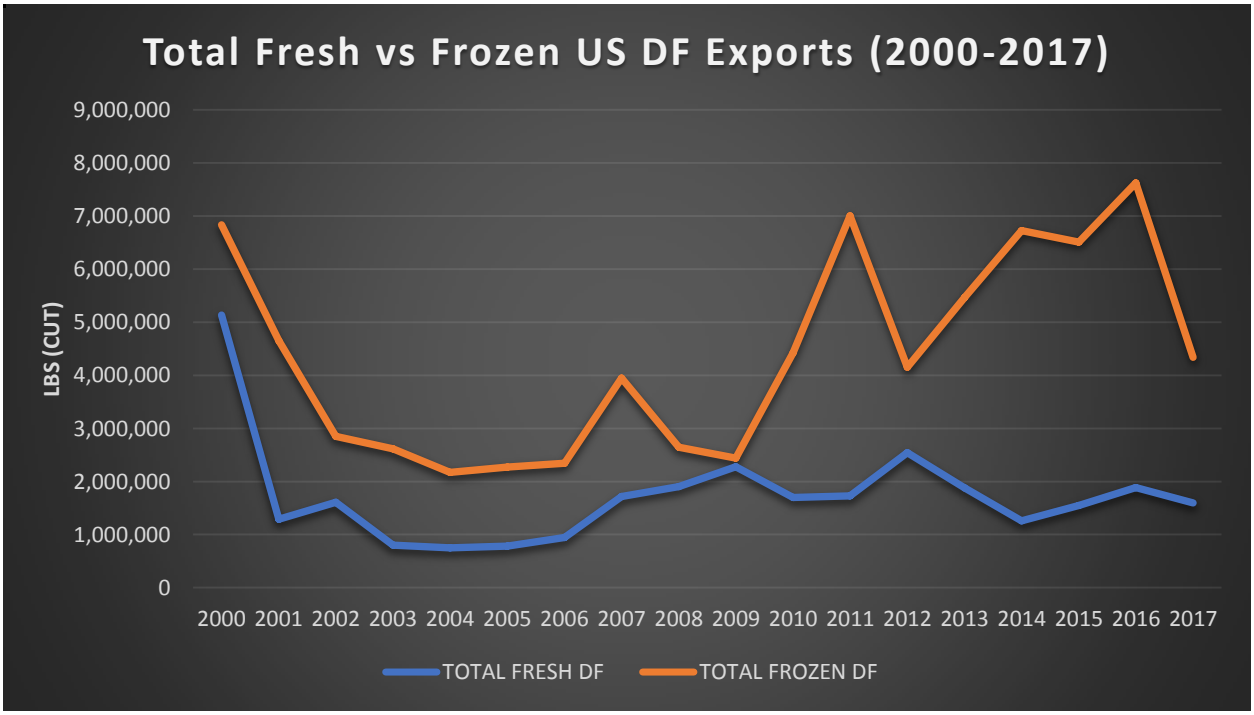
As **Figure 1** shows, between 2000-2002, the United States and Canada accounted for about 75% of all global exports to the EU. However, in 2003 when the FMP was put in place, US exports dropped by about 75% for the next five years, which once again provided opportunities for other countries to develop their fisheries. New countries increased their importance as exporters; particularly Canada and New Zealand. Also, amongst the EU27 countries, Spain became a central importer and exporter toward other west European countries (e.g. Portugal, Italy, France, and Greece) and several east European countries (e.g. Czech Republic, Poland, Bulgaria, and Slovenia). By 2010, the Northwest Atlantic spiny dogfish stock had fully recovered, and the United States regained control of most of the EU market. By 2017, the United States accounted for more than 90% of total global exports to the EU.

Market

Spiny dogfish product is known to be traded as fresh and frozen meat, including fillets; as tails; in smoked form; as fins; and as several by-products including cartilage and livers (or liver oil), hides, teeth and jaws. The 'back' represents the main body of the fish accounting for 28-30% of the total live body weight. Backs are exported for ultimate sale as fillets and steaks and for use in the fish and chips trade. 'Belly flaps' are produced during the dressing of the fish and are individually skinned and washed prior to freezing. The belly flap accounts for an additional 7% of the live weight (Personal Communication).

In the USA, the belly flaps are cut out, the fins removed, and the body is skinned leaving a white carcass or 'back' which is generally exported to Europe, particularly: France, Germany, Belgium, the UK, and Italy. Belly flaps are exported solely to Germany where they are smoked and used to prepare 'Schillerlocken'. Fins are frozen and exported to primarily to Thailand, where they are re-processed and re-distributed into the broader Asian market.

Figure 2. Total Fresh and Frozen US Spiny Dogfish Exports (2000-2017)



https://www.st.nmfs.noaa.gov/pls/webpls/FT_HELP.SPECIES

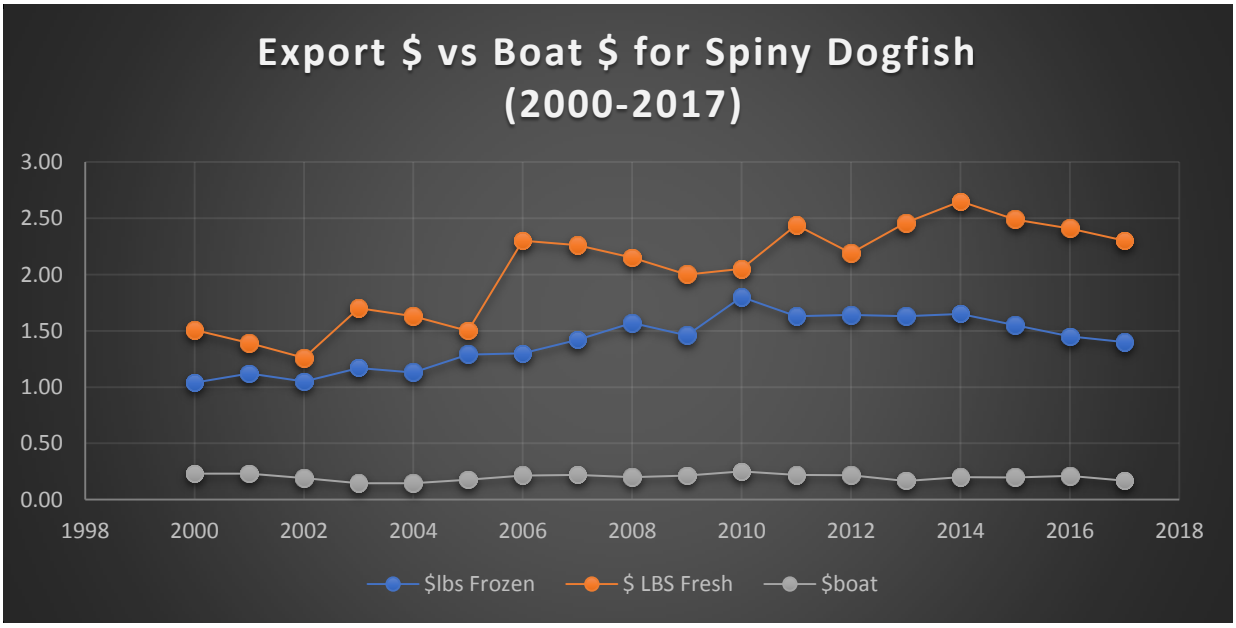
Figure 2 shows the relationship between the fresh and frozen spiny dogfish market over the last 17 years and illustrates the long-term trends in supply. As noted, US exports dropped considerably between 2000 and 2002 after the implementation of the FMP, and both frozen and fresh exports remained low until 2009. Up until this point, there also seemed to be a strong positive relationship between fresh and frozen supply, as they followed very similar trend lines. After 2009, the paths diverge considerably, and we start to see a significant increase in frozen dogfish exports. By 2016, the frozen exports were at their highest point in the last 20 years.

Meanwhile, fresh product showed a slight decline over this same period, and on average represented just 25% of the total dogfish export market (prior to 2009, the fresh market represented 50% or more of the total dogfish export each year). In 2012, we see a sharp decline in the fresh dogfish exports, which coincides with the EU concerns at that time about elevated PCB levels. However, this only seemed to impact the fresh market, as the frozen market increased sharply from 2012 all the way up until 2016, when it also crashed.

In the decade prior to 2016, the average export price (the price consumers are willing to pay) for frozen and fresh dogfish were both trending upwards. Over that same time, the total exports of frozen dogfish also increased sharply to take advantage of the higher price points (demand). Then, in 2016, the trip limit for dogfish increased to 6,000 lbs. per day, and according to processors and fishermen interviewed for this study, the domestic inventory became flooded with product (much of it ended up frozen), and the market crashed.

The quantity of US frozen dogfish exports fell by almost 40% from 2016 to 2017, and the export price of both fresh and frozen dogfish also declined. Together, the total US exports in 2016 was roughly 9.5 million lbs. of cut weight (at roughly 32% yield, this equates to about 28 million lbs. of whole dogfish quota). The consensus of both processors and fishermen interviewed for this analysis is that (for now) the global market for spiny dogfish can't support much more than 18-22 million lbs. of total catch (between 6-7 million lbs. of cut weight—backs, bellies and fins).

Figure 3. Export $ for Fresh and Frozen Dogfish (2000-2017)

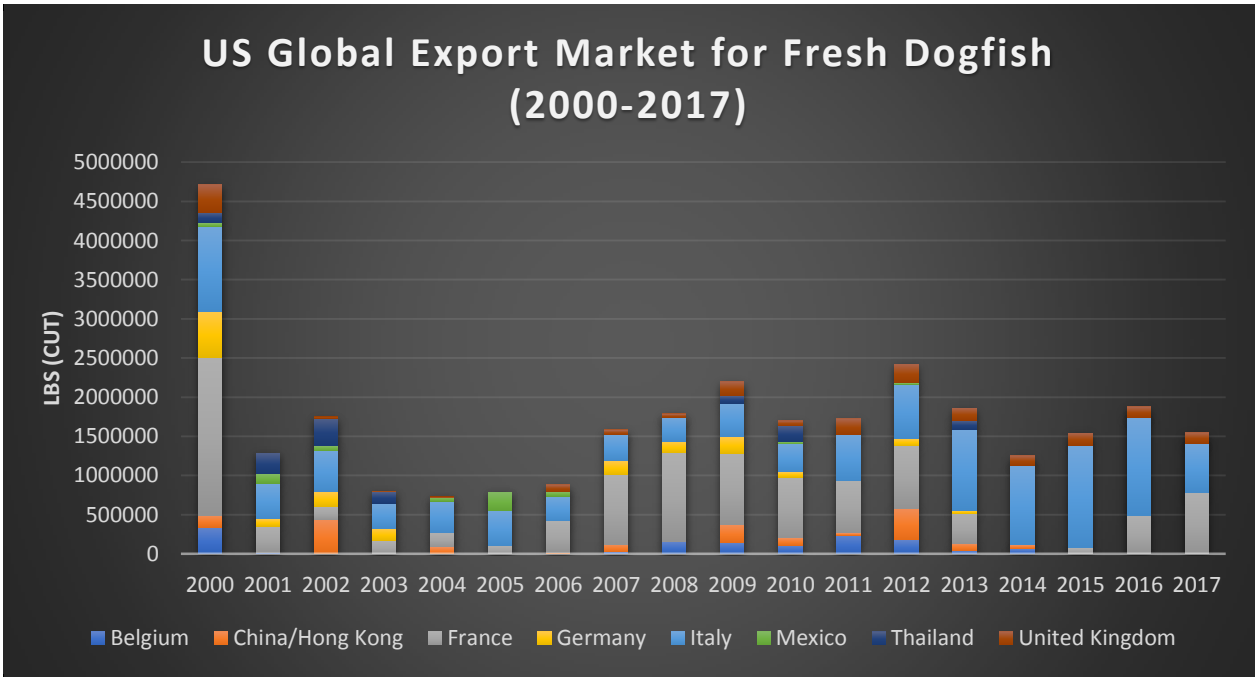


http://epp.eurostat.ec.europa.eu/newxtweb/;https://www.st.nmfs.noaa.gov/pls/webpls/FT_HELP.SPECIES

According to **Figure 3**, the average export price for both fresh and frozen dogfish has been trending up over the last 20 years. Two separate markets exist for fresh and frozen product, and the graph shows that on average, since 2010, the price for fresh dogfish is increasing and is about 40% higher than that of frozen dogfish. But, even as the fresh price has been increasing, the total exports of fresh dogfish have

fallen over this time. We would expect that higher prices would lead to increase production of fresh dogfish, but total exports (of fresh) have been trending down over the last 10 years even as prices have been trending up. Given the increases in quota and trip limits over the last ten years, it doesn't seem likely that significant constraints exist on the harvest of fresh dogfish. What's more likely is that the number of countries importing fresh dogfish has dropped. Countries who continue to buy fresh dogfish might be paying a little more for it, but by themselves, they can't make up for the loss of sales to other fresh dogfish markets.

Figure 4. US Global Export Market for Fresh Dogfish (2000-2017)



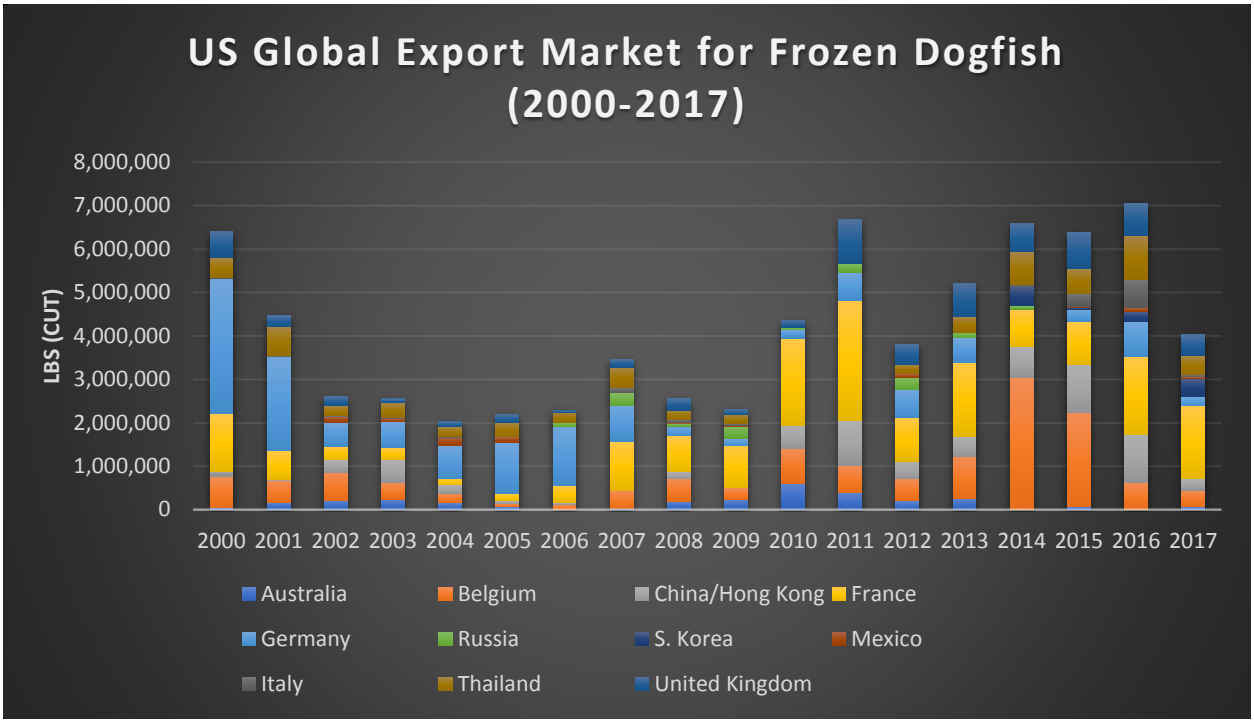
https://www.st.nmfs.noaa.gov/pls/webpls/FT_HELP.SPECIES

Figure 4 shows the change in the total US export market for fresh dogfish over the last 17 years. In 2000, prior to the implementation of the FMP, the fresh market for dogfish was about twice as high as it has been since then. In addition, in 2000, eight different countries purchased significant amounts of fresh dogfish. Exports slowed considerably between 2003-2008 while the fishery was rebuilding, but between 2009-2013, exports began to increase along with the diversity of the fresh fish market. However, ever since 2013, the diversity of the fresh dogfish market declined dramatically, and is now supported almost entirely by two countries: France and Italy (and to a much lesser extent, the UK).

It is unclear why the diversity of global buyers fell off so sharply, but again, the timing does coincide with the EU concerns about PCB in dogfish. In 2014 and 2015, France stopped purchasing fresh dogfish almost completely, and it was basically just Italy who supported the entire fresh market until 2016 when France came back in. In addition, over the last five years, there has been a concerted campaign led by EU politicians and environmental non-governmental organizations (ENGOs) to stop the sale and consumption of all shark species—including spiny dogfish. This appears to have had an impact of consumer preferences, and according to processors interviewed for this analysis, in countries like France, they stopped selling it in retail fish markets all together (to avoid labeling it as shark). The

primary markets that exist now for fresh are the prepared food markets, like restaurants, where species labeling is not as predominant.

Figure 5. US Global Export Market for Frozen Dogfish



https://www.st.nmfs.noaa.gov/pls/webpls/FT_HELP.SPECIES

The global market dynamics for frozen dogfish (**Figure 5**) tell a much different story than the markets for fresh dogfish. Most notably, the global export of frozen dogfish product has dramatically increased since 2010. There is also a much greater diversity of countries who purchase frozen product than fresh product; although, not all countries consistently buy it from year to year.

Prior to 2008, Germany was the largest global buyer of frozen product (this included both backs and belly flaps). But since 2008, it appears that Germany no longer purchases backs, and only purchases a small amount of belly flaps to prepare 'Schillerlocken'. Other countries, like Russia, Mexico and China will purchase frozen dogfish for a few years in a row, and then stop all together.

Nowadays, the most consistent countries purchasing frozen dogfish are once again France and Italy. Belgium has also been a consistent buyer over the years, as has Australia, who purchases 2-300,000 lbs. of backs per year. And as discussed earlier, the (frozen) shark fin market is predominantly dominated by Thailand, although exports are also sent to Hong Kong for re-processing and distribution throughout Asia.

In 2017, the market for frozen dogfish crashed by roughly 40%, but it doesn't appear this is a result of entire markets disappearing. Instead, the same diversity of countries bought frozen dogfish in 2017 as in 2016—the difference is that each country just purchased less. This puts frozen dogfish in a better

position to recover than fresh dogfish because at least the markets still exist. According to the processors interviewed for this analysis, once you lose the market, it is almost impossible to get back. This seems to be the case for now for the fresh market.

Summary of Global Trade Analysis

The Europeans developed a robust domestic market for spiny dogfish more than 80 years ago and sustained local demand primarily with local catch from Norway, Iceland, and the UK all the way up until the 1990s when the Northeast Atlantic stock began to decline. To meet EU demand, the northwest Atlantic stock was also severely depleted during the 1990s, but thanks to the world's first fishery management plan (FMP) for spiny dogfish developed by the NEFMC and MAFMC (and implemented in 2001) the stock was saved from collapse. Eventually, the FMP led to a massive rebuild of the northwest Atlantic stock, which positioned the United States to become the primary supplier of both fresh and frozen dogfish products to the EU and the rest of the world.

There are two primary dogfish products—fresh and frozen, which are characterized by significantly different prices, and a different mix of buyers. Over the last 10 years, the export price of both fresh and frozen dogfish has been increasing; however, only the frozen supply has significantly increased over this time frame. Frozen supply continued to increase until 2016, when the market significantly crashed due to oversupply—at this time, total exports equated to roughly 28 million lbs. of whole fish supply (quota). The combination of increased trip limits and new processors entering the market contributed to the oversupply.

Although fresh dogfish prices have been increasing over the last 10 years, the total supply of fresh product has been trending downward, and the number of global buyers has significantly declined. The entire fresh market is now mostly supported by two countries—France and Italy. It is unclear why the diversity of the fresh dogfish market has declined so dramatically, but it might be related to changes in consumer tastes and preferences—and to the overall shark conservation movement.

Still, historical data shows that alternative fresh markets have existed over the years in places like Latin America, China, and Belgium—which might present future opportunities for re-development. Based on the data, it is apparent that the fresh and frozen markets are entirely different; so, it could be possible to develop new fresh markets and increase the supply into those markets without negatively impacting the price or dynamics of the frozen markets. However, increasing the supply of frozen appears to be much more sensitive. In 2011 and in 2016, the total US exports of spiny dogfish exceeded 26 million lbs (whole weight), and both times the following year, the market crashed by roughly 40% (see Figure 3). Based on these analysis and interviews with processors and fishermen, until new markets are developed, the maximum sustainable size of the US export market is roughly 18-22 million lbs (whole weight) per year.

RESULTS OF INTERVIEW QUESTIONS

To better understand the market dynamics of spiny dogfish, especially as it relates to changes in management, we interviewed the four major processors (and exporters) of spiny dogfish in the United States—Marder Trawling, Seatrade, HIghliner, and Red's Best. We also received feedback on our interview questions from key industry participants Doug Feeney and Jamie Hayward, who spoke with us at length. To inform the management process, we developed a set of questions based primarily on comments and inquiries raised by the Dogfish AP in the 2016-2017 Dogfish Performance Reports. We also conducted an extensive literature review to derive additional questions and to validate answers of interviewees. To protect the confidentiality of interviewees, answers are grouped together under each question.

Questions for Processors and Fishermen

1. What are the biggest determinants of ex-vessel price for dogfish?

Ex-vessel price is primarily determined by the domestic processing capacity, the amount of inventory in the freezer, and the global demand of the European market. Prices are set by the processor to smooth landings over the course of the year so that daily processing capacity is not exceeded, and some scarcity remains in total inventory. Given the lack of global buyers, if buyers determine that freezer capacity is full, they will low ball export prices, and if processors hold out for a better price, they are at risk of losing the market altogether as buyers will readily substitute away from dogfish for another low value fish. This dynamic trickles back to the fishing vessel, and processors will continue to lower prices to the boat (off-loader) to slow fishing to clean out excess inventory.

As the number of processors increase, the risk of low ex-vessel prices also increases. For example, two years ago, there were four major processors, and a global market that could support ~20 million lbs. However, with an increase in daily trip limit to 6,000 lbs, the fishery landed about 28 million lbs., and inventory for all four major processors were exceeded. The global buyers had significant leverage in this situation, prices fell, and vessels were shut down by the off loaders in the major ports in New Hampshire, Massachusetts, Rhode Island, New Jersey, and Virginia. In 2018, the number of major processors has dropped back down from four to two, which has constrained total inventory and the daily processing capacity. This leaves some excess demand from global buyers, which should have a positive impact on prices and allows vessels to continue to fish.

2. What is the seasonality of dogfish landings across regions (fishing communities)?

The dogfish fishery is a seasonal fishery, which follows the migration of the larger female schools of fish from New England to Virginia. Starting in June, the dogfish begin to show up in waters of New England, and fishermen begin fishing for it heavily in July through October. By November, the schools have moved south to Rhode Island and make it to New Jersey by December. From there, they continue to migrate south to Virginia in January and February, and by March and April they have begun to migrate north again and can be found off the coast of New Jersey again. Eventually, they make their way back up north in May through June and the cycle repeats.

3. What is the relationship/difference between the fresh and frozen dogfish markets?

As shown in the trade data analysis, the fresh and frozen markets are completely different markets with significantly different price points. On average, the export price of frozen product has been roughly $1.50 per lbs, and the export price of fresh product has been around $2.25. At these prices, processors only make any real money from the fresh product. However, the fresh market doesn't exist until Sept 1, and then lasts throughout the winter months until April.

Most of the dogfish caught by New Hampshire and Massachusetts vessels occurs over the summer, especially during the months of July and August, where fishermen can declare out of the ground fish fishery and declare into the exempted dogfish fishery (where they can target dogfish without having to be on a sector trip). Almost all this dogfish is frozen.

Developing a summer fresh dogfish market would be hard, for a few reasons. First, European demand drops significantly for all fish in the summertime, and most Europeans tend to take the entire month of August off (including the European buyers). Second, it would require an extra investment by the vessel to carry more ice for the dogfish, which is hard to justify at the very low ex-vessel price. Finally, dogfish are highly perishable, even when packed for shipment, marginal increases in temperature that can occur during transport (like waiting on the Tarmac at the airport) significantly impact the quality of the dogfish product. Each year, processors expect a certain loss from spoiled dogfish, even during the fall/winter months.

Although some of the fresh market is supplied by Massachusetts and New Hampshire vessels in September and October, most of the fresh fish market is supplied by mid-Atlantic vessels from Rhode Island to Virginia. Even though processors make significantly more money from fresh dogfish than frozen dogfish, the ex-vessel price to the vessel/off-loader doesn't change—in fact, northern vessels on average make more money per lbs. than southern vessels (fresh fish vessels) because the increased transportation cost to ship the fish from the mid-Atlantic region to New England comes off the top of the price per lbs. processors pay off-loaders.

On average, this year, northern vessels are making 18-22 cents per lbs., and southern vessels are making 14-16 cents per lbs. Processors pay around 32 cents per lbs to the off-loader. In the mid-Atlantic, 12 cents per lbs comes off the top for transportation, 5-6 cents per lbs goes to the offloader, and the remaining 14-16 cents per lbs goes to the vessel. In New England, the proximity to processors reduces transportation costs, and results in less money coming off the top and higher prices to the vessels.

Processors can't pay differentially more for fresh fish than frozen fish because it is uncertain ahead of time how much of the fresh catch can be sold into the fresh market, and if it can't be sold into the fresh market, if it will be frozen and added to the frozen inventory. The frozen market is based on pennies and there is no guarantee that these pennies will be positive, so processors rely on profits from the fresh market to make money. Because the fresh and frozen products are intermingled at the processor level, the prices paid to the vessel are based an average of the revenue from both fresh and frozen products.

4. Would you support an increase in the daily trip limit for dogfish?

The consensus amongst all processors and fishermen interviewed was that an increase in the daily trip limit would not result in more money to the boat. Because capacity to process dogfish is constrained (120k per day), and over supply of frozen inventory can quickly lead to low-ball prices from global buyers, the net effect of increasing trip limits at this time would be a dedicated effort by off-loaders and processors to slow fishing activity by telling boats they are not accepting fish on certain days. According to all processors interviewed for this analysis, the dogfish markets are slowly recovering this year, but an increase in trip limits at this time could seriously jeopardize the progress being made to bring the markets back.

5. Would you support a 'male only' winter harvest by draggers?

In general, both processors and fishermen had concerns about the viability and market effects of a directed male dogfish fishery over the winter. In the end, both agreed that the only way this would work is if an entirely new market was developed first–where the smaller (lower dragger quality) males could be sold. None of the processors currently accept dragger dogfish due to the lower quality, and because the males are significantly smaller, the processing costs for males would be significantly higher. One processor mentioned that if a new market could be found to accept the males, the only way it would work from a processing standpoint is by developing an automatic cutting machine. However, utilizing such a machine for small males would destroy the belly flaps, and reduce the overall price of the dogfish product. Therefore, the price paid to the boat would be significantly less (12-14 cents per lbs.), and any new market that was created would have to be large enough, so it became a pure volume fishery. In this way, draggers could target as much fish as they could each trip (no trip limits) and make more money the more fish they caught. From an ecosystem perspective, this idea was interesting just to get the dogfish out of the ocean. But there are significant upfront costs, potential market risks, and regulatory changes that would need to occur to make this a viable option.

6. What are the chances that new markets for dogfish can be developed, or old markets re-developed?

The consensus among both processors and fishermen matched what the US export data showed, that the European markets for dogfish have changed significantly over the past 10 years, especially for the fresh market, and due to changing consumer tastes and preferences (and negative 'shark' PR), these fresh markets will be difficult to recapture-many fish markets and grocery stores in Europe won't display 'shark' products anymore. For the frozen market, there is a greater diversity of buyers and the potential for continued growth (see **Figure 2**). This might be because it is more versatile and can be used for more (behind the scenes) prepared products.

As the data shows, significant attempts have been made over the years to develop new markets in places like China, Russia, and Latin America—but these markets have not been sustainable. For example, both fishermen and processors interviewed have made large efforts in China, in particular. However, everyone came to the same conclusion—although the Chinese eat a lot fish, they still seem to not really like the dogfish product. Efforts are continuing in some of these places, and there is optimism that global markets could still materialize under the right conditions (and with continued exposure to the product, or to new value-added products). Part of the evolution could come about when the older generation of global buyers give way to a younger generation of buyers who have less experience with dogfish and are willing to learn more about it and take chances on this MSC certified product.

Still, everyone interviewed agreed that the highest likelihood of new markets is right here in the United States. Significant efforts have been made over the last ten years to increase awareness and change tastes and preferences for dogfish. For example, local universities are now purchasing a few hundred thousand lbs. per year, CSF programs (like New Hampshire Community Seafood) are offering dogfish as part of the rotation of fish to both consumer and restaurants, and multiple grants have been awarded to groups (especially on the Cape) to develop new value-added products with dogfish.

According to fishermen and processors interviewed, turning dogfish into value-added products could have the most significant impact on developing new long-term sustainable markets. Fishermen on the Cape have done the most work developing these markets, and over the last 10 years have received multiple federal grants for these purposes. The newly formed, Chatham Harvester Group is working with processors via 2-million-dollar grant from the USDA to develop multiple products, including: a fish burger, fish sticks, and fish nuggets. There is optimism that these products could form the basis of entirely new markets and increase prices that could trickle back to the boat.

In addition to value added products, all processors and fishermen also mentioned the potential for working directly with the prison system or the Defense Department to establish long-term contracts for dogfish purchases. Even though these avenues seem like logical options to explore, no one interviewed is aware of any work being done to develop these markets. It would probably take the efforts of a dedicated lobbyist, or marketing professional working full time (along with financial support, like another grant project).

7. Do you have any ideas for management changes that could improve the dogfish markets?

Most interviewees thought that there was no need to change any management regulations at this time. However, one respondent suggested an option that might make sense for the southern boats and the fresh market. Currently, processors send trucks down south to pick up fish three times a week—Monday, Wednesday and Friday. They do so because the daily trip limit forces fishermen to fish all week long to maximize landings. However, processors can only take product for the fresh market on Monday's and Fridays. This means that almost all fish that gets shipped up on Wednesday is put directly into the frozen inventory, which could lead to over-capacity in the freezer, overall lower prices and risk of market collapse. However, according to the processors interviewed if they had more fresh product on Mondays and Fridays, they could almost certainly sell it. The existing trip limits constrain boats from catching significantly more on Mondays and Fridays, but if there was a way to modify trip limits – either through regulation or informally dealer-imposed differential daily limits that might be accommodated through a flexible weekly limit regulation – on those days, fishermen and processors might be able to make more money.

One option for doing this is to go to a seasonal weekly trip limit during the fall-winter period (October-April) when catches are more variable due to weather and the Mid-Atlantic ports see most of the landings. This would allow fishermen to focus their efforts to load up the trucks on Monday and Friday and would likely allow them to save a trip or two in the middle of the week (saving fuel costs and other operating expenses). For processors, they save money only having to send a truck two days a week. And by receiving more fresh fish on Mondays and Fridays, they could more consistently fill orders, and potentially grow new markets for fresh fish. Because processors make more money selling fresh fish, profits should increase. And less 'winter harvest' dogfish going into the frozen inventory helps to keep frozen fish prices stable, and potentially increase, due to increase scarcity.

KEY OUTCOMES AND NEXT STEPS

- The global market for spiny dogfish is still the EU, with frozen dogfish representing 75 percent of all sales. Frozen dogfish also has a greater diversity of global buyers than fresh dogfish, and total exports have been increasing over the last 10 years—as opposed to exports of fresh dogfish, which has been trending down over the last 10 years.
- The total size of the global market for spiny dogfish is estimated at around 20 million lbs. (whole fish); and it appears that if exports increase significantly past this breaking point, the frozen market crashes (as it did in 2012 and 2017).
- The cost of processing dogfish is very expensive and requires specialized cutters. This constrains daily processing capacity to roughly 120,000 lbs per day for the major processors. If new markets were developed, it might be worth exploring the use of automatic cutting machines to reduce costs and increase capacity.
- Given the constraints of global demand and processing costs, an increase in trip limits at this time will likely lead to lower prices to the boat and time off the water.
- The biggest opportunities for new markets are likely here in the United States through prepared foods, or continued expansion to the 'local' food markets; especially schools, hospitals and CSFs.
- Management changes to allow a 'male only' harvest for draggers over the winter season would require significant upfront investment to develop new markets, testing of new methods of cutting (automated), and would necessitate significant flexibility in daily catch limits.
- The 'fresh' dogfish season doesn't really start until October (when the temperature outside drops) and runs through April; and most fresh dogfish is supplied by Mid-Atlantic vessels. Anything that doesn't sell into the 'fresh' market during this period is frozen and adds to the frozen inventory accumulated over the summer.
- There might be opportunity to increase sales to the fresh market without negatively impacting the frozen market by moving to a seasonal 'weekly' vessel limit. By coordinating with processors, fishermen might be able to prioritize harvest (land more) for Mondays and Fridays to coincide with the days of the week that processors sell fresh dogfish.

Next Steps

- Explore the potential for developing new government and institutional markets, like military and prisons.
- Explore the potential size and scope of new value-added markets, and determine key questions:
  -Who is developing these markets (e.g. Highliner, US Foods, Reds Best, Chatham Harvesters Group)? Would higher prices for value added products trickle down to the fishermen? Would new value-added markets significantly increase the amount of potential harvest? Would management regulations need to change to accommodate?
- Explore the historical use/future development of automatic cutting machines, and determine benefits and costs, including the potential to reduce processing costs and increase capacity to meet future value-added markets.
- Explore the benefits and costs of new fish handling and sorting techniques on the vessel, including: pre-processing and icing and bleeding. Compare shelf life and product characteristics (smell, taste, look) of pre-processed/pre-bled product to traditional product that has not been pre-processed.

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Atlantic States Marine Fisheries Commission

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MEMORANDUM

September 17, 2018

To: **Spiny Dogfish Management Board**

From: **Tina Berger, Director of Communications**

RE: **Advisory Panel Nominations**

Please find attached four new nominations to the Spiny Dogfish Advisory Panel – Thomas Lyons, a commercial gillnetter from New Hampshire; Doug Feeney, a commercial hook & line/gillnetter from Massachusetts; John Whiteside a commercial industry attorney from Massachusetts; and Scott MacDonald, a processor from Virginia. Please review these nominations for action at the next Board meeting.

If you have any questions, please feel free to contact me at (703) 842-0749 or tberger@asmfc.org.

Enc.

cc: Kirby Rootes-Murdy

SPINY DOGFISH ADVISORY PANEL

Bolded names await approval by the Spiny Dogfish Management Board

September 17, 2018

New Hampshire
Thomas Lyons (comm. gillnet)
653 Exeter Road
Hampton, NH 03842
Phone: 603.427.3428
tomrlyons@hotmail.com

Massachusetts
Doug Feeney (comm. hook & line/gillnet)
47 Barn Hill Road
Chatham, MA 02633
Phone: 774.994.0593
dougfeeney@comcast.net

John F. Whiteside Jr. (attorney who represents 4 seafood associations, seafood processors, and ancillary businesses to the fishing and seafood industries from Maine to Virginia)
678 State Road
Dartmouth, MA 02747
Phone (day): 508.991.333
Phone (eve): 508.246.2828
John@JWhiteside.com

Rhode Island
Francis W. Blount Jr. (charterboat)
390 Bridgetown Road
Saunderstown, RI 02883
Phone (day): (401)783-4988
Phone (eve): (401)789-2374
FAX: (401) 782-8520
Email: francesflt@aol.com
Appt. Confirmed 2/20/06
Appt Reconfirmed 5/10

James B. Webber (rec)
5 St. Andrews Way
Barrington, RI 02806
Phone: (401)524-7652
Email: jerry02806@yahoo.com
Appt. Confirmed 2/20/06
Appt Reconfirmed 5/10
Confirmed participation 4/2014

New York
Merry Camhi (conservation)
National Audubon Society
100 W. Main St.
West Islip, NY 11730-2323
Appt. Confirmed 1/31/01
Appt. Confirmed 1/2/06
Appt Reconfirmed 5/10
Incorrect phone number

New Jersey
Marty Buzas (comm./longline & gillnet)
558 Shunpike Road
Cape May Courthouse, NJ 08210
Phone (day): (609)827-2626
Phone (eve): (609)465-5776
Email: MBEileenB@yahoo.com
Appt Confirmed 8/3/10
Confirmed participation 4/2014

Virginia
William Reid (comm gillnet)
4950 Cypress Point Cir Apt. 203
Virginia Beach, VA 23455-6868
Appt. Confirmed 1/31/01
Appt. Confirmed 1/2/06
Appt Reconfirmed 5/10
Incorrect phone number

Scott MacDonald (processor)
4401 Monmouth Castle Road
Virginia Beach, VA 23455
Phone: 757.287.3534
smacdonald7@cox.net

North Carolina
Chris Hickman (comm gillnet)
PO Box 476
Hatteras, NC 27943
Phone: 919/986-2217
bouttimefishing@yahoo.com
Appt. Confirmed 8/21/00
Appt. Confirmed 1/2/06
Appt Reconfirmed 5/10; 4/14; 8; 18

SPINY DOGFISH ADVISORY PANEL

Bolded names await approval by the Spiny Dogfish Management Board

September 17, 2018

Vacancy – commercial

Nontraditional Stakeholder

Sonja Fordham
Shark Advocates International
c/o The Ocean Foundation
1990 M Street, NW
Suite 250
Washington, DC 20036 Phone: 202-436-1468
Email: sonja@sharkadvocates.org
Appt. Confirmed 5/19/06
Confirmed participation 4/2014

ATLANTIC STATES MARINE FISHERIES COMMISSION

Advisory Panel Nomination Form

This form is designed to help nominate Advisors to the Commission's Species Advisory Panels. The information on the returned form will be provided to the Commission's relevant species management board or section. Please answer the questions in the categories (All Nominees, Commercial Fisherman, Charter/Headboat Captain, Recreational Fisherman, Dealer/Processor, or Other Interested Parties) that pertain to the nominee's experience. If the nominee fits into more than one category, answer the questions for all categories that fit the situation. **Also, please fill in the sections which pertain to All Nominees (pages 1 and 2). In addition, nominee signatures are required to verify the provided information (page 4), and Commissioner signatures are requested to verify Commissioner consensus (page 4). Please print and use a black pen.**

Form submitted by: Douglas Grout (your name) State: NH

Name of Nominee: Thomas Lyons

Address: 653 Exeter Road (Winter: ↓

City, State, Zip: Hampton, NH 03842 (Winter:3651 10th St. NE St.Petersburg Fl. 33704)

Please provide the appropriate numbers where the nominee can be reached:

Phone (day): 603-427-3428 Phone (evening): 603-427-3428

FAX: _____ Email: tomrlyons@hotmail.com

. . . . . .

FOR ALL NOMINEES:

1. Please list, in order of preference, the Advisory Panel for which you are nominating the above person.
   1. Spiny Dogfish
   2. _____
   3. _____
   4. _____

2. Has the nominee been found in violation of criminal or civil federal fishery law or regulation or convicted of any felony or crime over the last three years?

   yes _____ no X

3. Is the nominee a member of any fishermen's organizations or clubs?

   yes X no _____

   If "yes," please list them below by name.

NH Commercial Fishing Assc.

NH Community Seafood

Yankee Fishermens Coop

4. What kinds (species) of fish and/or shellfish has the nominee fished for during the past year?

Dogfish

Groundfish-Cod,poll,hadd,

hake,whiting,flounders,monks,

lobster,redfish,etc.

5. What kinds (species) of fish and/or shellfish has the nominee fished for in the past?

lobster

cod,pollack,hake,flounders,

whiting,monk,halibut,bluefish

dogfish

Tuna, bluefin

FOR COMMERCIAL FISHERMEN:

1. How many years has the nominee been the commercial fishing business? 25 years
2. Is the nominee employed only in commercial fishing? yes X no
3. What is the predominant gear type used by the nominee? Gillnet
4. What is the predominant geographic area fished by the nominee (i.e., inshore, offshore)? Gulf of Maine, Jeffreys ledge, Have fished inshore early in season and generally end up outside coastal waters later in season.

FOR CHARTER/HEADBOAT CAPTAINS:

1. How long has the nominee been employed in the charter/headboat business? ~~25~~ years
2. Is the nominee employed only in the charter/headboat industry? yes _____ no_____

   If "no," please list other type(s)of business(es) and/occupation(s):_____

3. How many years has the nominee lived in the home port community? _____ years

   If less than five years, please indicate the nominee's previous home port community.

FOR RECREATIONAL FISHERMEN:

1. How long has the nominee engaged in recreational fishing? _____ years

2. Is the nominee working, or has the nominee ever worked in any area related to the fishing industry? yes _____ no _____

   If "yes," please explain.

_____

_____

_____

FOR SEAFOOD PROCESSORS & DEALERS:

1. How long has the nominee been employed in the business of seafood processing/dealing?
   25 years

2. Is the nominee employed only in the business of seafood processing/dealing?

   yes _____ no _____ If "no," please list other type(s) of business(es) and/or occupation(s):

_____

_____

_____

3. How many years has the nominee lived in the home port community? _____ years

   If less than five years, please indicate the nominee's previous home port community.

_____

FOR OTHER INTERESTED PARTIES:

1. How long has the nominee been interested in fishing and/or fisheries management? _____ years

2. Is the nominee employed in the fishing business or the field of fisheries management?
   yes _____ no X

   If "no," please list other type(s) of business(es) and/or occupation(s):

_____

_____

_____

FOR ALL NOMINEES:

In the space provided below, please provide the Commission with any additional information which you feel would assist us in making choosing new Advisors. You may use as many pages as needed.

Nominee Signature: Thomas Lyons Date: Aug 17, 2018

Name: Thomas Lyons
(please print)

COMMISSIONERS SIGN-OFF (not required for non-traditional stakeholders)

Douglas Grant
State Director

DEG for Dennis Abbott
State Legislator

DEG for G. Ritchie White
Governor's Appointee

ATLANTIC STATES MARINE FISHERIES COMMISSION

Advisory Panel Nomination Form

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Form submitted by David Pierce (your name) State: MA

Name of Nominee: Doug Feeney

Address: 47 Barn Hill Rd

City, State, Zip: CHATHAM MA 02633

Please provide the appropriate numbers where the nominee can be reached:

Phone (day): 774.994.0593 Phone (evening): same

FAX: 508.348.1119 Email: dougfeeney@comcast.net

FOR ALL NOMINEES:

1. Please list, in order of preference, the Advisory Panel for which you are nominating the above person.
   1. spiny dogfish
   2. _____
   3. _____
   4. _____
2. Has the nominee been found in violation of criminal or civil federal fishery law or regulation or convicted of any felony or crime over the last three years?
   ☐ yes ☑ no
3. Is the nominee a member of any fishermen's organizations or clubs?
   ☑ yes ☐ no

If "yes," please list them below by name.

Chatham Harvesters Coop - President
Aunt Lydia's Cove - Chairman (Oversees Chatham Fish Pier)

4. What kinds (species) of fish and/or shellfish has the nominee fished for during the past year?

Spiney Dogfish
Winter Skates
Mackerel

5. What kinds (species) of fish and/or shellfish has the nominee fished for in the past?

Same as above, plus:
All groundfish
Bluefin Tuna

FOR COMMERCIAL FISHERMEN:

1. How many years has the nominee been the commercial fishing business? 24
2. Is the nominee employed only in commercial fishing? ☑yes ☐no
3. What is the predominant gear type used by the nominee? Hook & Line, Sink net

FOR CHARTER/HEADBOAT CAPTAINS:

1. How long has the nominee been employed in the charter/headboat business? _____
2. Is the nominee employed only in the charter/headboat industry? ☐yes ☐no

   If "no," please list other type(s) of business(es) and/occupation(s): _____

3. How many years has the nominee lived in the home port community? _____ years

   If less than five years, please indicate the nominee's previous home port community.

FOR RECREATIONAL FISHERMEN:

1. How long has the nominee engaged in recreational fishing? _____ years

2. Is the nominee working, or has the nominee ever worked in any area related to the fishing industry? ☐yes ☐no

   If "yes," please explain.

   _____

FOR SEAFOOD PROCESSORS & DEALERS:

1. How long has the nominee been employed in the business of seafood processing/dealing? _____ years

2. Is the nominee employed only in the business of seafood processing/dealing?

   ☐yes ☐no
   If "no," please list other type(s) of business(es) and/or occupation(s):

   _____

3. How many years has the nominee lived in the home port community? _____ years

   If less than five years, please indicate the nominee's previous home port community.

   _____

FOR OTHER INTERESTED PARTIES:

1. How long has the nominee been interested in fishing and/or fisheries management? _____ years

2. Is the nominee employed in the fishing business or the field of fisheries management?
   ☐yes ☐no

   If "no," please list other type(s) of business(es) and/or occupation(s):

   _____

FOR ALL NOMINEES:

In the space provided below, please provide the Commission with any additional information which you feel would assist us in making choosing new Advisors. You may use as many pages as needed.

Nominee Signature: _____ Date: 8/10/2018

Name: Douglas Feeney
(please print)

COMMISSIONERS SIGN-OFF (not required for non-traditional stakeholders)

_____
State Director

_____
State Legislator

_____
Governor's Appointee

ATLANTIC STATES MARINE FISHERIES COMMISSION

Advisory Panel Nomination Form

This form is designed to help nominate Advisors to the Commission's Species Advisory Panels. The information on the returned form will be provided to the Commission's relevant species management board or section. Please answer the questions in the categories (All Nominees, Commercial Fisherman, Charter/Headboat Captain, Recreational Fisherman, Dealer/Processor, or Other Interested Parties) that pertain to the nominee's experience. If the nominee fits into more than one category, answer the questions for all categories that fit the situation. **Also, please fill in the sections which pertain to All Nominees (pages 1 and 2). In addition, nominee signatures are required to verify the provided information (page 4), and Commissioner signatures are requested to verify Commissioner consensus (page 4). Please print and use a black pen.**

Form submitted by David Pierce (your name) State: MA

Name of Nominee: John F. Whiteside, Jr.

Address: 678 State Road

City, State, Zip: Dartmouth, MA 02747

Please provide the appropriate numbers where the nominee can be reached:

Phone (day): 508-991-3333 Phone (evening): 508-246-2828

FAX: _____ Email: John@JWhiteside.com

FOR ALL NOMINEES:

1. Please list, in order of preference, the Advisory Panel for which you are nominating the above person.
   1. spiny dogfish
   2. _____
   3. _____
   4. _____
2. Has the nominee been found in violation of criminal or civil federal fishery law or regulation or convicted of any felony or crime over the last three years?

   ☐yes ☒no
3. Is the nominee a member of any fishermen's organizations or clubs?

   ☒yes ☐no

If “yes,” please list them below by name.

Sustainable Fisheries Association _____ American Scallop Association _____

_____ _____

_____ _____

4. What kinds (species) of fish and/or shellfish has the nominee fished for during the past year?

Striped bass (recreational) _____ Black sea bass (recreational) _____

_____ _____

_____ _____

5. What kinds (species) of fish and/or shellfish has the nominee fished for in the past?

Striped bass (recreational) _____ Black sea bass (recreational) _____

_____ _____

_____ _____

FOR COMMERCIAL FISHERMEN:

1. How many years has the nominee been the commercial fishing business?
2. Is the nominee employed only in commercial fishing? ☐yes ☐no
3. What is the predominant gear type used by the nominee? _____

FOR CHARTER/HEADBOAT CAPTAINS:

1. How long has the nominee been employed in the charter/headboat business? _____
2. Is the nominee employed only in the charter/headboat industry? ☐yes ☐no

   If “no,” please list other type(s) of business(es) and/occupation(s): _____
3. How many years has the nominee lived in the home port community? _____ years

   If less than five years, please indicate the nominee’s previous home port community.

   _____

FOR RECREATIONAL FISHERMEN:

1. How long has the nominee engaged in recreational fishing? _____ years

2. Is the nominee working, or has the nominee ever worked in any area related to the fishing industry? ☐yes ☐no

   If "yes," please explain.

   _____

FOR SEAFOOD PROCESSORS & DEALERS:

1. How long has the nominee been employed in the business of seafood processing/dealing? _____ years

2. Is the nominee employed only in the business of seafood processing/dealing?

   ☐yes ☐no
   If "no," please list other type(s) of business(es) and/or occupation(s):

   _____

3. How many years has the nominee lived in the home port community? _____ years

   If less than five years, please indicate the nominee's previous home port community.

   _____

FOR OTHER INTERESTED PARTIES:

1. How long has the nominee been interested in fishing and/or fisheries management? __10+__ years

2. Is the nominee employed in the fishing business or the field of fisheries management?
   ☐yes ☒no

   If "no," please list other type(s) of business(es) and/or occupation(s):

I'm an attorney who represents 4 seafood associations, seafood processors, and ancillary businesses to the fishing and seafood industries from Maine to Virginia.

FOR ALL NOMINEES:

In the space provided below, please provide the Commission with any additional information which you feel would assist us in making choosing new Advisors. You may use as many pages as needed.

I've been involved in the spiny dogfish fishery for more than 10 years as I represent the Sustainable Fisheries Association, whose members are seafood processors engaged in the spiny dogfish fishery. During that time, I have also represented several fishing associations before the 9th Circuit Court of Appeals and the US Supreme Court on issues that negatively impact the spiny dogfish fishery.

Recently I became an advisor to the spiny dogfish committee of the MAFMC. I'm also an advisor to the skate committee to the NEFMC.

I am fully engaged in the regulatory process concerning the spiny dogfish fishery as well as ancillary issues that materially affect the fishery including: US-China tariffs; EU trade barriers; the shipping container ban on shark products; and third-party sustainability certification (MSC).

Nominee Signature: _____ Date: 7-24-2018

Name: John F. Whiteside, Jr.
(please print)

COMMISSIONERS SIGN-OFF (not required for non-traditional stakeholders)

_____
State Director

_____
State Legislator

_____
Governor's Appointee

ATLANTIC STATES MARINE FISHERIES COMMISSION

Advisory Panel Nomination Form

This form is designed to help nominate Advisors to the Commission's Species Advisory Panels. The information on the returned form will be provided to the Commission's relevant species management board or section. Please answer the questions in the categories (All Nominees, Commercial Fisherman, Charter/Headboat Captain, Recreational Fisherman, Dealer/Processor, or Other Interested Parties) that pertain to the nominee's experience. If the nominee fits into more than one category, answer the questions for all categories that fit the situation. **Also, please fill in the sections which pertain to All Nominees (pages 1 and 2). In addition, nominee signatures are required to verify the provided information (page 4), and Commissioner signatures are requested to verify Commissioner consensus (page 4). Please print and use a black pen.**

Form submitted by: Robert O'reilly (your name) State: Virginia

Name of Nominee: Scott W MacDonald

Address: 4401 Monmouth Castle Rd

City, State, Zip: VA Beach VA 23455

Please provide the appropriate numbers where the nominee can be reached:

Phone (day): (757) 287-3534 Phone (evening): (757) 287-3534

FAX: (757) 363-3028 Email: Smacdonald7@cox.net

. . . . . .

FOR ALL NOMINEES:

1. Please list, in order of preference, the Advisory Panel for which you are nominating the above person.

   1. _____
   2. _____
   3. _____
   4. _____

2. Has the nominee been found in violation of criminal or civil federal fishery law or regulation or convicted of any felony or crime over the last three years?

   yes _____ no X

3. Is the nominee a member of any fishermen's organizations or clubs?

   yes _____ no X

   If "yes," please list them below by name.

_____ _____

_____ _____

_____ _____

4. What kinds (species) of fish and/or shellfish has the nominee fished for during the past year?

_____ _____

_____ _____

_____ _____

5. What kinds (species) of fish and/or shellfish has the nominee fished for in the past?

_____ _____

_____ _____

_____ _____

FOR COMMERCIAL FISHERMEN:

1. How many years has the nominee been the commercial fishing business? _____ years

2. Is the nominee employed only in commercial fishing? yes_____ no_____

3. What is the predominant gear type used by the nominee?_____

4. What is the predominant geographic area fished by the nominee (i.e., inshore, offshore)?_____

FOR CHARTER/HEADBOAT CAPTAINS:

1. How long has the nominee been employed in the charter/headboat business? _____ years

2. Is the nominee employed only in the charter/headboat industry? yes _____ no_____

   If "no," please list other type(s)of business(es) and/occupation(s):_____

   _____

3. How many years has the nominee lived in the home port community? _____ years

   If less than five years, please indicate the nominee's previous home port community.

   _____

FOR RECREATIONAL FISHERMEN:

1. How long has the nominee engaged in recreational fishing? _____ years

2. Is the nominee working, or has the nominee ever worked in any area related to the fishing industry? yes _____ no _____

   If "yes," please explain.

_____

_____

_____

FOR SEAFOOD PROCESSORS & DEALERS:

1. How long has the nominee been employed in the business of seafood processing/dealing? 35 years

2. Is the nominee employed only in the business of seafood processing/dealing?

   yes X no _____ If "no," please list other type(s) of business(es) and/or occupation(s):

_____

_____

_____

3. How many years has the nominee lived in the home port community? 42 years

   If less than five years, please indicate the nominee's previous home port community.

_____

FOR OTHER INTERESTED PARTIES:

1. How long has the nominee been interested in fishing and/or fisheries management? _____ years

2. Is the nominee employed in the fishing business or the field of fisheries management?
   yes _____ no _____

   If "no," please list other type(s) of business(es) and/or occupation(s):

_____

_____

_____

FOR ALL NOMINEES:

In the space provided below, please provide the Commission with any additional information which you feel would assist us in making choosing new Advisors. You may use as many pages as needed.

- Member of FMAC - Finfish Management Advisory Committee of Virginia Marine Resource Commission (VMRC)

- Selected to serve as an advisor to the Mid-Atlantic Fishery Management Council for the Spiny Dogfish Advisory Panel.

Nominee Signature: Scott W. MacDonald

Date: 9/14/18

Name: Scott W MacDonald
(please print)

COMMISSIONERS SIGN-OFF (not required for non-traditional stakeholders)

Robert J. O'Reilly proxy for Steven Bowman
State Director

Senator Monty Mason
State Legislator
consent by email to RD Reily

Brian Plumlee (consent by email to R. O'Reilly)
Governor's Appointee