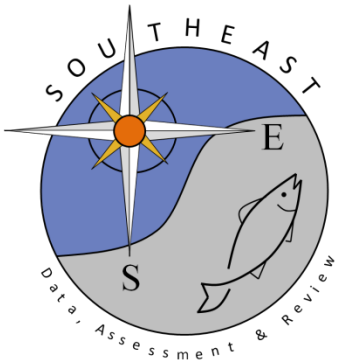
Estimated Catch of Blueline Tilefish in the Mid-Atlantic Region (SEDAR50-RD06)

Tom Allen, Andrew Loftus, Rob Southwick

SEDAR92-RD-02

April 2024



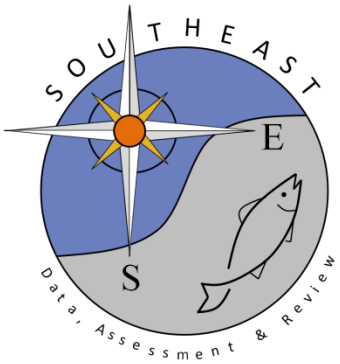
This information is distributed solely for the purpose of pre-dissemination peer review. It does not represent and should not be construed to represent any agency determination or policy.

Estimated Catch of Blueline Tilefish in the Mid-Atlantic Region

Tom Allen, Andrew Loftus, Rob Southwick

SEDAR50-RD06

27 April 2016



Estimated Catch of Blueline Tilefish in the Mid-Atlantic Region

Application of the Delphi Survey Process

Prepared for the:

Tom Allen, Southwick Associates
Andrew Loftus, Loftus Consulting
Rob Southwick, Southwick Associates

Produced by:

PO Box 6435
Fernandina Beach, FL 32035
Tel (904) 277-9765

March 2016

Executive Summary

Recognizing a potentially increasing demand for blueline tilefish in the recreational fishery, the Mid-Atlantic Fishery Management Council initiated emergency measures in 2015 to control harvest. Due to historically low catches of blueline tilefish by private recreational anglers, and lack of reporting among the for-hire sector (due to no mandates or misunderstanding of reporting requirements), few data exist on recreational effort or harvest within traditional data sources. To develop an initial estimate of blueline tilefish landings, the Council employed a modified version of the Delphi technique. This technique is a scientifically accepted method for gathering data from a group with expert knowledge, but has not commonly been applied to developing quantitative estimates such as fisheries catch or effort. Through an initial anonymous survey, charterboat and headboat operators, individual private anglers, and tackle shop owners with intimate knowledge of recreational blueline tilefish fishing in the Mid-Atlantic region provided detailed estimates of effort and catch for boats fishing from most ports in the region. This was followed by an in-person meeting to combine the collective knowledge of the expert panel to refine the initial estimates and a final follow-up survey after the meeting to confirm the refined estimates.

Based on an analysis of the collected information, the expert panel confirmed (general consensus) an estimate of total regional catch ranging from 32,340 to 50,645 blueline tilefish in 2015.

Estimated number of blueline tilefish landed by components of the recreational fishing sector in the Mid-Atlantic during 2015.

	Number of Fish Caught in 2015	
	Low	High
Charter Boats	10,770	17,000
Headboats	15,410	17,152
Private anglers	6,160	16,493
Total	**32,340**	**50,645**

More than half of the panel used personal or boat fishing logs to provide the data used as a basis for generating these estimates; others used best estimates based on recollection and all were confident to some degree in the accuracy of their numbers. Nobody expressed little or no confidence in the numbers that they provided.

It is not clear that catches have increased or decreased in the past one and five years. The responses were somewhat evenly distributed in reporting decreased, increased or no change in catches. However, effort directed toward blueline tilefish did seem to present a clear increasing trend and, noticeably, the number of private recreational boats seeking blueline tilefish seems to be on the increase.

There was a high degree of satisfaction with the use of the modified Delphi process to generate these estimates, with 85% of respondents indicating support for using this process for other data-poor fisheries in the Mid-Atlantic region. Responses to open ended questions also indicated substantial support for using this process for other aspects of fisheries management, such as management options for specific fisheries and allocations.

Contents

Background

Blueline tilefish are a non-migratory species susceptible to overfishing due to long lifespan and relatively sedentary nature. The Mid-Atlantic Fishery Management Council has begun developing management measures for blueline tilefish for the Mid-Atlantic region. This follows the implementation in June 2015 of federal (NOAA) emergency management measures for the blueline tilefish fishery in the Greater Atlantic Region. Since the announcement by NOAA, the Council has undertaken the following steps toward development of a long-term management plan:

- June 1-18, 2015: Scoping hearings were held throughout the Mid-Atlantic region to gather public input on blueline tilefish management.
- August 2015: The Council reviewed scoping comments and voted to proceed with an Amendment to the Golden Tilefish Fishery Management Plan to temporarily address blueline tilefish management issues.
- October 2015: The Council reviewed a preliminary set of alternatives for blueline tilefish management and endorsed development of a range of alternatives in a full Environmental Assessment to be reviewed at a future Council meeting.

The emergency measures will end in June of 2016, at which time the Council will implement the management amendment. Currently, little is known about the recreational catch, harvest, or effort statistics needed for developing the recreational component of this amendment. To aid the Council in the development of its long-term management plan for blueline tilefish, Southwick Associates coordinated a modified Delphi process involving selected experts in the fishery to establish consensus on recreational catch estimates, including recreational effort.

About the Delphi Method

The Delphi technique is a scientifically accepted method for gathering data from a group with expert knowledge when the issue in question, such as recreational catch, has limited empirical data on which to draw. The Delphi technique was originally developed by the RAND Corporation in the 1950s to assess the potential effects of military strategies when historic data on possible reactions by other countries were not available. Since then, the process has been refined and applied to assess the potential effects of many different types of government and private sector activities, decisions, and policies.

The classic Delphi process aims to achieve consensus across a range of people and opinions through the use of anonymous questionnaires delivered over multiple rounds of surveys. In a Delphi study, the answers to specific questions - such as best estimates of recreational catch - are processed, summarized and sent back to the panelists in a new questionnaire. The panelists can reinforce, change or modify their previous responses based on the response and input from the rest of the group. The questionnaires are administered anonymously and panelists are not aware of the identity of the other participants, to prevent bias.

Goal

To estimate the total catch by the recreational sector (private anglers, charter boats, and headboats) of blueline tilefish in the Mid-Atlantic region during 2015.

Methods

This project applied a modified Delphi process to arrive at a best expert consensus of blueline tilefish recreational landings in the Mid-Atlantic region. A panel of experts with an understanding of fishery management strategies in the Mid-Atlantic region and specific knowledge of blueline tilefish was identified and contacted by the Council for participation in this process. Information was collected from these experts through four primary and iterative mechanisms:

- A confidential survey (Survey 1) to ascertain catch (average and annual), effort (trips), and estimated number of charterboats, headboats, and private boats observed in the marina/port and on the water that were presumed to be fishing for blueline tilefish. This survey was administered prior to the in-person meeting
- In-person group discussion, including a second-round survey (Survey 2) to determine the appropriate means to clarify data collected in Survey 1.
- In-person group exercise to determine catch and effort of charter boats, by port, in the mid Atlantic.
- A third and final round of surveys (Survey 3) following the workshop to finalize consensus on the results developed with the information collected throughout the process.

The results of Survey 1 (pre-meeting survey) and Survey 3 (post-meeting survey) are discussed in the individual sections below. The survey conducted during the in-person meeting (termed "Survey 2") presented the overall coastwide estimates of landings and effort derived from Survey 1 and asked participants to react to them. As is typical in a Delphi process, participants' opinions were still being formed based on the feedback from their fellow participants and review of others' responses to the survey question. Subsequently, the results of Survey 2 were mixed but generally indicated that while participants were comfortable with their responses at an *individual* level they were less confident in judging the coastwide estimates resulting from the aggregated individual responses. Additionally, Survey 2 clearly indicated that calculation of coastwide landings estimates based on coastwide averages of catch and trips was less reliable than estimating catch and effort on a port-by-port basis and aggregating those to a coastwide level. This approach inherently accounts for varying degrees of effort and success in different geographic areas of the region. The input from Survey 2 formed the basis for the in-meeting exercise of analyzing charterboat catch and effort (based on avidity and skill level) on an individual port basis, the results of which are discussed in the Charterboat section below.

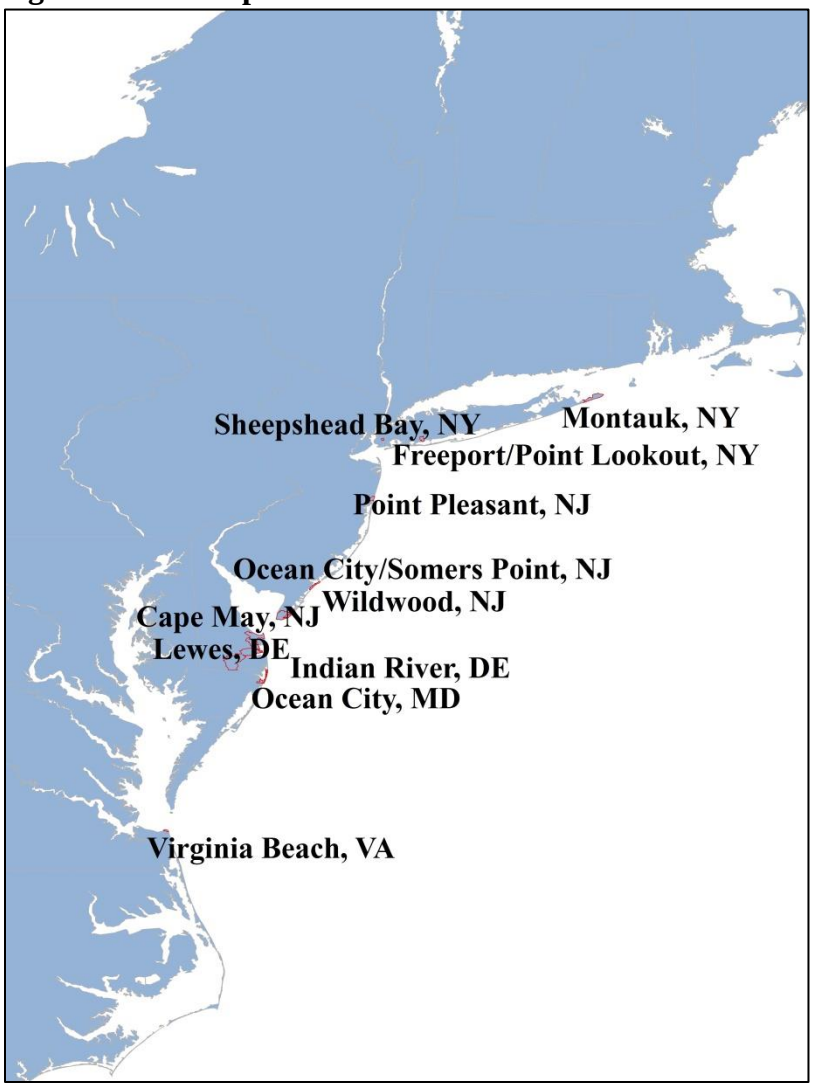
Results

Note: Throughout this document, the terms "primary" and "fallback" blueline tilefish trips are used. Primary indicates a trip where catching blueline was the primary purpose at the outset of the trip; fallback indicates a trip where the primary target was another species but blueline

tilefish were subsequently targeted as a secondary objective. For purposes of classifying and enumerating the number of charterboats and headboats in the survey, participants were asked to a) enumerate the number of boats that took one or more primary trips each year and b) enumerate boats that never took a primary blueline trip but engaged in blueline fishing as a secondary objective

Eight charterboat operators, seven headboat operators, one tackle shop operator, and four recreational anglers were contacted and invited to participate in the process. All twenty participants completed the initial survey for a 100% response rate, coming from Virginia, Maryland, Delaware, New Jersey, and New York (Figure 1). Ten respondents indicated that they used personal or boat fishing logs to complete the survey questions; five used best estimates based on recollection. Eight expressed very high confidence in the accuracy of their numbers, two were fairly confident, and three were somewhat confident. Nobody expressed little or no confidence in the numbers that they provided.

Figure 1. Ports represented in the MAFMC blueline tilefish modified Delphi process.



Charterboat Estimates

Results of Survey 1

Annual "catch" and "kept" estimates for each respondent were calculated as follows:

a) Typical (average) catch per primary trip x number of primary trips in 2015 x number of charterboats in that port that targeted blueline tilefish.

b) Typical (average) catch per fallback trip x number of fallback trips in 2015 x number of charterboats in that port that conducted fallback but not primary trips for blueline tilefish .

c) Total catch (or kept) was the sum of the estimates for primary and fallback trips, and provided an estimate of the number of blueline tilefish caught by charterboat operators in each port in 2015.

In three ports where no charterboat operator participated in the survey but where a headboat operator reported the number of charterboats, the charterboat catch for that port was calculated as follows:

a) Number of charterboats conducting primary trips x coastwide charterboat average catch per primary trip x coastwide charterboat number of primary blueline tilefish trips.

b) Number of charterboats conducting fallback trips x coastwide charterboat average catch per fallback trip x coastwide charterboat number of fallback blueline tilefish trips.

c) Total catch (or kept) was the sum of the fallback and primary estimates.

Coastwide catch estimates were derived by summing the individual port-specific estimates. In two cases where more than one respondent came from a single port, their total catch estimates were averaged to obtain a single port-specific estimate.

Using this methodology, it is estimated that the total number of blueline tilefish kept (landed) by charterboats 2015 in the Mid-Atlantic region was 17,152 fish.

In-Meeting Exercise

During the in-meeting group exercise, participants applied their knowledge of charterboat effort in each major port to enumerate the number of charterboats fishing for blueline tilefish classified by fishing effort (number of trips each year) and average catch per trip as in the matrix below (Figure 2). A separate matrix was produced for each port.

Figure 2. Template for in-meeting estimation of port-specific effort and catch for blueline tilefish by charterboats.

	Catch per Trip		
Trips per year:	**0-10 fish**	**11-20 fish**	**21+ fish (avg=30)**
1-2 trips	# of boats	# of boats	# of boats
3-6 trips	# of boats	# of boats	# of boats
7+ trips (avg=10)	# of boats	# of boats	# of boats

This had the advantage of capturing the personal experience and knowledge of the charterboat operators of their unique community in the Mid-Atlantic. Ports evaluated were identical to those identified through the survey ensuring that direct personal knowledge was brought into the analysis by operators within those ports. Ports analyzed spanned the entire range of the Mid-Atlantic (Figure 1).

Once port-by-port estimates were gathered, they were used to estimate blueline tilefish landed on an annual basis. Despite the high level of confidence of the respondents in their responses and the iterative approach to increase the accuracy of total catch, there remains a level of uncertainty around "average" estimates. As a result, low and high catch estimates are developed to enumerate the potential range around the average.

Low estimates applied the lowest value for each of the variables in a cell to calculate the number of fish landed. For example, in the cell represented by "1-2 trips" and "0-10 fish," the cell value (number of boats identified by participants) were multiplied by 1 trip and by 1 fish (it was assumed that each trip caught at least 1 fish for this purpose). Likewise, the cell represented by "11-20 fish" and "1-2 trips" multiplied the cell value (number of boats identified by participants) by 1 trip and by 11 fish. In this manner, the "low estimate" of total number of fish landed was the sum of the low estimates of the cell-by-cell calculations.

High estimates were developed in a similar way, but using the high value of the range for each element constituting the cell multiplied by the number of boats identified by participants in that cell. For the two open-ended highest categories (21+ fish and 7+ trips), an average number identified by participants (30 fish and 10 trips respectively) were used to calculate average landing estimates. Average estimates were calculated by applying the midpoint of each cell element multiplied by the number of boats identified by participants for that cell.

Total number of fish landed in the mid Atlantic was calculated as the sum of the total fish landed in each port. The total number of boats was calculated as the sum of all boats identified in each port.

Table 1. Number of blueline tilefish landed by charterboats in 2015, based on in-meeting port evaluation.

	Low Estimate	High Estimate	Average Estimate
Number of boats	na	na	119
Total fish landed	5,223	18,597	10,770

Although this presents a range of possible values, for either the low value or the high value to be true assumes that all charterboats take the fewest trips and catch the fewest fish, or conversely take the greatest number of trips and catch the highest number of fish, in each category. We believe that while this could technically be possible, the true value is likely closer to the midpoint between the low and high (11,910) or the calculated average (10,770) for this methodology.

Analysis

The results from the on-line survey and the in-meeting port-by-port analysis are generally consistent with each other. The survey reflects the *catch rate* and the number of trips that survey participants reported in 2015 multiplied by the total number of estimated charterboats per port. If the project participants are the more avid or more successful among their charterboat peers, then this number could be expected to be on the high end of the range. The in-meeting port-by-port analysis represents the best estimate of the number of boats classified by perceived avidity and success, and if accurate could be expected to represent the entire range of success and avidity across all charterboats. Given the differences in these approaches, the degree to which the estimates are in the same approximate range is likely indicative of their general validity. ***Based on these results, and the confidence expressed by the survey respondents, we believe that 10,770-17,000 is a reasonable estimate of blueline tilefish landed by the Mid-Atlantic charterboat community in 2015***.

Results of Survey 3: Confirmation of Estimates

The third round of surveys was conducted post-meeting and asked respondents to provide their input into the estimated values for number of fish landed and number of boats operating in the 2015 blueline charterboat fishery in the Mid-Atlantic that were based on their input during the earlier phases of this project. Four out of eight charterboat operators responded to this survey and were almost unanimous in the opinion that the numbers of boats and numbers of fish were reasonable. One respondent felt that both numbers should be slightly lower than calculated, but not substantially different from the lower end of the calculated range (Table 2). In response to questions to pinpoint the numbers at the lower or upper ends of the ranges, the number of responses is too low to draw definitive conclusions but in general there was a tendency toward the lower end.

Table 2. Charterboat consensus on calculated values of number of charterboats fishing for blueline tilefish and number of blueline tilefish landed in the Mid-Atlantic during 2015.

		Yes	No
Is 80-119 charter boats reasonable?		3	1
If yes, is it closer to…..	80 boats	2	-
	119 boats	1	-
If no, what is a reasonable number of boats?		-	50
Is 10,770- 17,152 fish landed by charter boats reasonable?		3	1
If yes, is it closer to …….	10,770 fish	2	-
	14,000 fish (midpoint)	1	-
	17,152 fish	-	-
If no, what is a reasonable number of fish?		-	10,000

Headboat Estimates

The headboat community fishing for blueline tilefish in the Mid-Atlantic as either a primary or fallback species is fairly small. As a result, the seven headboat operators who participated in this process very likely account for the vast majority of landings. During the in-meeting discussion, participants concluded that using the Vessel Trip Reports (VTRs) that most headboats in the region are required to complete and submit to NOAA Fisheries could provide a good indication of blueline tilefish landings for 2015. However, due to confusion about the need for reporting blueline tilefish on the VTRs (and incomplete coverage of these reports among the fleet), entries for past years and for all boats may not completely reflect the true landings, so VTRs should be viewed as a minimum catch estimate. Therefore, results of the survey were used to fill in where data were not available.

It is important to note that three headboats operate from a single port in Virginia, all operated by the same captain. In communications with this captain, it was determined that it was rare for even two of these vessels to have operated offshore at a single time in 2015 and therefore, for purposes of extrapolating responses into landings, this port was considered to have only a single headboat.

Results of Survey 1

Due to the small number of vessels operating in the headboat blueline tilefish fishery, survey results and VTR submissions are not discussed in detail to preserve confidentiality. However, through a comparison of the combined landings reported by several vessels on VTRs and the combined landings reported for those same vessels in the survey, we concluded that the survey responses were a good surrogate for VTRs and for helping to fill in some of the data gaps from headboats who either did not report or were not required to report blueline tilefish via VTRs.

Survey results were used in two ways: 1) the cumulative total of blueline tilefish directly reported to have been landed in 2015 by the seven headboat operator respondents, and 2)

summation of individual responses for the average catch per trip multiplied by the number of trips in 2015 and multiplied by the number of headboats in each port (identical to the methodology outlined earlier for charterboats, but using headboat reported data). As with the charterboat analysis, in one case a headboat was reported by charterboat respondents in a port where no headboats were represented among the project participants, and their catches were determined using the average coastwide catch and trips reported for other headboats (although the end contribution to the total estimate was fairly minimal).

Analysis

Through these techniques, total landings of blueline tilefish by headboats in the Mid-Atlantic in 2015 are estimated to be 15,410 (reported) to 17,152 (extrapolated) fish based on survey responses. Again, based on the strong agreement between the cumulative VTR landings data and corresponding survey response data we view this estimate to be a very close approximation to the actual landings.

Results of Survey 3: Confirmation of Estimates

The third round of surveys was conducted post-meeting and asked respondents to provide their input into the values for number of fish landed and number of boats operating in the 2015 blueline headboat fishery in the Mid-Atlantic based on their input during the earlier phases of this project. Four (out of seven) headboat operators responded. Due to the narrow range between the upper and lower bounds of the estimates, respondents were not asked to provide input on whether the true value was closer to one or the other. As with the charterboats, there was general consensus to the number of headboats and number of blueline tilefish landed by headboats in 2015, with the only dissension still falling within the general range (number of boats).

Table 3. Headboat consensus on calculated values of number of headboats fishing for blueline tilefish and number of blueline tilefish landed in the Mid-Atlantic during 2015.

	Yes	No	No Opinion
Is 6 primary-trip and 6 fallback-trip headboats reasonable?	3	1	-
If no, what is a reasonable number of headboats:	*Primary*	4	-
	Fallback	4	-
Is 15,410 to 17,152 fish landed by headboats reasonable?	3	-	1

To try to develop a further comparison between the 2015 averages and historical trends in landings, headboat operators were asked to provide their best estimate of the number of blueline tilefish landed during three historical time periods. The numbers in Table 4 reflect the average catch per vessel in each time period.

Table 4. What was your average catch (numbers) of blueline tilefish per year in each of the following time periods (mean value of respondents)?

Time period	Avg. catch
2004 to 2007	5,337
2008 to 2011	3,628
2012 to 2015	4,753

**Note: results do not include a reported value of 10 fish per year that was deemed an outlier. Note that fishing restrictions were put in place latter half of 2015 and may affect the results.*

Private Boat Estimates

There is little in the traditional recreational landings surveys to indicate the extent of private recreational angler effort or landings on blueline tilefish. The data that are available is very sporadic. Blueline tilefish are not easily accessible to recreational anglers due to their distance from shore. This is especially true for private individuals who must have large seaworthy vessels to venture the required distance. To ascertain the extent of recreational blueline tilefish landings, we relied on analysis and extrapolation of the survey results.

Results of Survey 1

The number of private boats that fish for blueline tilefish was estimated in two ways. First, a baseline number was determined by asking charterboat and headboat operators to estimate the number of private vessels docked in their port that caught blueline tilefish. We did not ask charter or headboat respondents to delineate whether these private vessels were primarily targeting blueline tilefish or whether they caught them as a fallback species. This estimate provides a very baseline estimate as it does not account for private vessels that dock at small marinas, private docks, or are trailered. Second, we asked all charterboat, headboat, and private boat respondents to estimate the number of vessels of each type that they observed presumably fishing for blueline tilefish on a typical trip when they fished for this species. Again, given the distance from shore and location of blueline tilefish grounds, it is reasonable to assume that vessels in the same vicinity are fishing for blueline tilefish and not another species (except perhaps golden tilefish).

The ratio of private "blueline tilefish" boats observed in port to blueline tilefish charterboats in that same port, and the ratio of private blueline tilefish boats to charterboats observed fishing on a typical trip were then used to extrapolate the total number of private boats based on the number of charterboats.

The average ratio of private boats observed *fishing* for blueline tilefish to charterboats fishing for blueline tilefish was as follows:

Charterboat respondents:	1.0 private boat per charterboat
Headboat respondents:	1.8 private boats per charterboat
Private boat respondents:	1.1 private boats per charterboat

The average ratio of observed private boats to charterboats *docked* in a port (including only boats that were believed to fish for blueline tilefish) averaged 0.8 for charterboat respondents and 0.5 for headboat respondents.

The lower ratio of private boats observed docked in port than those fishing seemingly provides in an indication that the in-port observations are a minimum number but the proximity of this ratio to those observed fishing provides a degree of comfort that the ratios observed fishing may be reasonable to use to extrapolate for purposes of determining overall numbers.

To estimate blueline tilefish landings per boat, private recreational anglers on our panel were asked the same questions as others related to number of trips taken to fish for blueline tilefish as a primary or fallback species, catch on their last trip, and average catch per trip in 2015. Results of those questions are shown in Table 5

Table 5. Estimated annual catch per boat of blueline tilefish by private anglers

	Private anglers
Primary Trips	
Catch on typical trip	11.8
Number of trips per year	4.5
Total annual catch per boat per year	53
Fallback Trips	
Catch on typical trip	6.0
Number of trips per year	4.0
Total annual catch per boat per year	24
Total annual catch per boat per boat per year	77

Analysis

Using a range of the ratio of private boats observed fishing for blueline tilefish to charterboats fishing on the same trip can provide an estimate of total landings (1.0 to 1.8). This ratio can be applied to the estimated number of charterboats as reported in the survey (80) and the estimated number of charterboats reported during the in-meeting port-by-port analysis (119). ***The resulting number of blueline tilefish caught by private individual anglers ranges from 6,160 fish to 16,493 fish.***

Estimate 1: 1.0 x 80 boats x 77 fish/boat/year = 6,160 fish.
Estimate 2: 1.8 x 80 boats x77 fish/boat/year = 11,088 fish.
Estimate 3: 1.0 x 119 boats x 77 fish/boat/year = 9,163 fish.
Estimate 4: 1.8 x 119 boats x 77 fish/boat/year = 16,493 fish.

Based on the discussions at the meeting, the private recreational anglers on the panel (whose catch and trip estimates are used for the basis of these calculations) are likely more avid than the

typical blueline tilefish angler and therefore these estimates may be slightly on the high side. However, based on those same discussions, blueline tilefish are not easily accessible to the casual angler and therefore *any* private angler fishing for blueline tilefish is likely above the average in terms of avidity.

Results of Survey 3: Confirmation of Estimates

The third round of surveys was conducted post-meeting and asked respondents to provide their input into the values for number of blueline tilefish landed and the ratio of private boats to charterboats that was used to calculate number of private boats operating in the 2015 blueline private boat fishery in the Mid-Atlantic. All four of the private recreational anglers participating in this process responded and were unanimous in their agreement with the estimates that were calculated (Table 6).

Table 6. Private angler consensus on calculated values of ratio of private to charterboats and number of blueline tilefish caught by private anglers during 2015.

	Yes	No
Is the range 1.0 to 1.8 private boats for every charterboat fishing reasonable?	4	0
Is 6,160 fish to 16,493 blueline tilefish landed by private anglers reasonable?	4	0

Overall Results

Landings for 2015

Assembling all of the calculated results and survey responses together across the three groups of recreational participants, we estimate the total regional catch of blueline tilefish in the Mid-Atlantic to range from 32,340 to 50,645 fish in 2015 (Table 7).

Table 7. Estimated number of blueline tilefish landed by components of the recreational fishing sector in the Mid-Atlantic during 2015.

	Number of Fish Caught in 2015	
	Low	High
Charter Boats	10,770	17,000
Headboats	15,410	17,152
Private anglers	6,160	16,493
Total	**32,340**	**50,645**

When asked if the total estimate range (from 32,340 to 50,645 fish) was reasonable, nine out of thirteen respondents agreed, and two had no opinion. The remaining two respondents felt that the estimate should be slightly below the lower end of the range (Table 8).

Table 8. Participant consensus on the estimate of the total number of blueline tilefish landed by all recreational anglers in the Mid-Atlantic region in 2015.

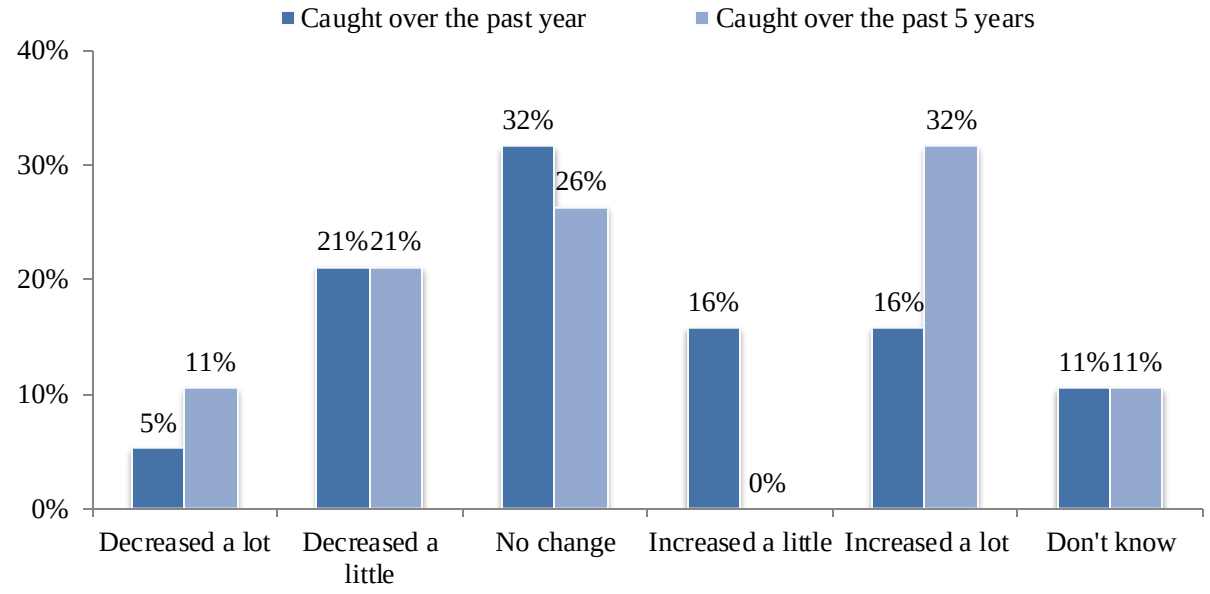
	Yes	No	No opinion
Is 32,340 to 50,645 a reasonable estimate?	9	2	2
If no, what is a reasonable estimate?		30,000 (two responses)	

The fact that there is significant agreement on the estimates whether asked as individual groups about their group estimates or asked to provide opinions on the total recreational landings across all groups lends support that these estimates are in the general range of the true tilefish harvest. In circumstances where individuals did not agree, they tended to feel that the estimates fell close to the lower end of the ranges.

Trends

Several questions during Survey 1 were designed to ascertain qualitative trends in fishing participation and landings of blueline tilefish from the previous one and five year periods. (Similar trend questions were also asked of tackle shop owners on the panel, but results are not presented due to low sample sizes that would result in a breach of confidentiality). Overall, there was no discernible trend in catches across all groups *based on this qualitative assessment*; just as many indicated no change or increased catches and those indicating no change or decreased catches (Figure 3). However, it is noticeable that one-third indicated that catches "increased a lot" over the past five years.

Figure 3. Your change in catch

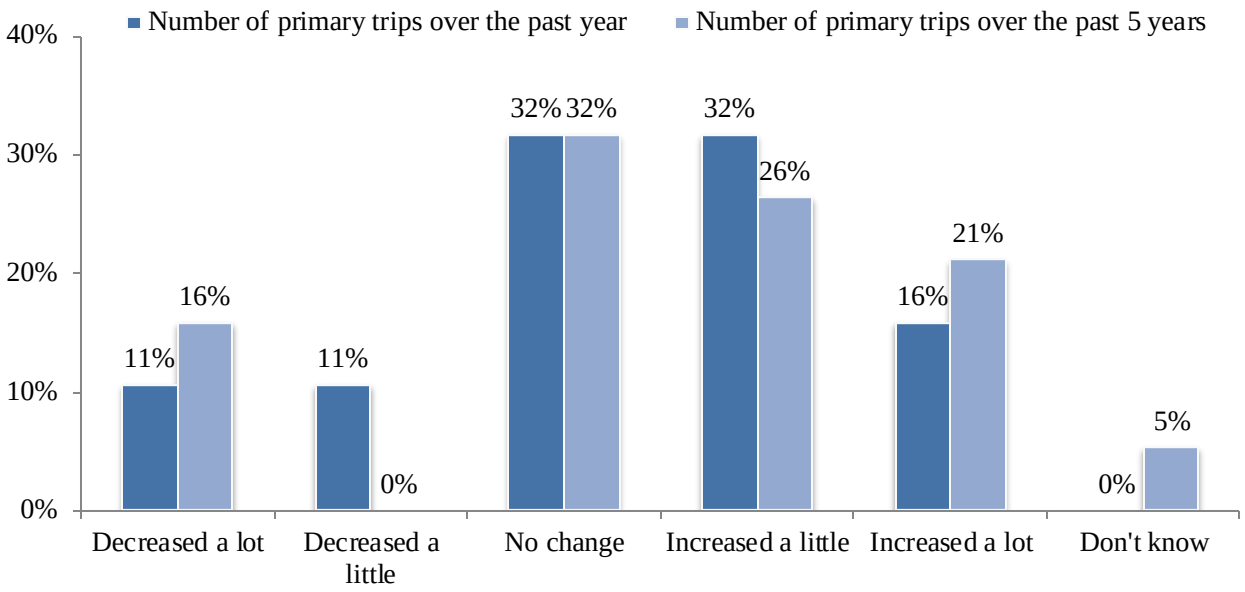


*Includes principal respondent groups

However, effort directed toward blueline tilefish did seem to present a clear increasing trend. The graphs for both the number of primary and the number of fallback trips are skewed to the higher

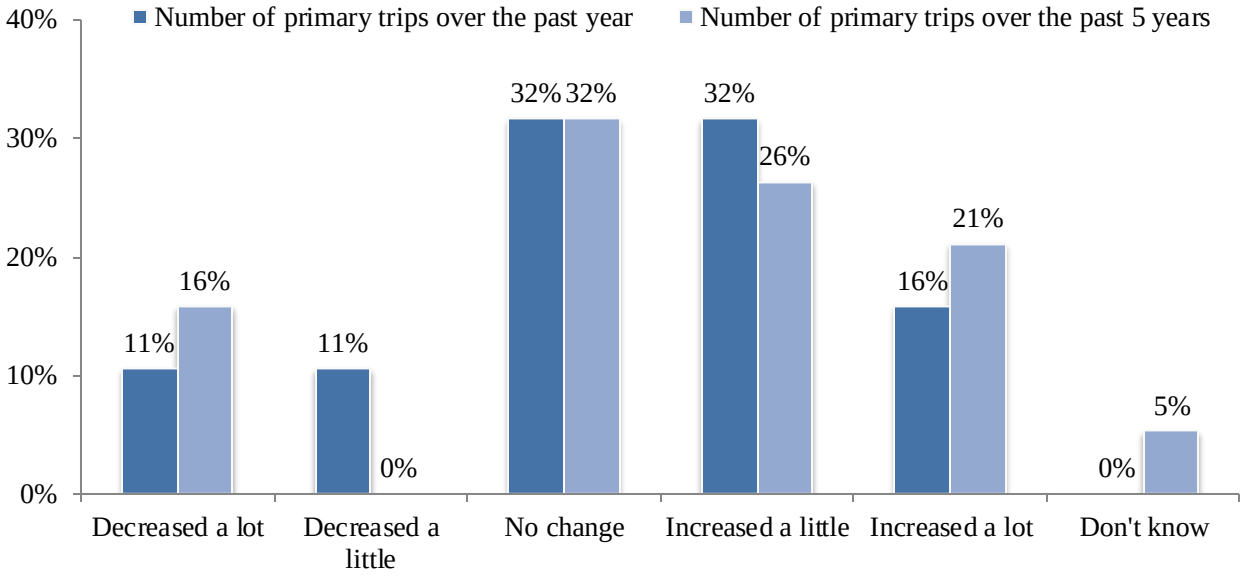
end (Figures 4 and 5). Noticeably, the number of private recreational boats seeking blueline tilefish seems to be on the increase (Figure 6).

Figure 4. Your change in trips when blueline tilefish was primary target



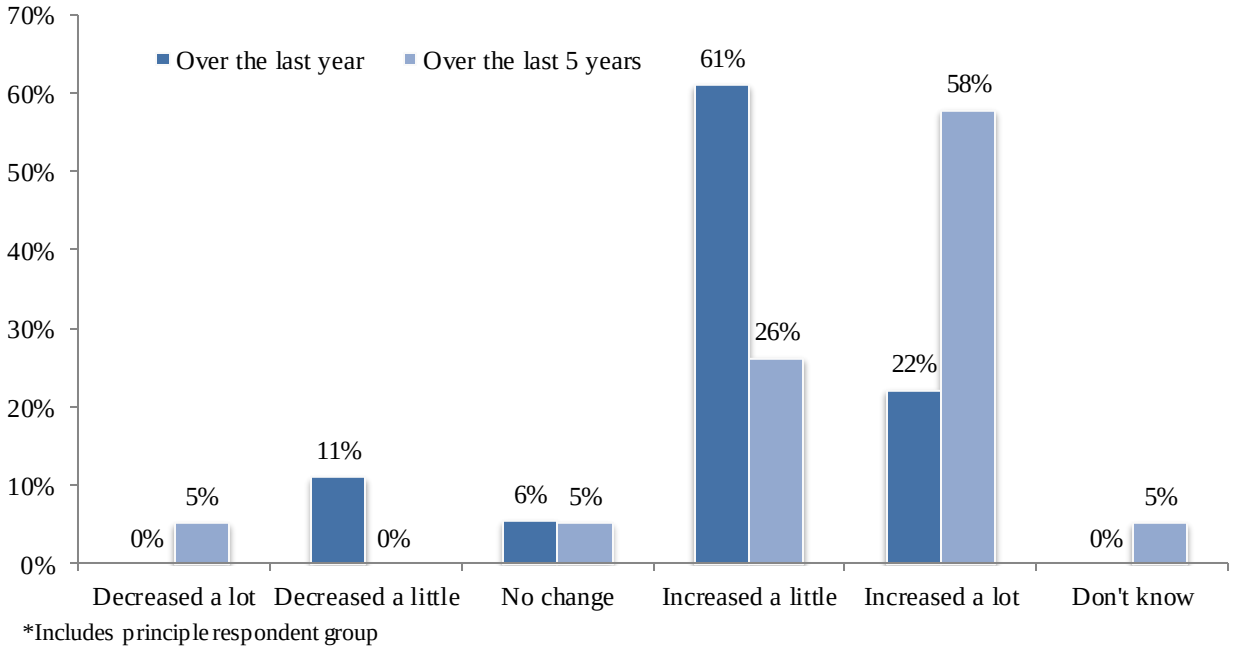
*Includes principle respondent groups

Figure 5. Your change in trips when blueline tilefish was fallback target



*Includes principle respondent groups

Figure 6. Change in the number of private boats



*Includes principle respondent group

Evaluation

Since application of the modified Delphi technique was a new approach for the Mid-Atlantic Fishery Management Council, respondents to the final survey were asked to provide their input into a) whether they would support its use in developing catch estimates in other data-poor fisheries (including an opportunity to provide free-form comments) and b) whether this type of approach would be useful in other aspects of the fishery management process. Although not unanimous, there was strong support by the respondents for applying this process to both aspects (Tables 9-12).

Table 9. Would you support using this process for other data-poor fisheries in the Mid-Atlantic region?

	Count
I would mostly support its use with little or no changes.	10
I would support its use with some changes.	1
I don't think it should be used.	2
No opinion.	0
Total	**13**

Table 10. How do you feel about the process that was used and in which you participated to estimate landings of blueline tilefish?

Open comment
• Very accurate and trustworthy estimate
• I feel this process was not only effective, but I also appreciate the way the information was gathered. I wish more fisheries management went to the fishermen like this for data and input
• I feel the estimates for charterboats participating in the fishery is too high as well as the catch estimates
• This was as an accurate first hand calculation from people who know, thanks
• It can be described as a good try guess-timate which has high probability of accuracy when looking at headboats, diminishing with charter boats and questionable at best accuracy when looking at private effort and estimated harvest.
• For lack of a better process and in such a small fishery it was a good starting point.
• The best available
• I feel confident with the numbers obtained.
• Good
• Given the almost total absence of any recreational blueline tilefish landings data, this process was the next best thing to estimate total recreational catch.
• I like the idea of communicating and using the opinions of the core fisherman in a fishery. They are the best chance for the most accurate data possible. The sit down discussion to let them collaborate and use their conclusions' is great. The "highliners" in a fishery understand and are the most knowledgeable in that fishery. I like to see more of this and groups like this one's conclusions to carry more weight in other fishery's management decisions.
• I think it was a place to start but I think going forward there needs to be an accurate method for recording recreational catches.

Table 11. What changes would you recommend to improve the process and the accuracy of the results?

Recommended changes
• I just feel that it can work with Blueline Tile because there are so few anglers. I think the data gets much more questionable as the pool of participants expands. Black Sea Bass are data poor but there are tens of thousands of participants in the fishery.
• It might be the best method for deep water species due to the difficulties involved with actual stock assessments but should not be used in data poor fisheries such as black sea bass.

Table 12. How do you feel about using this process for other aspects of fisheries management in the Mid-Atlantic region, such as management options for specific fisheries, allocations, etc?

Comments about process
• GREAT IDEA!!!!!! YES, YES, YES
• I feel this is an effective process.
• I don't think it should be used as a stand-alone process.
• Yes, it is spot on and not extrapolated from data that is only a guess based on number of permits
• From years of being around the process, this is by far the best way to get stakeholder input to lay out the groundwork on estimating effort and estimated harvest. There is no other way to do this unless gathering stakeholders together and have each bounce information and questions back and forth to get a better idea on whatever fishery is being discussed.
• I feel similarly to my above response. Possibly OK in this type of small fishery.
• At least they're talking to the right people and using our VTR
• I think it would be a good tool with some species- especially Black Sea bass.
• Good, especially for small, specialized fisheries like this one.
• Like blueline tilefish, there are a number of other unmanaged fish species in the Mid-Atlantic that are recreational targets with no management accountability. Red Hake and Cunner are 2 examples. This process is a viable way to start collecting total catch estimates that can be used to protect the species and begin the creation of a sustainable management process.
• I like then idea of communicating and using the opinions of the core fisherman in a fishery. They are the best chance for the most accurate data possible. The sit down discussion to let them collaborate and use their conclusions' is great. The "highliners" in a fishery understand and are the most knowledgeable in that fishery. I like to see more of this and groups like this one's conclusions to carry more weight in other fishery's management decisions.
• Would not favor this method...too much room for inaccurate catch data