10.0 INCIDENTAL TAKE STATEMENT (AMENDED NOVEMBER 27, 2018)

[NOTE: We have prepared this amended Incidental Take Statement (ITS) in response to the recent decision of the Federal district court in Washington, D.C., in Oceana, Inc., v. Ross, 1:08-cv-01881-PLF (D.D.C., August 17, 2018), and the particular circumstances of the Court's remand order.]

Section 9 of the ESA and Federal regulations issued pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, unless a special exemption has been granted. Take is defined as "to harass, harm, pursue, hunt, shoot, capture, or collect, or to attempt to engage in any such conduct." Incidental take is defined as take that is incidental to, and not the purpose of, the execution of an otherwise lawful activity. Under the terms of sections 7(b)(4) and 7(o)(2), the incidental taking identified here is not considered to be prohibited under the ESA provided that such taking is in compliance with the terms and conditions of this ITS.

The prohibitions against incidental take are currently in effect for all four species of sea turtles and all five DPSs of Atlantic sturgeon. Since the release of the July 12, 2012, opinion, an interim final section 4(d) rule for the threatened GOM DPS of Atlantic sturgeon was published in the *Federal Register* on November 19, 2013 (78 FR 69310). As a result, prohibitions on take of GOM DPS Atlantic sturgeon are now in effect and so are the exemptions provided by this ITS.

When a proposed NMFS action is found to be in compliance with section 7(a)(2) of the ESA, section 7(b)(4) of the ESA requires us to issue a statement specifying the impact of incidental taking, if any. It also states that we provide reasonable and prudent measures necessary or appropriate to minimize impacts of any incidental take along with implementing terms and conditions. The measures described below are non-discretionary and must therefore be undertaken in order for the exemption in section 7(o)(2) to apply. Failure to implement the terms and conditions through enforceable measures may result in a lapse of the protective coverage section of 7(o)(2).

Anticipated Amount or Extent of Incidental Take

As indicated earlier in this opinion, we anticipate incidental takes of sea turtles and Atlantic sturgeon to occur as a result of the continued operation of the scallop fishery. Based on the Murray (2011) and Warden (2011a) reports, incidental take data from observer reports for the scallop fishery and others using similar gear, serious injury/mortality rates for sea turtles and Atlantic sturgeon in both dredge and trawl gear, and the distribution and abundance of these species in the action area, we anticipate that the continued operation of the scallop fishery may result in the incidental take of ESA-listed species as follows[1]:

[1] For sea turtles other than loggerheads, the anticipated take is for both scallop dredge and trawl gear. Effort within the fishery may shift from year to year between gear types and, therefore, we believe it is most appropriate to have a single anticipated take number. For loggerheads, the incidental take statement includes separate anticipated takes for dredges and trawls. This is due to the fact that the take estimates for the gear types are calculated differently.

- for the NWA DPS of loggerhead sea turtles, we anticipate: (a) the take of no more than 322 individuals over any consecutive two-year period in dredge gear, of which up to 92 may be lethal, and (b) the take of no more than 700 individuals over any consecutive five-year period in trawl gear, of which up to 330 may be lethal[2];

- for leatherback sea turtles, we anticipate the annual lethal take of up to two individuals in dredge and trawl gear combined;

- for Kemp's ridley sea turtles, we anticipate the annual take of up to three individuals in dredge and trawl gear combined, of which up to two takes are anticipated to be lethal;

- for the North Atlantic DPS of green sea turtles[3], we anticipate the annual lethal take of up to two individuals in dredge and trawl gear combined;

- for Atlantic sturgeon, we anticipate the annual take of up to one individual from either the GOM, NYB, CB, Carolina, or SA DPS in trawl gear; once every 20 years this take is expected to result in mortality.

Anticipated Impact of Incidental Take

We have concluded that the continued operation of the scallop fishery under the Scallop FMP is likely to adversely affect, but is not likely to jeopardize, the NWA DPS of loggerhead sea turtles, leatherback sea turtles, Kemp's ridley sea turtles, the North Atlantic DPS of green sea turtles, and the five DPSs of Atlantic sturgeon (GOM, NYB, CB, Carolina, and SA). Nevertheless, NMFS must take action to minimize and monitor these takes. The following Reasonable and Prudent Measures (RPMs) have been identified as ways to minimize sea turtle and Atlantic sturgeon interactions with the scallop fishery and to monitor incidental take to provide a trigger for reinitiation and a check on analyses and assumptions in this opinion. These measures are non-discretionary and must be implemented by NMFS.

[2] The multi-year loggerhead take levels exempted in this ITS equate to annual average takes of up to 161 individuals in dredge gear, 46 of which may be lethal, and annual average takes of up to 140 individuals in trawl gear, 66 of which may be lethal. These loggerhead take levels equate to the upper ends of the 95% CIs for anticipated annual takes in the dredge and trawl fisheries as calculated by Murray (2011) and Warden (2011a) to ensure consistency across gear types and to be conservative for the species. In order to most effectively monitor impacts of the scallop fishery on loggerhead sea turtles, the takes exempted for dredge gear are over a two-year period and the takes exempted for trawl gear are over a five-year period. These take levels were quantified in the *Effects of the Action* section and then analyzed in the *Integration and Synthesis of Effects* section of the opinion in terms of the number of lethal removals from the loggerhead population each year.

[3] The previous amended ITS from May 1, 2015, treated green sea turtles as a single species. On April 6, 2016, the NMFS and U.S. FWS issued a final rule to list 11 DPSs of green sea turtles under the ESA (81 FR 20057). The final rule became effective on May 6, 2016, and supersedes the previous 1978 listing rule for green sea turtles. The North Atlantic DPS, the only DPS of green sea turtles found in the Greater Atlantic Region, was listed as threatened.

Reasonable and Prudent Measures
We have determined that the following RPMs are necessary and appropriate to minimize and monitor impacts of the incidental take of sea turtles and Atlantic sturgeon in the scallop fishery:

1. We must annually monitor and assess the distribution of fishing effort in the Mid-Atlantic scallop dredge fishery during the period of known sea turtle overlap (May through November) to ensure that there are no increases in the likelihood of interactions with sea turtles that may result from increased effort.

2. We must continue to investigate and implement, within a reasonable time frame following sound research, modifications to gears used in these fisheries to reduce incidental takes of sea turtles and Atlantic sturgeon and the severity of the interactions that occur.

3. We must continue to review available data to determine whether there are areas or conditions within the action area where sea turtle and Atlantic sturgeon interactions with fishing gear used in the scallop fishery are more likely to occur.

4. We must continue to quantify the extent to which chain mats and TDDs reduce the number of serious injuries/deaths of sea turtles that interact with scallop dredge gear.

5. We must continue to research the extent to which sea turtle interactions with scallop dredge gear occur on the bottom versus within the water column.

6. We must ensure that any sea turtles incidentally taken in scallop dredge or trawl gear and any Atlantic sturgeon incidentally taken in scallop trawl gear are handled in a way as to minimize stress to the animal and increase its survival rate.

7. We must seek to ensure that monitoring and reporting of any sea turtles and Atlantic sturgeon encountered in scallop fishing gear: (1) detects any adverse effects such as injury or mortality; (2) detects whether the anticipated level of take has occurred or been exceeded; and (3) collects data from individual encounters.

8. We must continue to engage in outreach efforts with commercial fishermen regarding the proper installation and use of chain mats on their scallop dredges.

Terms and Conditions
In order to be exempt from the prohibitions of section 9 of the ESA, and regulations issued pursuant to section 4(d), we must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. To comply with RPM #1 above, we must continue to monitor dredge hours in the Mid-Atlantic scallop dredge fishery during the months of May through November when sea turtle interactions are most likely to occur. We must collect and review effort data as stipulated under the monitoring plan below (i.e., two-year running averages) to determine

if dredge effort in the Mid-Atlantic is on the rise, and, if needed, re-evaluate the monitoring plan methodology annually in the event more refined methods become available through discussions within the agency or with the NEFMC or scallop industry. The calculation and comparison of two-year running averages should also be performed on an annual basis, with 2007-2008 serving as the baseline effort levels post-chain mats.

2. To comply with RPM #2 above, we must continue to investigate modifications to scallop dredge and trawl gear to further minimize adverse effects on sea turtles due to collisions with and/or entrainment in the gear. Through continued experimental gear trials from or by any source (e.g., through the Scallop RSA program), we and our partners must review all data collected from those trials, determine the next appropriate course of action (e.g., expanded gear testing, further gear modification, rulemaking to require the gear modification), and initiate management action based on the determination. These trials may include further refinements of and improvements to the TDD as well as continued testing and evaluation of modified trawls (e.g., trawls with TEDs, topless trawls).

3. To comply with RPM #3 above, we must continue to review all available data[4] on the incidental take of sea turtles in the scallop fishery as well as other suitable information (e.g., data on observed sea turtle interactions with other dredge and trawl fisheries, sea turtle distribution information, satellite tagging and stranding data, or fishery surveys in the area where the scallop fishery operates) to assess whether correlations with environmental conditions (e.g., depth, SST, salinity) or other drivers of incidental take (e.g., gear configuration) can be identified for some or all portions of the action area. If additional analysis is deemed appropriate, within a reasonable amount of time after completing the review, we must take action, if appropriate, to reduce sea turtle interactions and/or their impacts.

4. To comply with RPM #4 above, we must continue to use available and appropriate technologies to quantify the extent to which chain mats and TDDs reduce the number of serious injuries/deaths of sea turtles that interact with scallop dredge gear. This information is necessary to better determine the extent to which these two gear modifications reduce injuries leading to death for sea turtles and may result in further modifications of the fishery to ensure sea turtle interactions, including those causing serious injuries and mortalities are minimized.

5. To comply with RPM#5 above, we must continue to use available and appropriate technologies to better determine where (on the bottom or in the water column) and how sea turtle interactions with scallop dredge gear are occurring. Such information is necessary to assess whether further gear modifications in the scallop dredge fishery will actually provide a benefit to sea turtles by either reducing the number of interactions or the number of interactions causing serious injury and mortality.

[4] Available data includes numbers of observable takes, which can be quantified through fisheries observer data, plus estimates of unobservable, quantifiable takes, which can be quantified through fisheries observer data or experimental research. The distinctions between these two types of data are described in the conceptual frameworks and methodologies presented in Murray (2011), Warden (2011a, 2011b), and Warden and Murray (2011).

6. To comply with RPM #6 above, we must ensure that all Federal permit holders in the scallop fishery possess handling and resuscitation guidelines for sea turtles and Atlantic sturgeon. For sea turtles, all Federally-permitted fishing vessels should have the handling and resuscitation requirements listed in 50 CFR 223.206(d)(1) and as reproduced in Appendix C. For Atlantic sturgeon, we must instruct fishermen and observers to resuscitate any individuals that may appear to be dead by providing a running source of water over the gills.

7. To also comply with RPM #6 above, we must continue to develop and distribute training materials for commercial fishermen regarding the use of recommended sea turtle and Atlantic sturgeon release equipment and protocols. Such training materials would be able to be brought onboard fishing vessels and accessed upon incidental capture (e.g., CD that could be used in on-board computer, placard, etc.).

8. To comply with RPM #7 above, we must continue to place observers onboard scallop dredge and trawl vessels to document incidental bycatch of sea turtles and Atlantic sturgeon. Monthly summaries and an annual report of observed sea turtle takes in gears primarily landing scallops must be provided to the Greater Atlantic Regional Fisheries Office Protected Resources Division. A similar data reporting plan must be developed for Atlantic sturgeon.

9. To also comply with RPM #7 above, we must continue to instruct observers to tag and take tissue samples from incidentally captured sea turtles as stipulated under their ESA section 10 permit. The current NEFOP protocols are to tag any sea turtles caught that are larger than 26 centimeters in notch-to-tip carapace length and to collect tissue samples for genetic analysis from any sea turtles caught that are larger than 25 centimeters in notch-to-tip carapace length. We must continue to instruct observers to send any genetic samples of sea turtles taken to the NEFSC. We must further instruct observers to take fin clips from all incidentally captured Atlantic sturgeon and send them to us for genetic analysis. Fin clips must be taken according to the procedures outlined in Appendix D and prior to preservation of other fish parts or whole bodies.

10. To also comply with RPM #7 above, we must continue to reconvene the Sea Turtle Injury Working Group in order to better assess and evaluate injuries sustained by sea turtles in scallop dredge and trawl gear, and their potential impact on sea turtle populations. New data should be reviewed on an annual basis.

11. To comply with RPM #8 above, we must distribute information to scallop permit holders specifying the chain mat and TDD regulations and be prepared to provide them assistance to resolve issues that may cause chain mats or any components of the TDD to be rigged improperly or malfunction.

Justification for Proposed Reasonable and Prudent Measures and Terms and Conditions
The RPMs, with their implementing terms and conditions, are designed to minimize and monitor the impact of incidental take that might otherwise result from the proposed action. Specifically, these RPMs and Terms and Conditions will ensure that we monitor the impacts of the proposed action in both short- and long-term time frames that allow for the detection, identification, and reporting of interactions with ESA-listed species. The discussion below explains why each of these RPMs and Terms and Conditions is necessary or appropriate to minimize or monitor the level of incidental take associated with the proposed action. The RPMs and Terms and Conditions involve only a minor change to the proposed action.

RPM #1 and Term and Condition #1 are necessary and appropriate because they allow us to continually track changes in scallop fishing effort from year to year during the turtle season in the Mid-Atlantic so that the agency can adapt its management approach in order to minimize both the quantity and severity of sea turtle interactions with the scallop fishery. In the absence of an effort monitoring program, increases in the susceptibility of sea turtles to takes in the scallop fishery due to increased effort in areas where sea turtles are most abundant could largely go unnoticed because chain mats and TDDs are intended to exclude sea turtles from being captured; therefore, any interactions or takes at depth likely will not be observed at the surface. The effort monitoring allows us to assess anticipated takes on an ongoing basis, and on a shorter, more routine time frame than the five-year cycle for sea turtle bycatch estimates.

RPM #2 and Term and Condition #2 are necessary and appropriate because they allow us to design, research, and implement the most advanced gear modifications believed to have the lowest potential of interactions with sea turtles. If gear modifications are implemented, rulemaking will be completed in a timely manner to minimize any increase in costs or any decrease in efficiency of the fisheries, representing only a minor change to the actions.

RPM #3 and Term and Condition #3 are necessary and appropriate because they allow us to identify environmental conditions or other parameters present in the action area that may lead to elevated takes, therefore allowing more targeted mitigation efforts that can be more effective and minimize costs associated with those efforts. If regulations are implemented, rulemaking will be done in a manner that minimizes any increase in costs or any decrease in efficiency of the fisheries, representing only a minor change to the actions.

RPM #4 and Term and Condition #4 are necessary and appropriate because they allow us to evaluate the success of and troubleshoot recently implemented gear modifications designed to reduce the severity of interactions between sea turtles and scallop dredge gear. Follow-up studies to Milliken et al. (2007) and Smolowitz et al. (2010) utilizing similar gear configurations and methods could provide more robust estimates of the conservation benefits of chain mats and TEDs when used both together and separately. Repeated field testing of scallop dredges using photographic and video-based analysis has led to the currently required designs and constructs of both gear modifications, which were adapted over time to successfully exclude sea turtles while also retaining sizeable catches of scallops and minimizing bycatch of non-target fish species. If additional regulations are implemented to further modify the chain mat and TDD designs, rulemaking will be done in a manner that minimizes any increase in costs or any decrease in efficiency of the fisheries, representing only a minor change to the actions.

RPM #5 and Term and Condition #5 are necessary and appropriate to determine the location in the water column where most sea turtle interactions with scallop dredge gear are occurring. Due to their life histories and foraging behaviors, certain sea turtle species (e.g., hard shelled sea turtles) are likely more prone to interactions on the bottom, while others (e.g., leatherbacks) are likely more prone to interactions in the water column. Such information is necessary to assess whether further gear modifications in the scallop dredge fishery will actually provide a benefit to sea turtles by reducing either the overall number of interactions or the number of interactions causing serious injury and mortality. ROV work conducted in 2009, 2010, and 2011 has already provided information on behavior of sea turtles in waters where the scallop fleet operates. Also, from 2009-2014, over 100 satellite tags were placed on sea turtles which provided data regarding vertical distribution. Continuing this research can provide an even larger, more robust data set on sea turtle depth preferences throughout the action area.

RPM #6 and Terms and Conditions #6 and #7 are necessary and appropriate to ensure that any sea turtles or Atlantic sturgeon that survive capture or entanglement in gear have the maximum probability of remaining alive and not suffering additional injury or subsequent mortality through inappropriate handling. This is only a minor change as following these procedures is not expected to result in an increase in cost or a decrease in the efficiency of the operation of these fisheries.

RPM #7 and Terms and Conditions #8, #9, and #10 are necessary and appropriate to ensure the proper documentation of any interactions with sea turtles and Atlantic sturgeon as well as requiring that these interactions are reported to us in a detailed and timely manner. The data and information collected can be used to monitor anticipated take levels in the scallop trawl fishery, evaluate the effectiveness of chain mats and TDDs in eliminating captures of sea turtles in the dredge fishery, and potentially provide helpful information about sea turtle interactions with both gear types. This RPM and its Terms and Conditions represent only a minor change as compliance is not expected to result in an increase in cost or a decrease in the efficiency of scallop fishery operations.

The collection of genetic samples (e.g., biopsies, fin clips) allows us to conduct genetic analysis to determine the DPS of origin or nesting/spawning stock for sea turtles and Atlantic sturgeon. These procedures are common practices in fisheries science and do not appear to impair an individual's ability to swim or cause any long-term adverse impact. This represents only a minor change as following these procedures will have an insignificant impact on the proposed actions.

RPM #8 and Term and Condition #11 are necessary and appropriate because they allow us to ensure that modified gear requirements are followed by the fishing industry so that sea turtle takes can be minimized to the extent possible. Any outreach activities will be done in a manner that minimizes any increase in costs or any decrease in efficiency of the scallop fishery, representing only a minor change to the action.

Sea Turtle Monitoring

We must continue to monitor levels of sea turtle bycatch in the scallop fishery. Fisheries observer data, and their incorporation into statistical models (specifically, generalized additive models as described in Murray [2011] and Warden [2011a, 2011b]), have been used as the principal means to estimate sea turtle bycatch rates in the scallop fishery and to monitor incidental take levels since the 1990s. At present, and due to reasons explained below, the NEFSC produces statistically robust sea turtle bycatch estimates for scallop dredge, bottom trawl, and gillnet gear on five-year rotational cycles. During those individual cycles, observer data by gear type is analyzed over 1-2 years and monitored over the following 3-4 years. We must continue to use fisheries observer data and the NEFSC-produced bycatch estimates to monitor sea turtle bycatch in dredge and trawl gear that is authorized by the Scallop FMP, though the role and utility of observers and use of fishery dependent data will differ for each gear type. Furthermore, due to required gear modifications in certain times and areas to prevent sea turtles from being captured in the dredge and ultimately observed on deck, additional monitoring tools beyond observers are necessary for the dredge portion of the fishery as described below.

Dredge gear

The use of chain mats and TDDs has greatly reduced the likelihood that sea turtles struck by or incidentally swimming into scallop dredge gear would go under the dredge frame and enter the dredge bag, thereby significantly reducing serious injury and mortality (71 FR 50361, August 25, 2006; NEFMC 2011b). Scallop dredge vessels are required to use these gear modifications throughout the Mid-Atlantic during times when sea turtles are most abundant in the action area (i.e., west of 71° W longitude from May through November). Interactions with, and potential injuries/mortalities to, sea turtles that may occur as a result of the sea turtle being struck by the dredge gear underwater may occur, but will not be observed unless the sea turtle is small enough to pass underneath the low-profile dredge frame and between the chains, where it can enter the dredge bag, or is otherwise caught on the dredge frame and carried to the surface. This also means that observer coverage of scallop dredge vessels will be less effective in monitoring incidental takes of sea turtles in the dredge component of the scallop fishery.

During the development of the 2008 and 2012 opinions on the scallop fishery, we considered the use of underwater video on scallop dredge vessels to monitor sea turtle interactions with the gear. Based on the information available as well as the hardships experienced during previous use of this technology in studies of sea turtle interactions with scallop dredge gear, we determined that the use of underwater video monitoring for monitoring the take of sea turtles in scallop dredge gear is not feasible (see, e.g., memo from N. Thompson, NEFSC to P. Kurkul, NERO, October 16, 2007). We also considered whether chains mats should be removed from scallop dredge gear during some observed trips to allow observers to document any sea turtle interactions that would go undetected if chain mats were on the gear. However, we determined that this is not a reasonable method for monitoring sea turtle interactions with the dredge component of the scallop fishery, nor is it beneficial for those species, given that the removal of the chains will likely increase the number of serious injuries and mortalities of sea turtles in comparison to the numbers that would have occurred if chains were present.

As described in the 2008 and 2012 opinions on the Scallop FMP, we have routinely requested guidance from the NEFSC on methods to monitor sea turtle takes (e.g., captures, collisions) in

the dredge component of the scallop fishery once the chain mat and TDD rules were approved and implemented. The NEFSC provided information on fishery dependent and fishery independent approaches they considered for monitoring interactions between sea turtles and scallop dredge gear and the reasonableness of each approach. The methods and analyses in Murray (2011) and Warden and Murray (2011) are the results of this initiative.

In our view, these two reports are the best available science for determining sea turtle bycatch rates. Thus, we will continue to utilize the models developed in Murray (2011) and Warden and Murray (2011) to quantify and monitor sea turtle interactions with dredge gear over a multi-year time scale. The NEFSC undertook these analyses in an attempt to develop a sea turtle bycatch estimate for the scallop dredge fishery that incorporated both observable and unobservable, quantifiable interactions. There are a number of caveats associated with these analyses, especially because chain mats and TDDs are required in the fishery in areas and at times of the year when the majority of sea turtle interactions are known to occur. The use of TDDs and chain mats in combination is expected to decrease the severity of takes, but will also decrease the number of takes observed in the dredge fishery. With each new year of data, hauls without chain mats will only be from the winter months (December through April), and thus will not represent a random sample as over the whole time series. Hauls without chain mats will be represented in the early years, and will also become disproportionally smaller in the dataset (Murray 2011). Nonetheless, we have determined that these methods are scientifically valid and should allow us to produce a new bycatch estimate for sea turtles in the dredge fishery every five years. If the next dredge bycatch estimate produced for loggerhead sea turtles indicates that average annual takes are greater than 322 over a two-year period (an average of 161 per year quantified through the Murray (2011) and Warden and Murray (2011) models), then consultation would be reinitiated. Similarly, reinitiation of consultation will also be required upon exceedance of the smaller numbers of takes exempted for the other three species: leatherbacks, Kemp's ridleys, and greens.

In the short term, and also due to the likelihood that most dredge-based takes of sea turtles in the future may be unobservable because of the use of TDDs and chain mats, we will use fishing effort (specifically, dredge hours) as a surrogate measure for monitoring actual takes of loggerheads and the other three species of sea turtles. We will assume that the incidental take level for loggerheads exempted by this opinion (322 individuals over any two-year period in dredge gear) has been exceeded if, over any future two-year period, the fishery exceeds the average number of estimated dredge hours from 2007-2008. We chose that time period because it is the first two full years after chain mats were required and the last two years included in the Murray (2011) analysis upon which the loggerhead sea turtle dredge take estimates in this ITS are based. For loggerheads, the average annual take estimate of 161 individuals in scallop dredge gear considered in this opinion was derived from the 2001-2008 time series of fishery observer data and was specific to the post-chain mat time frame from September 26, 2006, to December 31, 2008 (Murray 2011).

The likelihood of sea turtle interactions with scallop dredge gear is higher in Mid-Atlantic waters as compared to waters further north (e.g., Georges Bank and the Gulf of Maine), and sea turtle interactions with scallop dredge gear almost always occur from May through November each year. In order to address these factors, and the concern that monitoring the numeric incidental

take level by using just a five-year bycatch estimate may not be sufficient to detect whether the incidental take level is exceeded, we will monitor sea turtle interactions with scallop dredge gear on a shorter term, biennial basis by:

- using "dredge hour" as the measure of scallop fishing effort for the purpose of monitoring sea turtle interactions with scallop dredge gear;
- using the average of the total number of dredge hours for Mid-Atlantic waters during the period of May through November 2007 and May through November 2008 as the benchmark against which the two-year running average of dredge hours for each subsequent May through November period of each scallop fishing year will be compared; and,
- consider that the incidental take level provided with this opinion has been exceeded if the two-year running average of dredge hours in Mid-Atlantic waters (inclusive of NMFS statistical areas between 525 and 700, excluding areas 538, 539, 551, 561, and 562) during the period of May through November of any scallop fishing year is greater than the average of the total number of dredge hours for Mid-Atlantic waters (as far south as Cape Hatteras) during the same period of 2007 and 2008.

The Mid-Atlantic dredge hour monitoring surrogate is set as a two-year running average and is not an average for static two-year periods. In other words, each year we will be monitoring the dredge hour average, for example, from 2011-2012, 2012-2013, 2013-2014, and so on, as opposed to the dredge hour average from 2011-2012, 2013-2014, 2015-2016, etc. This monitoring approach allows for a reliable, short-term assessment of how the scallop fishery is performing as compared to our expectations. Dredge hours are a reliable surrogate because effort data are well-documented and available by location and season. Dredge hours are calculated from the moment the dredge enters the water to the moment it is hauled back on deck, thus, the dredge hour calculations account for both mid-water and bottom interactions of sea turtles with dredge gear. Since the dredge hour calculation excludes time during which the vessel is not actively fishing, it does not encompass the time during which the gear is out of the water. As a result, the dredge hour surrogate is an effective and appropriate monitoring tool which avoids errors or inaccuracies that would be introduced by including time in which turtle-gear interactions cannot occur. Because dredge hour data are available on an ongoing basis, they can be reviewed at shorter, more routine intervals than the five-year time frame of the Murray (2011) and Murray and Warden (2011) models. The dredge hour data for the Mid-Atlantic from May through November of each year will be quality checked, verified for monitoring purposes, and reviewed the following March to identify any exceedance of the incidental take level for a given two-year period before May 1, when the next year's sea turtle season begins.

To clarify the link between the number of sea turtles taken and the dredge hour surrogate, we have illustrated below the positive relationship that exists between estimated sea turtle takes and biennial dredge hours between the months of May and November from 2001-2008 (Figure 5). [5]

[5] The figure above is listed as Figure 5 as there were four previous figures in the 2012 opinion prior to the ITS section.

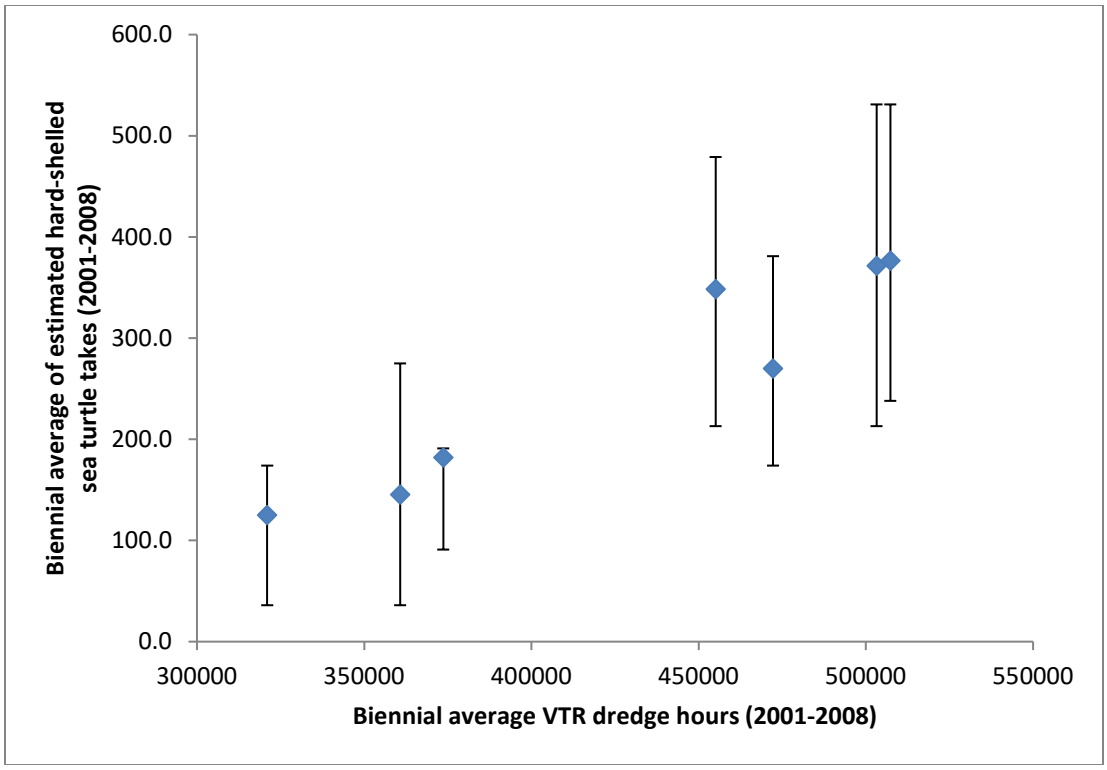

Figure 5. Scatter plot comparing biennial averages (including 95% CIs) of estimated takes of hard-shelled sea turtles with biennial averages of VTR dredge hours in the Mid-Atlantic scallop fishery from May through November 2001-2008.

This graph plots commercial scallop dredge effort against the total number of hard-shelled sea turtle interactions as estimated by a non-linear model in Murray (2011). It demonstrates a positive relationship between the average number of dredge hours in the Mid-Atlantic from May through November and estimated takes of hard-shelled sea turtles.

Figure 5 is not intended to be a predictive model whereby sea turtle takes can be predicted based on a certain level of dredge effort. The purpose of the graph in Figure 5 is to show that there is a positive relationship between two variables, commercial dredge hours (plotted on the "x" axis) and estimated sea turtle takes (plotted on the "y" axis), from May to November in the Mid-Atlantic. It is not our intent to utilize this relationship to predict "y" given a specific value for "x." We have displayed this plot to demonstrate that a positive relationship exists between the two variables, in a way that can be easily visualized. Logically, the more time that scallop dredge gear is in the water during the Mid-Atlantic sea turtle season, the greater the number of sea turtle takes that will occur in that time and area.

While Figure 5 is not itself a predictive model, the take estimates used in Figure 5 came from a predictive model developed in Murray (2011). In the Murray (2011) analysis, a non-linear generalized additive model was used to predict the estimated number of sea turtles taken per dredge hour fished in the scallop fishery, based on a particular sea surface temperature, depth, and dredge type used on a commercial trip. These factors (temperature, depth, and use of a chain mat) were shown to be correlated with the sea turtle take rate. The sum of the predictions over

all trips in the fishery was the total estimate for that year (which provided the estimated take values for Figure 5). This non-linear approach is typically undertaken to estimate annual takes in a fishery.

The basis for the Murray (2011) bycatch analysis, which informed the ITS and monitoring scheme in the 2012 opinion, was fisheries observer data. The implementation of chain mats on dredges since September 2006, and the implementation of TDDs in May 2013, has made it difficult for observers to document sea turtle interactions because chain mats and TDDs prevent sea turtles from being captured in the dredge bag or cutting bar. Without those gear modifications, turtles were observed after the gear was hauled back to the water surface or on deck. With so few observable takes in the fishery, it is very difficult analytically to estimate total takes in the fishery and fitting models to these data results in a high degree of uncertainty. Therefore, we must rely on additional tools besides fisheries observers to monitor the ITS in the fishery. However, we still use observers to monitor the fishery for sea turtle takes in times and areas where chain mats and TDDs are not required, and to ensure that chain mats and TDDs are working properly.

Given the positive relationship between fishing effort and estimated sea turtle interactions, we are relying on dredge hours as a means to monitor and evaluate the risk to sea turtles and to augment our direct monitoring approach using observers. We set the two-year average of 359,757 dredge hours as the benchmark because that was the level of effort in the fishery at the time of the final two years assessed in the Murray (2011) analysis. That level of effort corresponded to an estimated take level that we determined would not jeopardize the continued existence of any sea turtle species. If the two-year benchmark average of 359,797 dredge hours is exceeded in the future, then we will reinitiate consultation because we assume the higher level of effort will result in a level of sea turtle take in excess of the levels exempted by the ITS.

As explained above, the effectiveness of our direct take monitoring scheme using observers is likely to decrease going forward. Thus, we have elected to monitor effort as a means to evaluate the potential for increased takes in the fishery. Because our analysis of effects in this opinion is based on the post-chain mat period from September 26, 2006, through the end of 2008, which represents the best available information, we will use the two-year average number of dredge hours in the Mid-Atlantic from May through November of 2007 and 2008 (calculated to be 359,757 hours[6]) as the benchmark. Thus, we will determine whether the incidental take level for sea turtles in the dredge component of the fishery has been exceeded by comparing the average number of dredge hours for future two-year periods to the benchmark of 359,757 hours.

For loggerhead sea turtles, the level of incidental takes occurring annually is highly variable and influenced by factors such as the distribution and level of fishing effort, turtle abundances, prey availability, water temperatures, and other oceanographic factors that often cannot be predicted.

[6] The dredge hour benchmark of 359,757 hours for 2007-2008 differs from what was reported in a previous memo to the record on April 1, 2011 (included in the Supplemental Administrative Record for the 2012 opinion). In that memo the 2007-2008 running average was listed as 252,323 hours. The reason for this discrepancy is that the original calculation of dredge hour data for 2007 was completed in the middle of the May through November period, not at the end; hence the much lower number. We performed additional quality control checks on the dredge hour data, resulting in the following dredge hour counts: 355,321 hours for 2007 and 364,272 hours for 2008.

Because of this variability, it is unlikely that loggerheads will be consistently impacted by the scallop fishery at the same magnitude from year to year. For example, there may be some years where there are no observed interactions in the scallop dredge and trawl fisheries and thus no estimated captures (see Murray [2007], where the estimated bycatch of loggerheads in scallop dredge gear for 2005 was 0). Likewise, there may be some years when incidental take is higher than average.

As a result, exempting and monitoring loggerhead takes in the scallop fishery on a one-year basis would produce potentially unreasonable results depending on which year's incidental take level we chose to serve as the incidental take limit. For example, adopting an incidental take limit of zero for each year the fishery operates, based on the 2005 bycatch level, would be favorable for loggerhead conservation. However, the fishery would not have any take coverage, which is inconsistent with our conclusion that the fishery is likely to adversely affect, yet not jeopardize the continued existence of loggerhead sea turtles, given the 2005 bycatch level of zero is not representative of other years. If we were to choose the year with the highest level of incidental take and assume that level occurred year after year, that assumption would not align with the observed data from this fishery and more incidental take would be exempted than is likely to occur. In order to account for the variability of incidental take, to avoid the extreme results identified above, and to exempt a non-jeopardizing level of incidental take that would allow the action to proceed lawfully, we have chosen to base our incidental take limit on an average that takes into account this annual variability.

The average is generated by modelling that used multiple years' worth of incidental take data to account for the variability, but applied it to a two-year rolling time period rather than a longer period (e.g., over a three-, four-, or five-year rolling average). By using the shortest period of time for the incidental take rolling average, we are taking a conservative approach to setting the loggerhead incidental take limit. Using a three-, four-, or five-year rolling average could allow more variability in incidental take to occur from year to year before we could evaluate whether the limit had been exceeded. Furthermore, using a rolling average (a new average is produced every year) is a more conservation-oriented approach than using a static two-year average (an average would be produced every two years). With a rolling average, we can better evaluate whether an exceptionally high level of incidental take occurred in a single year than if we were to use a static two-year average. In sum, our choice of the two-year average, calculated on a rolling basis, is a more conservation-oriented alternative to the two extreme methods of setting an annual take limit identified above. It will enable us to reinitiate consultation immediately if the take level in one year causes the two-year average to be exceeded, while also accounting for the variability in incidental takes in the fishery.

Trawl gear

For the purposes of monitoring this ITS for the trawl component of the fishery, we will continue to use records from the fisheries observer program as the primary means of collecting incidental take information. For loggerhead sea turtles, the take estimate described in this opinion was generated using a statistical model that is not feasible to conduct on an annual basis due to the data needs; length of time to develop, review, and finalize the estimates; and methodology, as explained below.

Murray (2009a), summarizes the use of the same statistical methods for loggerhead bycatch estimation that are used in Warden (2011a), explaining that "to directly compare future levels of loggerhead bycatch to the average annual estimates and [95%] confidence intervals reported in this paper, these future estimates would also need to be 5-year averages" This necessity is reiterated in the Warden (2011a) trawl bycatch analysis, which states that "if these interaction estimates are updated approximately every five years, then future levels of loggerhead interactions can be evaluated by comparing the average annual estimates and CIs reported in this paper to the future average annual estimates and CIs." Therefore, for the following reasons, we will continue to implement a five-year monitoring framework rather than an annual one:

1. As we mentioned throughout the opinion, observed loggerhead interactions are rare, and we often need to pool data across years to have enough data to produce a robust, model-based estimate of total interactions. We need at least ten observations per parameter in the model. Thus, even with a very simple model, we usually require 20-30 observed bycatch events. It is uncommon to have this many observed loggerhead interactions in a single year, as documented in publications including Murray (2008, 2009) and Warden (2011a). Subsequently, when we pool data over five years to report an annual average, we need another five years to compare averages, as explained above.

2. It normally takes a year to process, clean, and analyze data for a valid bycatch estimate, for one gear type. With current resources, it is neither reasonable nor possible to estimate bycatch annually across multiple gear types.

3. Annual estimates are unlikely to change considerably such that they affect the population assessments. On page 35 of Warden et al. (2015), the authors indicate that "when the population is large compared to the incidental mortality, frequent (e.g., annual) monitoring is not likely to produce results that are substantially different from the previous assessment. Less frequent but more comprehensive assessments, which explicitly address uncertainty, may provide more reliable information."

Although we collect raw data on the number of observed loggerhead takes in the scallop trawl fishery as they are documented and verified (usually on a time lag of three months per the Northeast Fisheries Observer Program's data quality control and assurance procedures), we cannot produce a reliable short-term take estimate using them, because observed turtle take is a rare event dependent on a wide range of both human and natural factors that vary greatly over short time periods (i.e., less than a year). Examples of human factors include variation in the number of vessels fishing, time spent fishing, percent observer coverage, regulatory regimes, market forces, etc. Natural factors include changes in oceanographic conditions such as water temperature, distribution of prey, weather conditions, shifting distributions and abundance of loggerheads, etc. Typically the number of takes, observed in a short time period (i.e., one year), when considered with the factors identified above means that the observed takes cannot be extrapolated or used to estimate the actual number of takes in that short time period. Nor do the raw data provide a large enough sample size to identify any exceedances of the incidental take level. For all of the foregoing reasons, we will rely on the statistical methods used in Warden (2011a), which we have determined is the best available scientific information for loggerhead

bycatch estimation, to re-estimate loggerhead takes in the scallop trawl fishery approximately every five years.

However, with respect to leatherback, Kemp's ridley, and green sea turtles, we do not have five-year bycatch estimates. Thus, the raw annual numbers of observed takes are the best available scientific information, and reviewing the raw annual numbers of observed takes is the only available method for monitoring the incidental take level in trawl gear; thus, we will continue to rely on such data for monitoring takes of these three species.

This two-pronged methodology for monitoring sea turtle takes in scallop trawl gear is consistent with the conceptual framework described in Figure 2 of Haas (2010), in which a low level metric such as raw counts (simple to estimate, but less informative) could be used for monitoring the incidental take level for certain species (e.g., leatherbacks, Kemp's ridleys, and greens) on the short term (i.e., annually) and a higher level metric such as a bycatch estimate (difficult to estimate, more informative) could be used for monitoring the incidental take level for others (e.g., loggerheads) over a longer (i.e., five year) time frame. For loggerheads, no other monitoring alternatives exist for the trawl fishery that are feasible on a shorter term than the five-year period required to produce an updated bycatch estimate.

Atlantic Sturgeon Monitoring

NMFS must continue to monitor levels of Atlantic sturgeon bycatch in the scallop fishery. For the five Atlantic sturgeon DPSs, we will use all available information, which includes observed takes documented via the fisheries observer program, to determine if the incidental take level anticipated and exempted in this opinion has been exceeded.