



**Mid-Atlantic Fishery Management Council**

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Phone: 302-674-2331 | FAX: 302-674-5399 | [www.mafmc.org](http://www.mafmc.org)  
Michael P. Luisi, Chairman | G. Warren Elliott, Vice Chairman  
Christopher M. Moore, Ph.D., Executive Director

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## MEMORANDUM

**Date:** September 18, 2018  
**To:** Council  
**From:** Jason Didden  
**Subject:** Spiny Dogfish Specifications

In this tab please find enclosed the following documents:

- Spiny Dogfish Monitoring Committee Summary
- Staff Acceptable Biological Catch (ABC) memo to the Scientific and Statistical Committee (SSC)
- Advisory Panel (AP) Fishery Performance Report (FPR)
- Fishery Information Document created for the Advisory Panel discussion
- Massachusetts-Commissioned Spiny Dogfish Economics Analysis
- Letter from David Borden regarding spiny dogfish trip limits

The SSC report for spiny dogfish is included in the Committee Reports Tab. That report, and a link to the recent spiny dogfish assessment update, are also available at: <http://www.mafmc.org/ssc-meetings/2018/sept-11>.

The recommendations in the Spiny Dogfish Monitoring Committee Summary also reflect staff's recommendations.

Summaries of current federal regulations may be found at: <https://www.greateratlantic.fisheries.noaa.gov/sustainable/species/sdogfish/index.html>.



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## MEMORANDUM

**Date:** September 18, 2018  
**To:** Council  
**From:** Jason Didden  
**Subject:** Spiny Dogfish Monitoring Committee Summary

The Spiny Dogfish Monitoring Committee (SDMC) met on September 14, 2018. Members of the SDMC in attendance included Jason Didden, Angel Willey, Cynthia Hanson, Dan McKiernan, Eric Schneider, Fiona Hogan, and Kathy Sosebee. Others in attendance included Kirby Rootes-Murdy, Greg DiDomenico, John Whiteside, Kevin Wark, Stew Michels, and "cmatt." The SDMC first discussed the recent spiny dogfish assessment update and then considered recommending measures related to spiny dogfish management, specifications, and trip limits.

The SDMC discussed several reporting issues including potentially anomalous 2017 Virginia landings and how late reporting affects quota monitoring, which is an issue not unique to spiny dogfish. The SDMC recommends that both of these issues be further investigated and that management partners may want to consider reporting modifications based on the results of that investigation. Timely reporting could be especially important for restraining catches within the regional/state quotas so that overages in one area do not affect opportunities in other areas, especially for federal permit holders. It would also be useful for the public to have access to final annual landings by fishing year on the NMFS website and in table-form in Council documents.

Another discussion revolved around the impact of the recent performance of the NEFSC survey vessel. Given biomass estimates are largely driven by 2016-2018 survey results, there is concern because the 2016 survey was delayed a month and the 2018 survey start was delayed with additional weather and mechanical issues resulting in a 1/3 reduction in accomplished tows. The strata used in the assessment were sampled in the affected surveys but the exact impacts of these vessel performance issues on the dogfish indices of abundance cannot be known.

Given the Acceptable Biological Catches (ABCs) recommended by the Council's Scientific and Statistical Committee (SSC), the SDMC considered what should be specified for expected Canadian landings, management uncertainty, discards, recreational landings, and the commercial quota (Table 1, below). Following practices from previous years, the SDMC examined correlations on how recent performance predicted future landings/discards. Based on the relative strength of the correlations examined and recent trends, the SDMC determined that using the most recent catch for Canada was appropriate, that a management uncertainty buffer is not needed due to the existing quotas/closure provisions, that using a 3-year average of recent discards was appropriate,

and that using the most recent recreational landings was appropriate. Table 1 shows how these specifications combine to determine the commercial quota. There was a discussion that in the future the Council may want to explicitly request constant ABCs from the SSC based on the P\*-averaging provisions in the Council's ABC control rules.

Table 1. SDMC-Recommended Specifications

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

Finally, the SDMC had a substantial discussion about possible changes to trip limits. In terms of major changes such as removing the federal trip limit or removing the complete closure once 100% of the quota is caught, such substantial changes are likely more appropriate for frameworks or amendments where more analysis and public comment can be evaluated.

The SDMC concluded that changes to the current 6,000 pound trip limit do not currently appear necessary given recent fishery performance – 2017 fishing year landings are recorded as just under 18 million pounds, and 2018 fishing year landings-to-date are recorded as trending slightly less. Accordingly, the fishery may not close with the potential 20.5 million pound 2019 fishing year quota even with the current trip limit. The economic analysis commissioned by the State of Massachusetts (posted to meeting materials page) also found that current fishery participants do not believe that the market will support more than 18-22 million pounds of total landings. The SDMC acknowledged that recent landings at current or lower trip limits have been as high as 28 million pounds (2016) so closures are a possibility with a quota of 20.5 million pounds and the current trip limits. As long as regions and states adhere to their quotas under regional (ASMFC) management (Table 2 below), then one region should not affect fishing opportunities for other regions, as NMFS will close the federal fishery only when the federal commercial quota has been fully landed. Given their large share of the quota and early access to fish, vigilant monitoring by states in the northern region will be important to preserve fishing opportunities for more southern participants. In general, the SDMC does not expect substantial increases in effort at current prices and market conditions; trip limit changes could be considered next year if conditions change.

Depending on how strongly managers want to avoid closures, lower trip limits could be considered, though lower trip limits may just lead to lower landings below the quota. Given recent fishery variability under trip limits in the 3,000-6,000 pound range, it is unlikely that trip

performance analysis will be accurately predictive of future landings under different trip limits besides a qualitative observation that lower trip limits will lead to slower and lower landings. It was also noted that regions and states could implement more conservative trip limits if they want to extend their fisheries.

There was input from the public on the call that a conservative approach to trip limits and avoiding quota closures should be taken, and Council staff recommended these preferences be communicated to the Council for inclusion in the briefing book.

Table 2. Regional/State Management in 2018

States/Regions	Possession Limit	ASMFC Allocation	2018/2019 Quota	Preliminary 2018 Landings in lbs through Sept 12 (NOAA Quota Monitoring Page)	Percentage of Quota
ME	5,000	58%	22,153,577	0	0.00%
NH	6,000			472,559	2.13%
MA	6,000			5,074,852	22.91%
RI	6,000			104,984	0.47%
CT	6,000			4,920	0.02%
ME-CT				5,657,315	25.54%
NY	5,000	2.707%	1,033,961	33,102	3.20%
NJ	6,000	7.644%	2,919,689	6,401	0.22%
DE	10,000	0.896%	342,235	0	0.00%
MD	up to 10,000*	5.920%	2,261,193	993	0.04%
VA	6,000	10.795%	4,123,239	0	0.00%
NC	20,000	14.036%	5,361,166	66	0.00%
<b>Total</b>		<b>100%</b>	<b>38,195,058</b>	<b>5,697,877</b>	<b>14.92%</b>

Northern  
Region

MD\* – possession limits range from 1,000 lbs to 10,000 lbs depending on permit category

□



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## **MEMORANDUM**

**Date:** September 7, 2018  
**To:** Chris Moore  
**From:** Jason Didden  
**Subject:** Spiny Dogfish 2019-2021 Acceptable Biological Catches (ABCs)

### **Introduction**

This memo supports the September 2018 Scientific and Statistical Committee (SSC) meeting discussions to set spiny dogfish ABCs for up to three years (May 1, 2019-April 30, 2022).

The Magnuson Stevens Act (MSA) as currently amended requires each Council's SSC to provide, among other things, ongoing scientific advice for fishery management decisions, including recommendations for ABCs. The SSC recommends ABCs that address scientific uncertainty such that overfishing is unlikely to occur per the Council's risk policy. Spiny dogfish are jointly managed by the Mid-Atlantic and New England Fishery Management Councils - their ABC recommendations to NMFS for the upcoming fishing year(s) cannot exceed the ABC recommendations of the SSC. As such, the SSC's ABC recommendations are the upper limit for catches.

Once the SSC meets and recommends ABCs, the technical Spiny Dogfish Monitoring Committee will meet to discuss if changes to other management measures should be considered, such as Annual Catch Limits (ACLs), Annual Catch Targets (ACTs), and Accountability Measures (AMs). Modifications to other operational details of the fishery such as trip limits may also be evaluated. Based on the SSC's, Monitoring Committee's and Spiny Dogfish Committee's recommendations, the Councils will make recommendations to the NMFS Northeast Regional Administrator. Based on NMFS' evaluation of the Councils' recommendations, NMFS will publish a Proposed Rule for specifications and then a Final Rule, which may change from the Proposed Rule based on public comment.

## **Spiny Dogfish**

### **Summary**

-The 2018 assessment update includes several methods of data smoothing to address recent missing and/or variable annual NEFSC survey information. Staff supports the NEFSC-recommended approach of including the unusually low 2017 data point but no longer using the Kalman filter.

-For 2019-2021, staff recommends ABCs of 12,914 metric tons (MT) (28.5 million pounds) for 2019, 14,126 MT (31.1 million pounds) for 2020, and 16,043 MT (35.4 million pounds) for 2021. These ABCs are based on starting with the 2016, 2017, and 2018 survey values and not applying the Kalman filter. They assume a typical life history and a 100% coefficient of variation (CV) on the overfishing catch level to derive ABCs with the appropriate probability of overfishing for a stock that is not overfished but below its target, per the Council's risk policy.

-Fishery participants on the Advisory Panel (AP) reported no marked changes in spiny dogfish abundance. They highlighted that landings are extremely dependent on international demand, which has been relatively weak in recent years. There was also substantial discussion that the trip limit has a strong effect on the pace of landings (some think this is good and some think the trip limit should be increased).

### **Regulatory Review**

The directed dogfish fishery of the 1990s harvested primarily the largest (80+ cm) spiny dogfish in the stock, and the species' life history is such that these fish are primarily mature females. The federal fishery management plan was developed in 1998 and implemented in 2000 in order to halt depletion of reproductively mature female spiny dogfish and allow the stock to recover. The fishery management plan eliminated the directed fishery for spiny dogfish beginning in 2000. Increases in SSB and quotas followed, and were substantially faster than was originally predicted based on the life history/biology of spiny dogfish.

The dogfish fishery currently operates under an open-access permit system with a 6,000 pound federal waters/permit trip limit, which makes the directed fishery a small-boat fishery (mostly gill net and bottom longline). States may set different trip limits in state waters. Further information on regulations applicable to the spiny dogfish fishery may be found at <https://www.greateratlantic.fisheries.noaa.gov/sustainable/species/sdogfish/index.html>.

The May 1, 2018 – April 30, 2019 ABC for spiny dogfish is 22,635 MT (49.9 million pounds), which translates into a domestic commercial landings quota of 17,325 MT (38.2 million pounds) after discards and other landings are accounted for. Quotas in the previous two fishing years were slightly higher. About 46% of the quota in the 2017-2018 fishing year was landed, and landings in the current fishing year are lagging compared to last year at the same point.

## **Biological Reference Points, Stock Status, and Projections**

A spiny dogfish assessment update is posted to the SSC meeting page. Several smoothing approaches for the terminal years (2016-2018) were considered, and the NEFSC recommended the standard 3-year averaging approach. Council staff concurs that this approach appears most appropriate. Under this approach, the 2018 SSB estimate is 106,753 MT (235.4 million pounds) compared to an SSBthreshold of 79,644 MT (175.6 million pounds) while the fishing mortality estimate for 2017 is 0.202 compared to an Fmsy proxy of 0.2439. Based on the point estimates the stock is not overfished and overfishing is not occurring. The update estimates there is a 13% chance that the stock is overfished and less than a 1% chance that overfishing occurs in 2018 based on recent catch rates.

## **Catch and Landings**

U.S. commercial activity has dominated catch in most years. The fishery operated at a moderate level in the 1980s and at a higher level in the 1990s. Landings were restricted in the early 2000s to allow rebuilding and have increased in the later 2000s to current. Discards have been a substantial source of mortality, and were often responsible for more mortality than landings in the 2000s. Discards have decreased as a proportion of mortality as landings have increased while discard quantities remained approximately level. Landings have been substantially below the commercial quotas for the last six fishing years and appear to be on a similar trajectory in the current fishing year. Fishery participants report that landings have been less than the quota due to low market demand and associated low prices (see Fishery Performance Report and Informational Document at <http://www.mafmc.org/council-events/2018/september-2018-ssc-meeting>).

## **OFL/ABC Recommendations**

### **OFL/ABC**

The updated assessment recommends an OFL of 21,549 MT (47.5 million pounds) for 2019, which is also recommended by staff. Future OFLs depend on the ABCs that are implemented.

### **ABC**

The variability in the spring survey and recent issues with survey performance suggest there is relatively high uncertainty for spiny dogfish biomass, which translates to high uncertainty about ABCs. In terms of variability, the survey would suggest that in the last 15 years the biomass of mature females usually changes by more than a third from year to year with frequent oscillations up or down by 50% or more. For such a long-lived species (up to 40 years), a survey that tracked abundance with reasonable precision would be expected to change slowly. While the various smoothing approaches address the noisiness of the survey results to some degree, it is not clear to staff how much of the result is true abundance versus residual variability in availability. In terms of survey performance, 2018 saw a delay and loss of 1/3 of the survey stations, 2017 was normal, 2016 was delayed by about a month, 2015 was normal, and 2014 was late with enough missed stations in important strata that an index for dogfish is not computed.

Given these issues with the survey, which the assessment hinges on, staff sought and constructed a complementary index of abundance based on the average spiny dogfish discards per bottom trawl trip 1989-2017 (generally there are 7,000-12,000 bottom trawl trips per year). The trawl discards are as estimated in the assessment update, and previous NEFSC center work related to river herring bycatch had provided an estimate of total bottom trawl trips from 1989-2017. As illustrated in Figure 1, this “discard index” is remarkably similar to the survey-based biomass index in the 1990s in both trend and scale of decline, and follows the upward trend in the 2000s but to a much lesser degree. A slow increase is more what one would have expected given the life history of spiny dogfish compared to the apparent survey regime-shift that occurred from 2005-2006. Staff suspects the higher trawl indices from 2006-2012 and declines in the early 2010s are primarily related to availability issues, and two recent papers have suggested that vertical and horizontal availability issues may be substantial for the survey specifically for spiny dogfish (*AE Carlson et al 2014* and *SR Sagarese et al 2016*).

However, the re-alignment of the 3-year survey average with the staff discard index in the terminal years suggests to staff that using the NEFSC-recommended 3-year averaging approach for the survey should currently be reasonable. That said, staff has substantial reservations about the year-to-year usefulness of the survey as a standalone indicator of spiny dogfish biomass, even when smoothed. The substantial variation in biomass/projected catch outcomes, depending on the chosen smoothing approach, reinforces this concern.

Based on all of the above, the assessment update, and the Advisory Panel’s Fishery Performance Report, staff recommends ABCs of 12,914 MT (28.5 million pounds) for 2019, 14,126 MT (31.1 million pounds) for 2020, and 16,043 MT (35.4 million pounds) for 2021, following the NEFSC 100% CV P\*<sup>1</sup> projections (which are based on the 2016-2018 survey numbers without the Kalman filter). Incidentally, these ABCs would allow modest increases (about 15% each year) in landings compared to the 2017-2018 fishing year.

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<sup>1</sup> P\* refers to the Council’s policy for determining the acceptable risk of overfishing. Based on the recommend smoothing approach, assuming a typical life history, and considering the estimated spiny dogfish stock status (above overfished but below the target), the Council’s P\* risk policy suggests the appropriate risk of overfishing for spiny dogfish is 26.9% in 2019, 27.4% in 2020, and 29.6% in 2021.



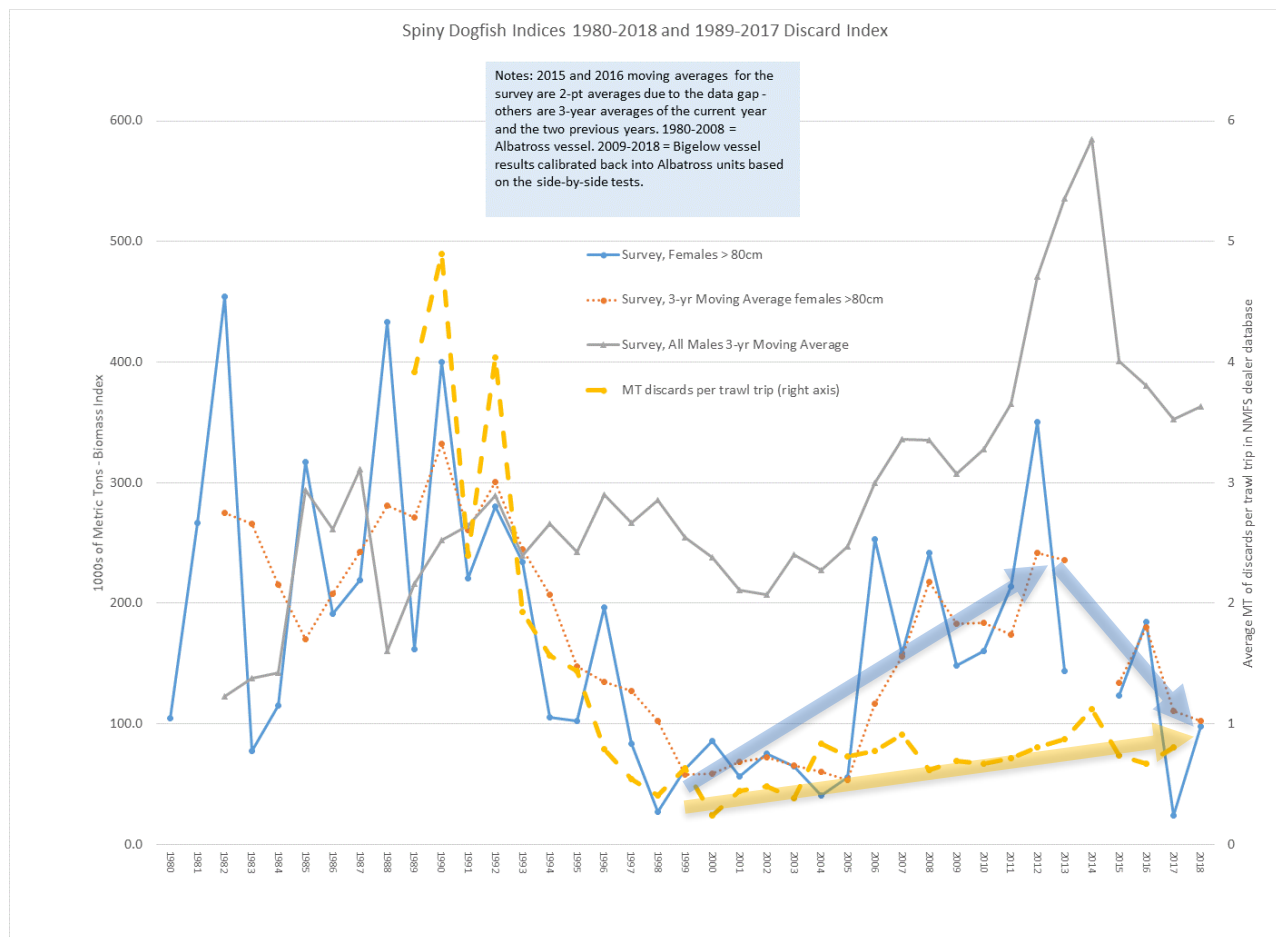


Figure 1. Spiny dogfish survey indices and a basic trawl discard index.

### **Rationale for 100% C.V.**

Staff did not have time to systematically consider the relative appropriateness of 60% vs 100% vs 150% CVs. A 60% CV would not appear appropriate given the survey index issues described in this memo and the uncertainties highlighted in the assessment update. Given the re-alignment of the survey with the staff discard index and that a slow increasing trend from the early 2000s would be consistent with spiny dogfish life history, staff supports the use of a 100% CV at this time.

### **Citations**

Carlson AE, Hoffmayer ER, Tribuzio CA, Sulikowski JA (2014) The Use of Satellite Tags to Redefine Movement Patterns of Spiny Dogfish (*Squalus acanthias*) along the U.S. East Coast: Implications for Fisheries Management. PLoS ONE 9(7): e103384.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0103384>

Skyler R. Sagarese, Michael G. Frisk, Robert M. Cerrato, Kathy A. Sosebee, John A. Musick & Paul J. Rago (2016) Diel Variations in Survey Catch Rates and Survey Catchability of Spiny Dogfish and their Pelagic Prey in the Northeast U.S. Continental Shelf Large Marine Ecosystem, Marine and Coastal Fisheries, 8:1, 244-262, DOI: 10.1080/19425120.2015.1135219

## 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.
  - o The Shark Alliance did not promote European boycotts of US spiny dogfish/other legally caught sharks (though other entities have sought to do this).
  - o Europe seems to have the U.S. figured out in terms of pricing
  - o 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:
  - o Exploration of how spiny dogfish recovered so much faster than predicted.
  - o Increased engagement with fishermen as part of scientific research.
  - o 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.
  - o Obtaining reproductive and other biological information across the range of the species before the next assessment.
  - o 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/SB122290720439096481>).
  - o Other advisers noted that “Cape Shark” is an approved market name ([http://www.accessdata.fda.gov/scripts/fdcc/?set=seafoodlist&id=Squalus\\_acanthias&sort=SLSN&order=ASC&startrow=1&type=basic&search=dogfish](http://www.accessdata.fda.gov/scripts/fdcc/?set=seafoodlist&id=Squalus_acanthias&sort=SLSN&order=ASC&startrow=1&type=basic&search=dogfish))

**Spiny Dogfish Advisory Panel (AP) Informational Document - August 2018**  
**Prepared by Jason Didden, Council Staff**

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

### **Basic Biology**

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

### **Status of the Stock**

Reports on “Stock Status,” including Stock Assessment Workshop (SAW) reports and peer-review reports are available online at the NEFSC website: <http://www.nefsc.noaa.gov/nefsc/saw/>. An assessment update in 2015 found that the stock is not overfished nor subject to overfishing. A data update that did not re-run the assessment model but includes the 2017 spring survey is available at <http://www.mafmc.org/ssc-meetings/2017/september-13>. The point estimate of mature female biomass from the 2017 spring survey was the lowest in the time series. We are awaiting a new stock assessment update from the NEFSC that will also incorporate 2018 data.

### **Regulatory Summary**

Spiny Dogfish regulations are summarized at <https://www.greateratlantic.fisheries.noaa.gov/sustainable/species/sdogfish/index.html>. We are currently in multi-year regulations from May 2016-April 2019 (see Table 1 below), and the Council will need to set new specifications for May 1, 2019 and beyond. The SSC (<http://www.mafmc.org/ssc>) meets September 11, 2018 to set the upper bound on catches, and then the Council will meet in October 2018 to set specifications. Spiny dogfish is jointly managed and the New England Fishery Management Council will meet in December to set specifications.

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

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

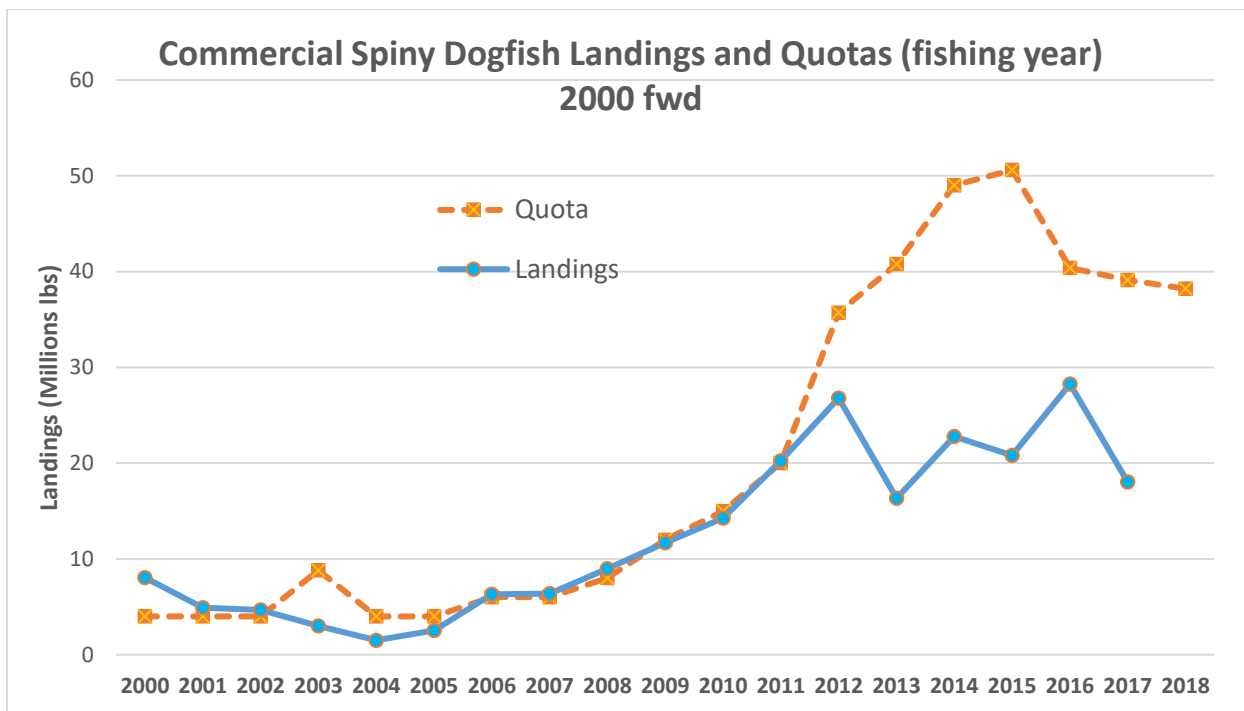
OFL = Overfishing Level; ABC = Acceptable Biological Catch; ACL = Annual Catch Limit; ACT = Annual Catch Target; TAL = Total Allowable Landings; Rec = Recreational; Comm = Commercial.

## Fishery Performance

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

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

The following pages provide information on quotas and landings since 2000 (page 3), prices (page 4), the progression of landings for the current and previous fishing years (page 5), landings by state, month, and gear for 2015-2017 (page 6), vessel activity since 2000 (page 7), and an illustration of trip sizes for the 2017 fishery (page 8).

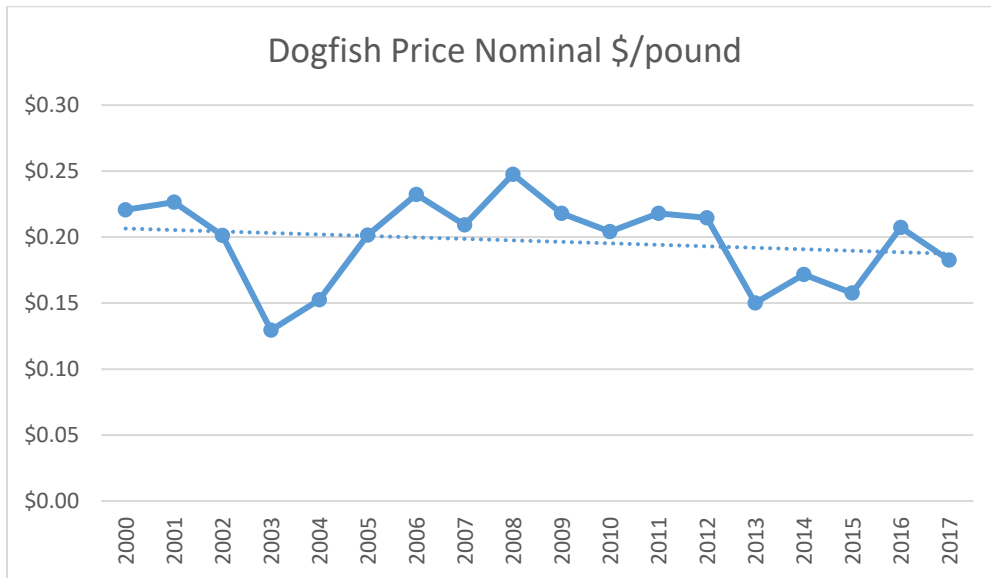


**Figure 1. Spiny Dogfish Landings and Quotas 2000-2017. 2017 = May 1, 2017 to April 30, 2018.**

*Source: Unpublished NMFS dealer reports*

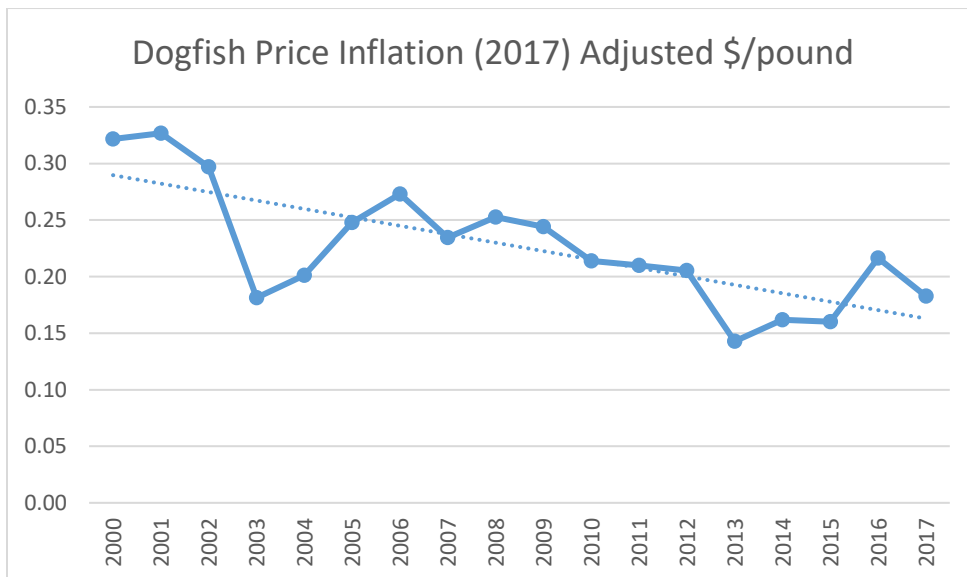
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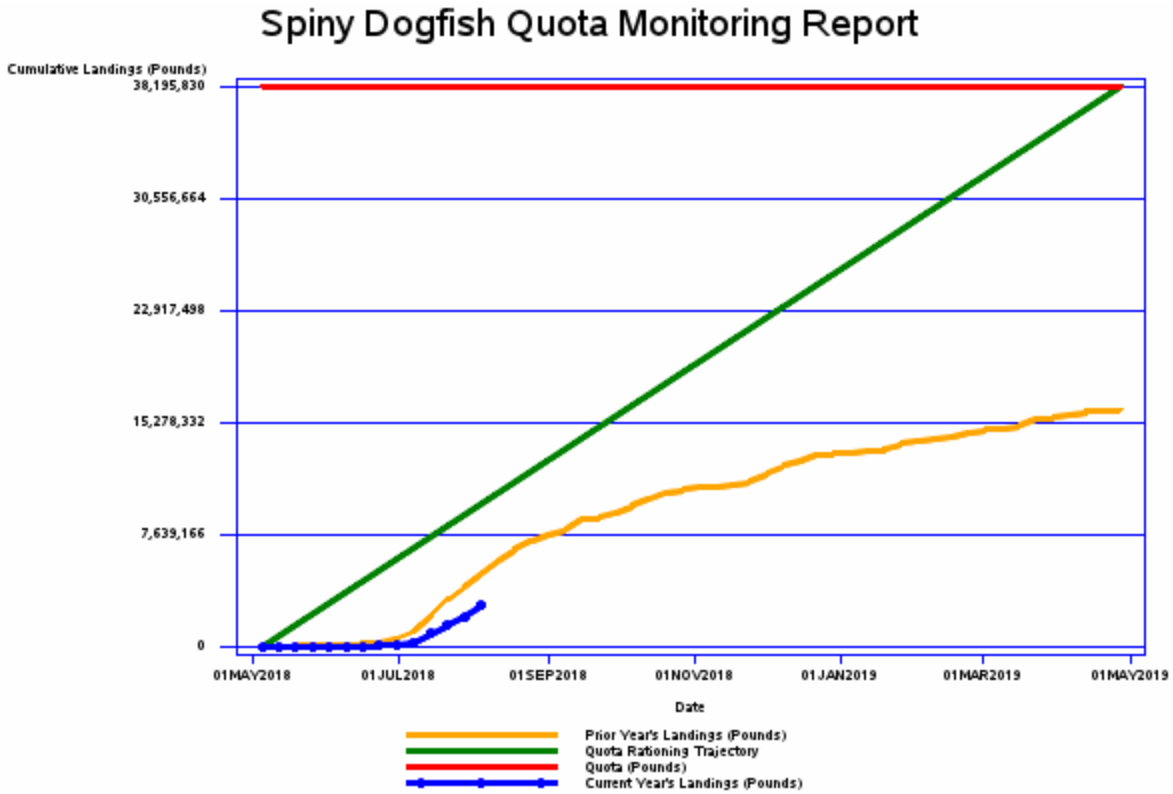


**Figure 2. U.S. Spiny Dogfish fishing year ex-vessel prices Calendar Year (Nominal)**  
*Source: Unpublished NMFS dealer reports*

Note: Avg. Price since Jan 1, 2018 = 17 cents/pound; (Preliminary)



**Figure 3. U.S. Spiny Dogfish fishing year ex-vessel prices Calendar Year (Producer Price Index adjusted, 2017 dollars)**  
*Source: Unpublished NMFS dealer reports*



**Figure 4. Recent Spiny Dogfish Landings (Blue = 2018-2019 Fishing Year; Orange = 2017-2018 Fishing Year)**  
(Data through 8/8/18)

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**Table 2. 2015-2017 Calendar Year dogfish landings by state (pounds)**

YEAR	CT	MA	MD	ME+NH+ Other	NC	NJ	NY	RI	VA	Total
2015	34,400	7,849,795	1,140,724	944,165	3,835,242	1,910,056	29,835	528,559	2,796,559	19,069,335
2016	33,128	14,365,312	1,381,015	756,283	2,320,523	3,607,489	39,064	670,682	3,495,086	26,668,582
2017	56,429	9,575,485	1,968,561	858,130	378,458	2,376,382	52,355	360,330	8,512,383	24,138,513

*Source: unpublished NEFSC dealer reports*

**Table 3. 2015-2017 Calendar Year dogfish landings by month. (pounds)**

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2015	2,149,252	1,879,910	1,042,833	664,004	217,713	188,187	3,051,504	2,879,635	1,859,773	811,894	1,737,913	2,586,717	19,069,335
2016	2,848,995	1,352,475	1,845,163	1,413,103	299,780	1,140,263	3,834,146	4,962,902	3,162,140	2,089,312	1,970,507	1,749,796	26,668,582
2017	2,203,654	2,455,325	2,542,396	1,851,299	165,948	441,465	3,679,307	3,312,798	1,496,306	1,610,354	1,328,813	3,050,848	24,138,513

*Source: unpublished NEFSC dealer reports*

**Table 4. 2015-2017 Calendar Year dogfish landings by gear. (pounds)**

YEAR	GILL_NET_SINK_ _OTHER	LONGLINE_ BOTTOM	UNKNOWN	GILL_NET_SET_ST AKE_SEA_BASS	TRAWL_OTTER_ BOTTOM_FISH	HAND_LINE _OTHER	GILL_NET_DRIFT_ _LARGE_PELAGIC	GILL_NET_RUN AROUND	GILL_NET_ OTHER	Other	Total
2015	10,103,553	2,939,522	226,295	3,283,804	846,502	1,228,404	184,228	169,974	25,895	61,158	19,069,335
2016	15,540,703	6,446,262	349,408	1,618,757	975,895	991,391	262,135	311,992	138,640	33,399	26,668,582
2017	12,456,879	4,219,665	5,326,204	284,492	1,013,859	293,776	176,245	104,763	229,833	32,797	24,138,513
Total	38,101,135	13,605,449	5,901,907	5,187,053	2,836,256	2,513,571	622,608	586,729	394,368	127,354	

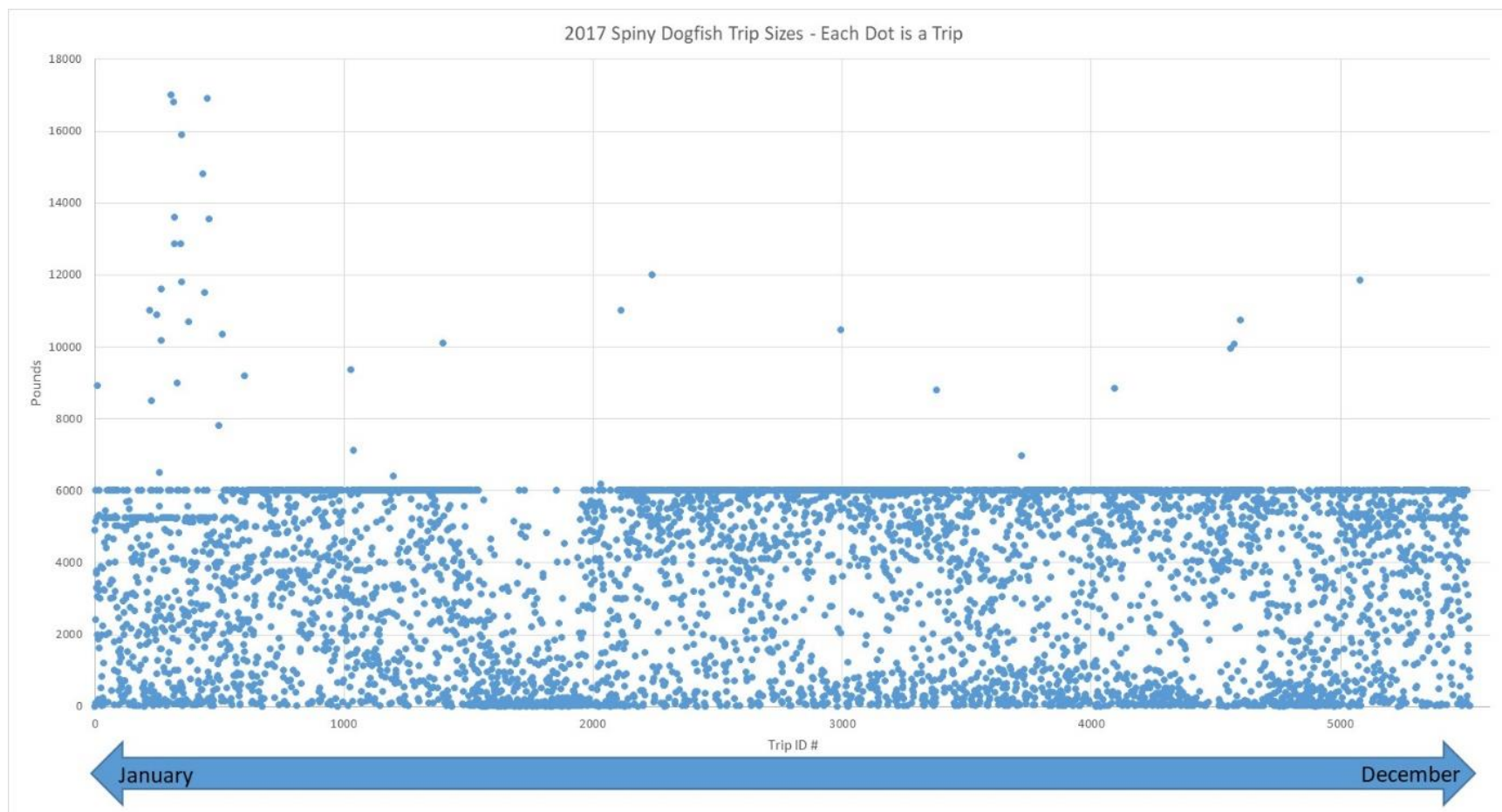
*Source: unpublished NEFSC dealer reports*

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

YEAR	Vessels 200,000+	Vessels 100,000 - 199,999	Vessels 50,000 - 99,999	Vessels 10,000 - 49,999	Total with at least 10,000 pounds landings
2000	30	24	25	122	201
2001	4	12	11	32	59
2002	2	14	8	31	55
2003	4	5	3	11	23
2004	0	0	0	43	43
2005	0	0	2	65	67
2006	0	0	8	117	125
2007	1	5	17	74	97
2008	0	11	18	107	136
2009	0	11	42	191	244
2010	0	22	42	124	188
2011	2	55	71	140	268
2012	20	40	56	181	297
2013	10	29	43	83	165
2014	29	37	39	88	193
2015	26	26	34	56	142
2016	50	31	27	45	153
2017	39	27	11	43	120

*Source: unpublished NEFSC dealer reports*

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**Figure 5. Spiny Dogfish Trip Sizes in 2017 calendar year (5,521 identifiable trips)**

# 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

Prepared by:

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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% of 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<sup>2</sup> to better understand important questions raised by the Dogfish AP and the MAFMC over the last few years<sup>3</sup>, 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%<sup>4</sup>, 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)<sup>5</sup>.

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<sup>2</sup> 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.

<sup>3</sup> 2017 Spiny Dogfish Advisory Panel (AP) Fishery Performance Report (FPR)  
<https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/59a6eb60893fc02cee00ad2c/1504111457029/2017-Dogfish-FPR.pdf>

<sup>4</sup> Lack, Mary 2006. CONSERVATION OF SPINY DOGFISH SQUALUS ACANTHIAS: A ROLE FOR CITES?

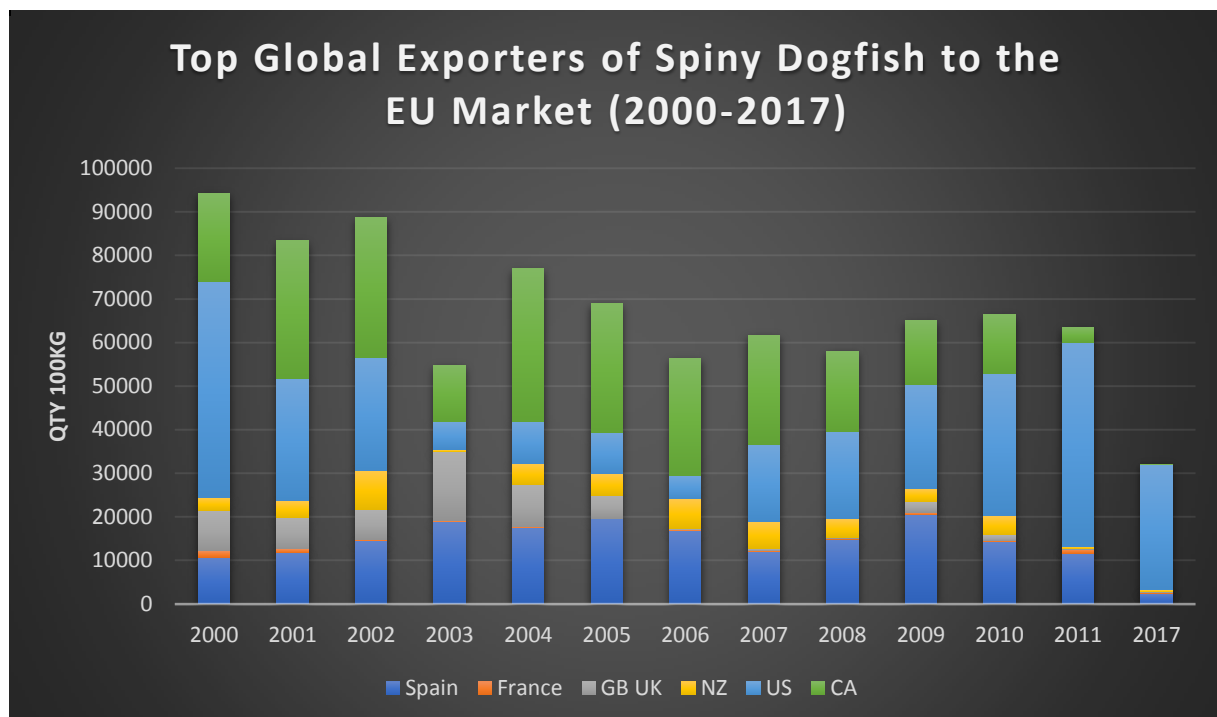
[https://www.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/FINAL\\_Spiny\\_Dogfish\\_ImplementationRepDez06.pdf](https://www.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/FINAL_Spiny_Dogfish_ImplementationRepDez06.pdf)

<sup>5</sup> 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](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 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/>)

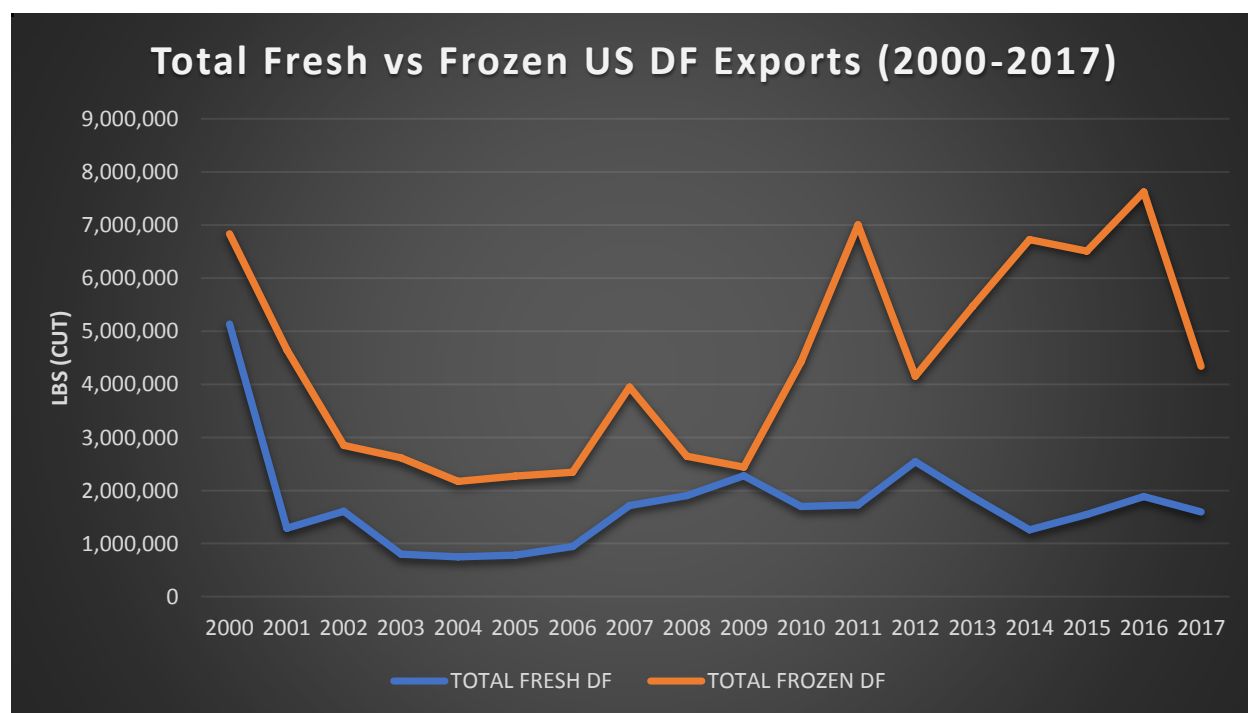
As **Figure 1** shows, between 2000-2002, the United States and Canada accounted for about 75% of all global exports to the EU. However, in 2003 when the FMP was put in place, US exports dropped by about 75% for the next five years, which once again provided opportunities for other countries to develop 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](https://www.st.nmfs.noaa.gov/pls/webpls/FT_HELP.SPECIES)

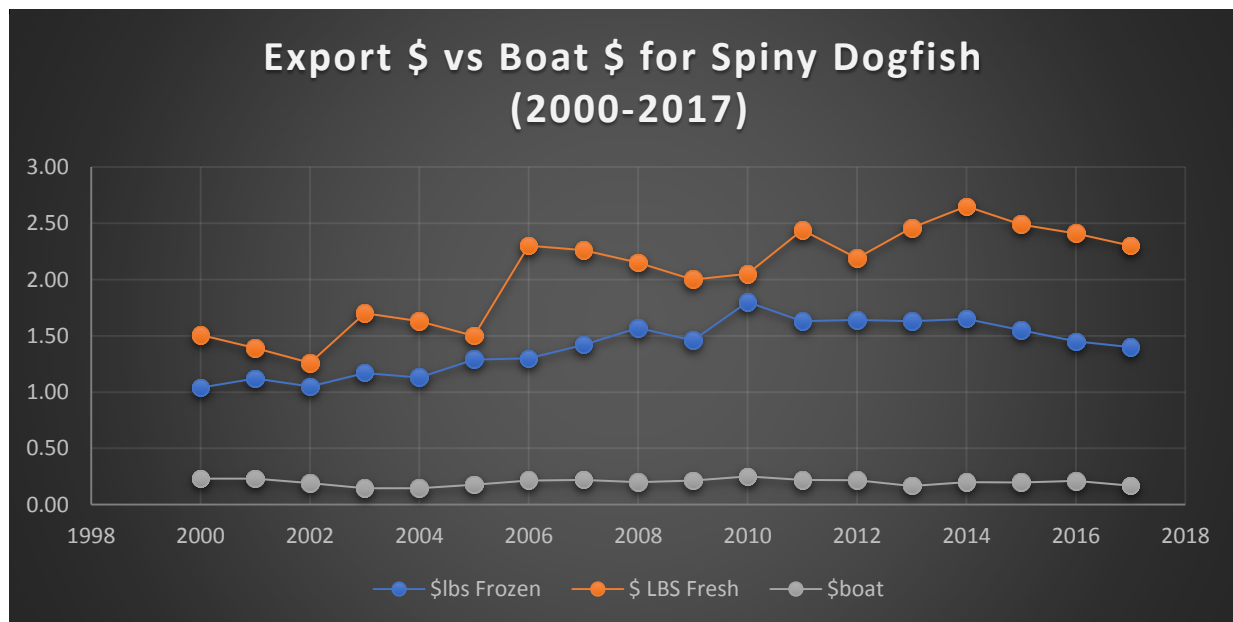
**Figure 2** shows the relationship between the fresh and frozen spiny dogfish market over the last 17 years and illustrates the long-term trends in supply. As noted, US exports dropped considerably between 2000 and 2002 after the implementation of the FMP, and both frozen and fresh exports remained 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)**

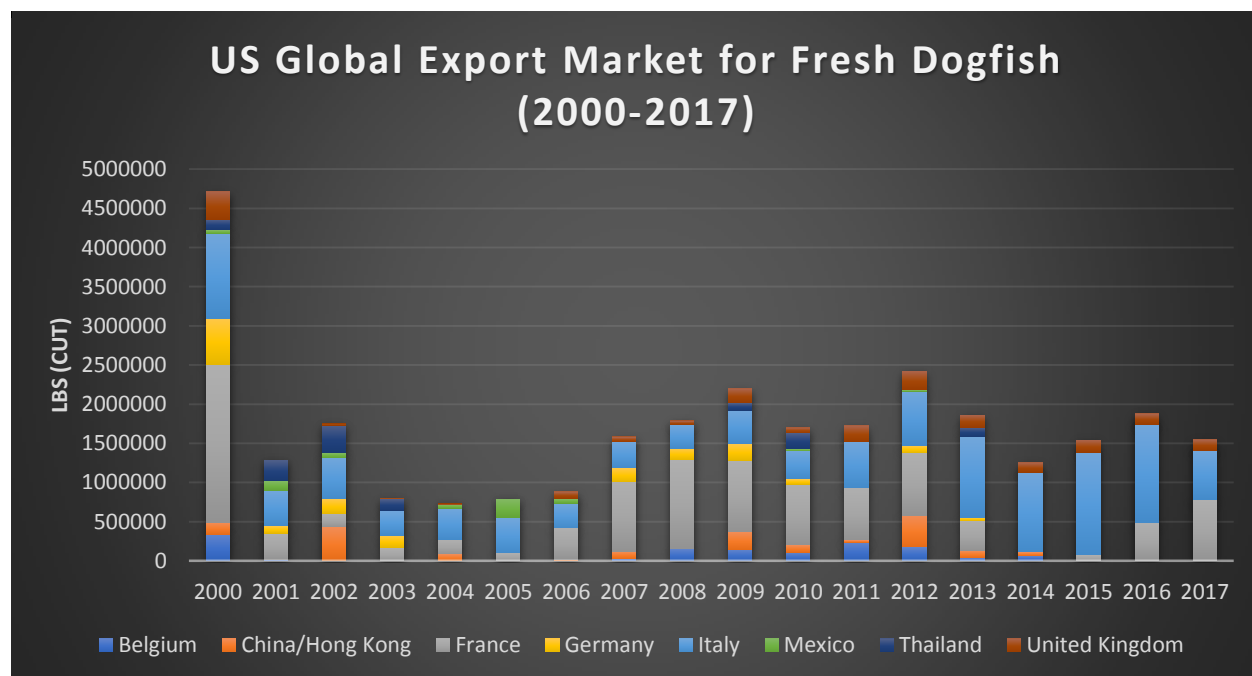


<http://epp.eurostat.ec.europa.eu/newxtweb/>; [https://www.st.nmfs.noaa.gov/pls/webpls/FT\\_HELP.SPECIES](https://www.st.nmfs.noaa.gov/pls/webpls/FT_HELP.SPECIES)

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)**



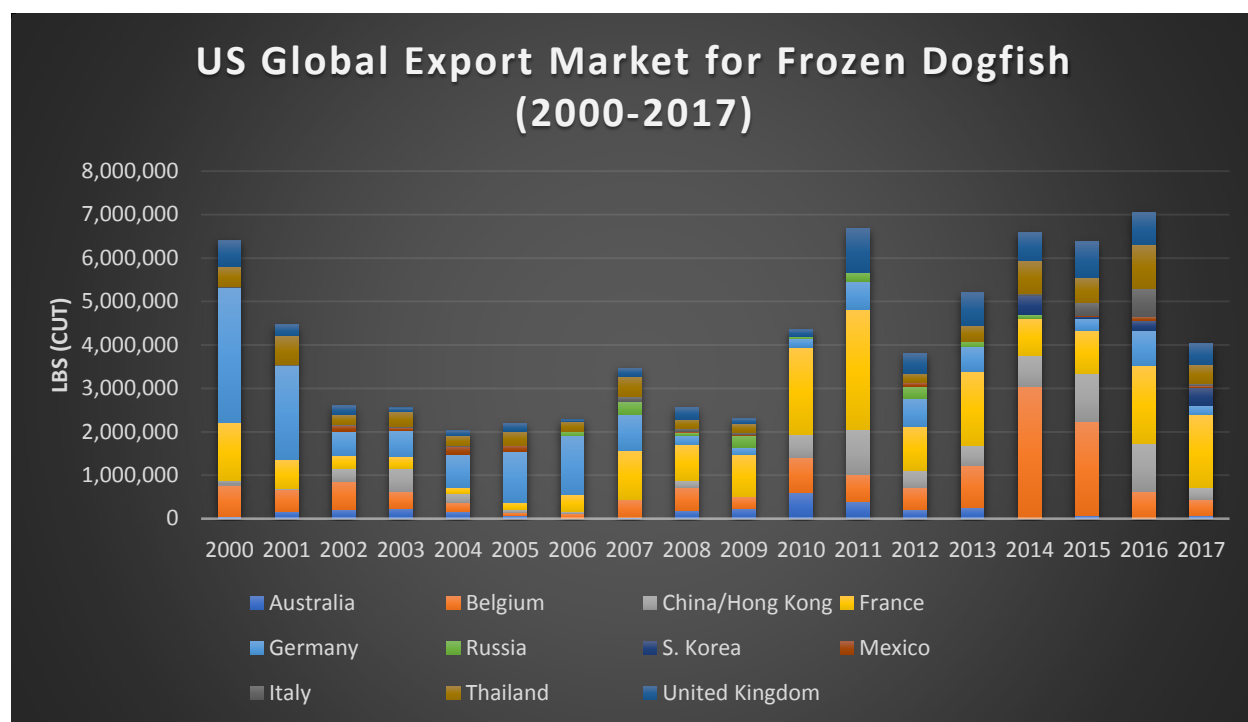
[https://www.st.nmfs.noaa.gov/pls/webpls/FT\\_HELP.SPECIES](https://www.st.nmfs.noaa.gov/pls/webpls/FT_HELP.SPECIES)

**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](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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September 6, 2018

Dr. Christopher M. Moore  
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Mr. Robert O'Reilly  
ASMFC Spiny Dogfish Management Board Chair  
Virginia Marine Resources Commission  
2600 Washington Ave, 3rd Floor  
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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 flexibility 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,

A handwritten signature in blue ink, appearing to read "David Borden", with a stylized flourish at the end.

David Borden  
RI Commissioner, ASMFC

cc: ASMFC Spiny Dogfish Board