1 September 2015

Ms. Jolie Harrison, Chief
Permits and Conservation Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, Maryland 20910-3226

Dear Ms. Harrison:

The Marine Mammal Commission (the Commission), in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the applications submitted by Spectrum Geo Inc. (Spectrum), TGS-NOPEC Geophysical Company (TGS), ION GeoVentures (ION), and TDI-Brooks International Inc. (TDI-Brooks) seeking incidental harassment authorizations under section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA) to take small numbers of marine mammals by harassment incidental to geophysical surveys conducted for the oil and gas industry in the Atlantic Ocean. The Commission also has reviewed the National Marine Fisheries Service's (NMFS) 29 July 2015 notice (80 Fed. Reg. 45195) announcing receipt of the applications and requesting comments and information.

Background

The applicants are proposing to conduct geophysical surveys beginning in 2016 in the Mid- and South-Atlantic planning areas[1] of the Atlantic Ocean. Three of the applicants are proposing to conduct seismic surveys, and the fourth, TDI-Brooks, is proposing to conduct a high-resolution geophysical survey that would use only a multibeam echosounder and sub-bottom profilers. The three seismic surveys would be conducted in an area extending from Delaware to Florida; the high-resolution geophysical survey would be conducted in a smaller area extending from North Carolina to Florida. The outer boundaries of each of these surveys are illustrated in Figure 1[2] (see enclosure). The proposed survey duration, total trackline distance, spacing of the survey tracklines, and survey equipment for the applicants are as follows—

- Spectrum is proposing to conduct a year-long two-dimensional (2D) seismic survey beginning in February 2016. The survey would consist of approximately 67,591 km of tracklines, including turns at the end of each line. Spectrum has proposed to survey two different grid configurations. Its "regional" survey would extend beyond the continental shelf in the South- and Mid-Atlantic planning areas and include 21,534 km of tracklines to survey 25 x 32-km grids, whereas, its "detailed" survey would begin at the 30-m isobath and

[1] Planning areas as defined by the Bureau of Ocean Energy Management (BOEM; http://www.boem.gov/Atlantic-Oil-and-Gas-Information/).
[2] Figure 1 was generated using a map of all geological and geophysical (G&G) applications received by BOEM for the Atlantic Outer Continental Shelf (OCS) region and displays only the boundaries for the four applications reviewed herein. GXTechnology is a division of ION.

extend offshore within the Mid-Atlantic planning area and include 46,047 km of tracklines to survey either 4 x 4-km or 8 x 8-km grids. Spectrum would tow a 32-airgun array with a total volume of 4,920 in^3 behind each of two source vessels.

- TGS also is proposing to conduct a year-long 2D seismic survey beginning in February 2016. The survey would extend beyond the continental shelf in the South- and Mid-Atlantic planning areas and consist of approximately 62,845 km of tracklines, including turns, transits between lines, and operations at the start (run in/ramp up) and end (run out) of lines. The survey grid would consist of tracklines spaced 6–100 km apart. TGS would tow a 48-airgun array with a total volume of 4,808 in^3 behind each of two source vessels.
- ION is proposing to conduct a 100-day 2D seismic survey in the summer and fall of 2016. The survey would extend beyond the continental shelf in the South- and Mid-Atlantic planning areas and consists of approximately 13,062 km of tracklines to survey gridlines that vary in spacing (20–190 km x 30–220 km apart). ION would tow a 36-airgun array with a total volume of 6,420 in^3 behind a single source vessel.
- TDI-Brooks is proposing to conduct a high-resolution geophysical survey—the proposed start date and survey duration were not specified in the application. The survey would occur only in the South-Atlantic planning area in an approximate 234,223-km^2 area, with 2.25-km spacing between lines in shallow water and 4.5-km in deeper water. TDI-Brooks would use a multibeam echosounder and sub-bottom profilers on a single source vessel.

Consistent with BOEM's 2014 Record of Decision (ROD) on Atlantic proposed geological and geophysical (G&G) activities, the three applicants conducting seismic surveys indicated they would comply with the following mitigation measures—

(1) using vessel strike avoidance measures while in transit and speed restrictions in designated time-area restriction areas[3] for North Atlantic right whales or when female-calf pairs, pods, or large groups of cetaceans are observed nearby;
(2) maintaining a minimum distance of 500 m from any North Atlantic right whale, 100 m from other whale species listed under the Endangered Species Act (ESA), and 50 m from all other marine mammals;
(3) refraining from conducting seismic surveys in designated time-area restriction areas for North Atlantic right whales;
(4) using trained protected species observers on survey vessels to monitor an exclusion zone[4] around each vessel;
(5) using ramp-up, delay, power-down, and shut-down procedures;
(6) imposing sound limits to ensure that sound levels outside of the designated time-area restriction areas do not exceed 160 dB re 1 μPa at the boundaries of those areas;
(7) using passive acoustic monitoring to supplement visual monitoring; and
(8) maintaining a minimum 40-km separation distance between vessels conducting simultaneous seismic surveys.

[3] Time-area restriction areas identified in the ROD for North Atlantic right whales include NMFS-designated critical habitat areas off Florida and Georgia, all-coast seasonal management areas in the Mid-Atlantic from the Delaware Bay to Cape Canaveral, and active dynamic management areas (http://www.boem.gov/Record-of-Decision/).
[4] The proposed size of each applicant's exclusion and disturbance zones (based on Level A and B harassment, respectively) varies and in at least one case does not comply with the ROD protocol; see text for further discussion.

The fourth applicant (TDI-Brooks) stated that it would comply with the following mitigation measures—

(1) using vessel strike avoidance measures and speed restrictions in areas where North Atlantic right whales or female-calf pairs are observed nearby;
(2) refraining from conducting high-resolution geophysical surveys in North Atlantic right whale critical habitat;
(3) using trained protected species observers on survey vessels to monitor an exclusion zone around each vessel (the size of the exclusion zone to be monitored was not specified);
(4) using ramp-up, delay, and shut-down procedures; and
(5) using passive acoustic monitoring to supplement visual monitoring.

Reducing the potential for duplicative or overlapping seismic surveys

Seismic airguns emit high energy, low-frequency impulsive sound that travels long distances. Marine mammal response to seismic surveys can cause disruption of important marine mammal behaviors. Sound from airguns also can mask biologically important sounds, including communication calls between individuals of the same species. It is not clear how sound from seismic surveys conducted in the U.S. Atlantic or elsewhere will impact marine mammals. Airgun sounds produced in coastal waters of the Atlantic are capable of traveling nearly 4,000 km and have been detected at the mid-Atlantic ridge (Nieukirk et al. 2012). Studies have indicated that fin whales in the Mediterranean Sea alter their vocalizations and avoid areas of seismic activity, which can affect and chronically increase the energetic costs critical for life functions (e.g., communication; Castellote et al. 2012). Reducing sound generated by potentially duplicative or overlapping seismic surveys in U.S. Atlantic waters therefore should be considered a high-priority mitigation measure.

In addition to the three incidental take applications associated with seismic surveys that are the subject of this letter, BOEM is reviewing at least four other applications[5] for seismic surveys in the Mid- and South-Atlantic planning areas. All of those surveys overlap to a large degree[6] and could be considered duplicative as they are collecting similar data. If surveys that overlap in space and/or time are allowed to proceed, it would increase the numbers of marine mammals authorized to be taken and potentially expose them to unnecessary risks.

The Commission repeatedly has emphasized the need to minimize duplicative or overlapping seismic surveys in all areas of oil and gas exploration (see the Commission's 20 April 2015 letter). BOEM recently started requiring G&G permit applicants in the Gulf of Mexico to include a "Non-Duplicative Statement" certifying that a proposed survey would not be duplicative (R. Brinkman, BOEM, personal communication). BOEM also is in the process of developing criteria to evaluate those statements based on the applicant's proposed survey design and data acquisition parameters[7] in comparison to previous surveys conducted by the same company or others in the same area. However, information on whether a proposed survey is duplicative of other proposed surveys has yet to be required of applicants proposing to conduct seismic surveys in the Atlantic.

[5] http://www.boem.gov/Currently-submitted-Atlantic-OCS-Region-Permits/.
[6] http://www.boem.gov/Atlantic-Permit-Applications/.
[7] Acquisition parameters may include, but are not limited to, survey geometry, source array composition and configuration, spatial sampling, and sampling rate (Brinkman, pers. comm.).

Based on the information provided in the three incidental take applications for the proposed seismic surveys, the applicants are proposing to conduct seismic surveys in the same general areas using essentially the same data acquisition parameters, including potential ensonification of the same areas based on overlapping tracklines. Hence, the Commission considers these surveys to be duplicative, in whole or in part.

NMFS's regulatory authority to minimize duplicative surveys is provided in section 101(a)(5)(A)(i)(II)(aa) of the MMPA, which directs NMFS to structure incidental take authorizations so that they prescribe "other means of effecting the least practicable adverse impact on such species or stock and its habitat…." NMFS has had some success in the past in having applicants collaborate on seismic surveys in the Arctic and should be working closely with BOEM on parallel measures to reduce the number of incidental take authorizations and G&G permits issued for potentially duplicative surveys in the Atlantic. The Commission continues to believe that BOEM's issuance of G&G permits for potentially duplicative seismic surveys would be inconsistent with the mandates of the Outer Continental Shelf Lands Act to balance resource development with environmental harm. The Commission therefore recommends that NMFS work with BOEM to require all applicants proposing to conduct seismic surveys in the Mid- and South-Atlantic planning areas to collaborate or devise other means for minimizing the potential for duplicative or overlapping surveys.

Inconsistencies in take estimation methods

It is difficult to evaluate the potential impact of the proposed surveys, both individually and cumulatively, due to the lack of consistency among applicants regarding their take estimation methods. Major inconsistencies include (1) the sources used for density data to estimate takes and for abundance data to aid in assessing small numbers and negligible impact, (2) the acoustic thresholds used to determine Level A and B harassment zones and estimate associated numbers of takes, and (3) the assumptions regarding the effectiveness of mitigation in reducing the numbers of estimated Level A harassment takes.

Regarding sources used for density data, the applicants used at least four different sources—Navy OPAREA Density Estimates data[8], National Oceanic and Atmospheric Adminstration Cetacean Density and Distribution Mapping Working Group data[9], Ocean Biogeographic Information System-Strategic Environmental Research and Development Program data[10], and Atlantic Marine Assessment Program for Protected Species data[11]. Some of those sources reflect more recent information on marine mammal densities and abundance than others. The Commission understands that NMFS considers the CetMap data to be the best available information at present[12] regarding density estimates for the Atlantic planning areas. Therefore, it is unclear why NMFS did not direct all applicants to use the CetMap data. In addition, abundance estimates from NMFS's stock assessment reports, CetMap, and various other references were used as the basis for species-specific regional or best population estimates. Rather than allowing each of the applicants to determine what data source(s) it would use, NMFS should have specified the preferred data

[8] NODEs (Department of Navy 2007).
[9] CetMap (http://cetsound.noaa.gov/cda-index).
[10] OBIS-SERDP (http://seamap.env.duke.edu/search/?app=serdp).
[11] AMAPPS data from 2010-2014.
[12] The results of the AMAPPS surveys, including results from offshore ship surveys, have yet to be made available publicly or incorporated into CetMap.

source(s) for each species. That guidance would ensure consistent density and population estimates are used to inform small numbers and negligible impact determinations, particularly in light of the overlapping nature of the surveys being considered for authorization.

Regarding determination of Level A and B harassment zones, the applicants used both the current NMFS guidance for acoustic thresholds (based on 180- and 160-dB re 1 μPa for Level A and B harassment, respectively) and various interpretations of the dual criteria of sound exposure levels (SELs) and peak sound pressure levels (SPLs)[13] from Southall et al. (2007) and/or NMFS's draft guidance on acoustic thresholds for permanent threshold shift (PTS)[14] for impulsive and non-impulsive sources. Until NMFS revises its acoustic thresholds for Level A harassment, current policy is for applicants to provide estimates of both the Level A and B harassment zones[15] and the associated numbers of takes based on the 180- and 160-dB re 1 μPa thresholds for Level A and B harassment, respectively.

To estimate numbers of takes, the applicants used both animat modeling and simple area x density calculations [16]. The applicants provided take estimates based on numbers of exposures, and in at least one case also provided the numbers of individual animals that might be exposed. However, it was not clear how those two estimates would be reconciled to determine the numbers of takes to authorize.

Three of the four applicants requested authorizations for Level A harassment takes. The fourth applicant did not request Level A take authorization based on the assumption that mitigation measures would prevent all Level A harassment takes. The Commission generally does not agree with reducing take estimates based on assumptions of presumed mitigation effectiveness unless empirical studies have been conducted under the same or similar circumstances as the proposed activities that support such assumptions.

The lack of consistency among applications appears to be the result of inadequate or inconsistent guidance provided to the applicants by NMFS. To address these inconsistencies, the Commission recommends that NMFS work with the applicants and provide clear guidance on recommended sources of density and abundance data, the appropriate thresholds to determine the relevant Level A and B harassment zones and the associated numbers of takes, and whether requested Level A harassment takes should be reduced based on presumed mitigation effectiveness. Unless and until this guidance is provided to achieve consistency amongst the applications, the Commission believes it is not possible to determine the numbers of takes to authorize. The Commission further recommends that NMFS develop criteria and provide guidance to applicants regarding the circumstances under which it will consider requests for Level A harassment takes under section 101(a)(5)(D) of the MMPA.

In addition, it is not clear what types of takes TDI-Brooks is proposing to be authorized and what guidance it received from NMFS regarding estimation of the Level B harassment zone. With

[13] Applicants confused SELs with SPLs in several instances.
[14] PTS equates to Level A harassment.
[15] The Commission does note that the distances to the various isopleths in shallow water are less than those isopleths in intermediate and deep water in the ION application, a trend not observed in the Spectrum application.
[16] In addition, one applicant used sightings data and line-transect theory (including effective strip width) to estimate takes for rare species that did not have reliable density data.

respect to types of takes, the applicant indicated that it did not anticipate any Level A harassment to occur based on the proposed sound sources (a multibeam echosounder and sub-bottom profilers) and additional mitigation procedures. However, in calculating the numbers of animals that could be taken by harassment, the applicant referred to numbers of marine mammals that could be exposed to acoustic levels defined by NMFS as capable of producing a temporary threshold shift (TTS). The applicant then appears to have calculated the total ensonified area based on the 180-dB re 1 μPa threshold (i.e., the threshold for Level A harassment). NMFS (and the Commission) generally believes that the sources proposed to be used by the applicant would not be expected to result in Level A harassment takes. Unfortunately the applicant did not provide information on the size of the harassment zone used to estimate the take numbers listed in Table 2 of its application, so it is unclear whether those takes represent Level A or B harassment takes. The Commission recommends that NMFS work with TDI-Brooks to clarify the type and numbers of harassment takes proposed for authorization.

Regarding the calculation of Level B harassment takes by TDI-Brooks, the Commission has argued on several occasions that for the proposed types of sources, a Level B harassment threshold of 120 dB re 1 μPa should be used[17] (rather than the 160-dB re 1 μPa threshold used by NMFS for impulsive sources). Therefore, the Commission recommends that NMFS require that TDI-Brooks estimate the numbers of marine mammals taken by non-impulsive acoustic sources (i.e., echosounders and sub-bottom profilers) based on the 120- rather than the 160-dB re 1 μPa threshold.

Mitigation and monitoring measures

NMFS is required by regulation to prescribe measures that set forth permissible methods of taking and other means of effecting the least practicable adverse impact on the species or stock of marine mammal, paying particular attention to rookeries, mating grounds, and areas of similar significance. However, beyond the designated time-area restrictions for North Atlantic right whales, it is not clear whether NMFS has directed the applicants to identify and avoid conducting surveys in any other areas where or times when other marine mammal species are known to concentrate.

The lack of baseline information regarding the abundance and distribution of marine mammals in Atlantic offshore waters (BOEM 2014, Waring et al. 2015) will make it challenging to implement meaningful and effective time-area restrictions. There are some known areas of high biological productivity, such as the shelf edge off Cape Hatteras, which should be avoided as they are likely to attract large aggregations of marine mammals. However, information is lacking on the extent to which predictable spatio-temporal aggregations of marine mammals occur in relation to particular oceanographic or habitat features in offshore waters of the Atlantic Ocean (Rickard 2015). Such information, if available, could be used to identify additional biologically important areas that should be avoided.

As already noted, the proposed mitigation measures differ among applicants and, in some cases, do not conform with measures required in other planning areas or the minimum measures specified in BOEM's ROD. Mitigation measures should be consistent among applicants conducting

[17] See the Commission's letter from 24 August 2015 regarding the proposed rule for fisheries research activities conducted by the NMFS Northeast Fisheries Science Center.

the same types of surveys and revised to reflect any additional guidance that NMFS has provided to certain applicants. To ensure consistency in mitigation and monitoring requirements, the Commission recommends that NMFS provide additional guidance to the applicants regarding—

- Time-area restrictions—In addition to the designated time-area restrictions for North Atlantic right whales, known areas of high biological productivity should be identified and avoided.
- The size of the exclusion and buffer zones to be monitored—Each applicant should establish source- and site-specific Level A and B harassment zones, based on acoustic modeling and/or empirical data. If zones are based on modeling, applicants should conduct in-situ sound propagation measurements for each airgun array (including the mitigation airgun) at the beginning of the survey at representative depths and adjust the Level A and B harassment zones, as necessary.
- Use of the mitigation gun—The mitigation gun should not be used for longer than 1 hour and should be fired only once every minute instead of every few seconds. These recommendations are based on requirements imposed recently by NMFS on seismic surveys in the Arctic (80 Fed. Reg. 40016) and would ensure that use of the mitigation gun is minimized without compromising its (presumed) effectiveness.
- The number of protected species observers—Given the size of the exclusion zone for seismic surveys (greater than 1 km), at least two observers should monitor at all times during seismic operations to increase the likelihood of detecting marine mammals and implementing mitigation measures. The use of a second observer also would allow for the collection of additional data on marine mammal behavior and on movements in response to the source.
- Monitoring periods—Applicants should be required to monitor the exclusion zone for marine mammals for 30 minutes before the proposed activities begin, during the proposed activities, and for 30 minutes after the proposed activities have ceased.
- Use of passive acoustic monitoring—Passive acoustic monitoring should be required to increase detection probability for real-time mitigation and monitoring of exclusion and disturbance zones, especially when visibility is obscured by darkness, sea state, or other factors.

As noted above, assumptions should not be made regarding the effectiveness of mitigation measures until they have been fully evaluated, preferably under the environmental conditions in which the seismic surveys would be conducted. The Commission recommends that NMFS require the applicants to include in their final report empirical data in support of determining the probability of detecting marine mammals under the different sea states, weather conditions, and light levels that would be encountered during the seismic surveys. In addition, the Commission recommends that NMFS require the applicants to make all visual and acoustic monitoring data publicly available in a timely manner. Those data will contribute to the limited data currently available on marine mammal presence and behavior in the Atlantic offshore area and can be used to develop, adapt, or refine mitigation measures over time. One platform for posting data collected during monitoring would be the Ocean Biogeographic Information System-Spatial Ecological Analysis of Megavertebrate Populations (OBIS-SEAMAP) website.

Large-scale monitoring plan

As previously noted, baseline information is lacking regarding marine mammal abundance, distribution, and habitat use in some of the proposed offshore survey areas. Baseline information on the environmental characteristics of an area and the natural variability of those environmental characteristics is a fundamental requirement for assessing impacts resulting from seismic activities (Nowacek et al. 2013). However, it does not appear that NMFS or BOEM will require applicants to collect that information prior to authorizing those activities.

Of even greater concern is the apparent lack of large-scale monitoring associated with the proposed surveys. MMPA incidental take provisions require that requests for incidental take authorizations include "monitoring and reporting measures that will result in increased knowledge of the species, [and] the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities…" (50 CFR § 216.104(a)(13)). NMFS and BOEM have implemented large-scale biological monitoring programs in the Arctic and in more coastal waters of the Atlantic (AMAPPS). It is the Commission's understanding that NMFS and BOEM also are working to expand the scope of AMAPPS into more offshore waters and establish similar monitoring programs in other areas where significant seismic activity occurs (i.e., the Gulf of Mexico and Cook Inlet).

If NMFS proceeds in the short-term with the authorization of seismic surveys in the Atlantic, the lack of baseline information necessitates a go-slow approach that limits unnecessary overlap or duplication of seismic activities (as recommended herein), coupled with intensive data collection (e.g., aerial and ship surveys, tagging and telemetry, analysis of data from stranded animals) to better understand what species and stocks are being taken, the effects of such taking, and measures needed to mitigate adverse effects. Monitoring to better understand and mitigate adverse effects of proposed activities should be a required component of any large-scale project, but it does not appear that NMFS or BOEM would require the current applicants to conduct any large-scale monitoring in the Atlantic once the survey activities are authorized to complement data being collected under the AMAPPS program. This is particularly important as the U.S. Atlantic is a relatively new area for seismic activities and the effects of seismic surveys on marine mammal species in this area has yet to be determined.

Addressing large-scale monitoring goals up-front with each applicant and encouraging a cooperative monitoring effort would ensure that the MMPA mandates with regard to monitoring are being met. The Commission therefore recommends that NMFS require the applicants to work with BOEM and NMFS, prior to the initiation of survey activities, to develop a large-scale monitoring program to better understand what species and stocks would be taken, the effects of such taking, and the measures needed to mitigate any adverse effects.

The Commission hopes you find its letter useful. Please contact me if you have questions regarding these recommendations.

Sincerely,

Rebecca J. Lent, Ph.D.
Executive Director

Enclosure

cc: William Brown, BOEM Chief Environmental Officer

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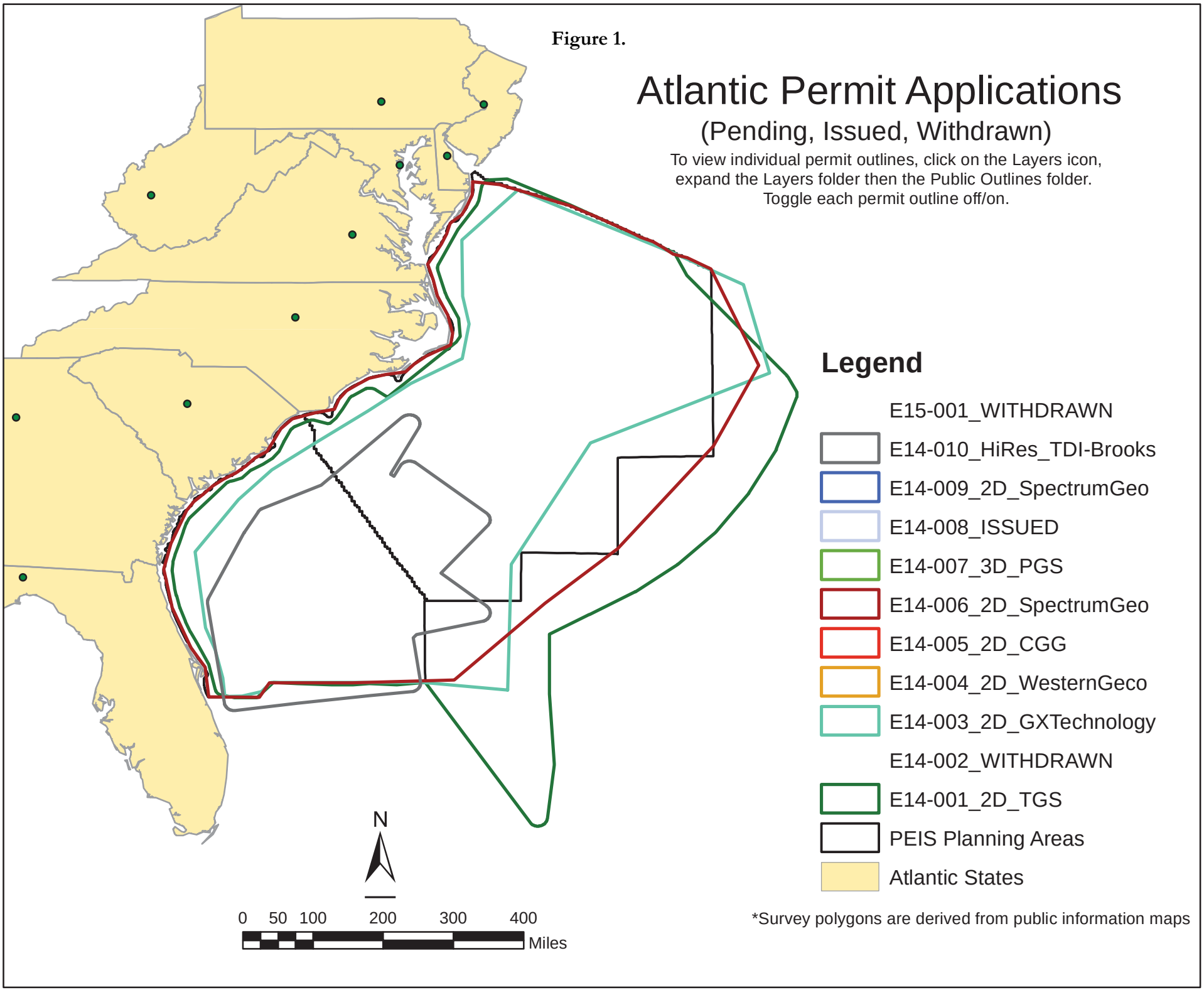
Figure 1.


Atlantic Permit Applications
(Pending, Issued, Withdrawn)
To view individual permit outlines, click on the Layers icon,
expand the Layers folder then the Public Outlines folder.
Toggle each permit outline off/on.
Legend
E15-001_WITHDRAWN
E14-010_HiRes_TDI-Brooks
E14-009_2D_SpectrumGeo
E14-008_ISSUED
E14-007_3D_PGS
E14-006_2D_SpectrumGeo
E14-005_2D_CGG
E14-004_2D_WesternGeco
E14-003_2D_GXTechnology
E14-002_WITHDRAWN
E14-001_2D_TGS
PEIS Planning Areas
Atlantic States
*Survey polygons are derived from public information maps
N
0 50 100 200 300 400
Miles