July 8, 2019

Mr. Gary Poole
WesternGeco, LLC
100001 Richmond Ave
Houston, TX 77042

Re: South Carolina Department of Health and Environmental Control - Office of Ocean and Coastal Resource Management's Objection to Consistency Certification submitted by WesternGeco, LLC (HNN-BMBP-FT3KS)

Dear Mr. Poole:

On March 12, 2019, WesternGeco, LLC (WesternGeco) submitted a Consistency Certification to the South Carolina Department of Health and Environmental Control 's Office of Ocean and Coastal Resource Management (DHEC or the Department) for a proposed geophysical and geological (G&G) seismic survey. This Consistency Certification is subject to review by DHEC pursuant to 15 CFR §930 Subpart D – Consistency for Activities Requiring a Federal License or Permit to ensure that the proposed activities are consistent with the applicable enforceable policies of the South Carolina Coastal Zone Management Program (SCCZMP).

WesternGeco has applied to the US Department of Interior's (DOI) Bureau of Ocean Energy Management (BOEM) for a federal permit (Federal Permit Number E14-004) to conduct two-dimensional (2D) seismic exploration activities in the federal waters of the Atlantic Ocean. Details of the proposed activities are stated in WesternGeco's Consistency Certification as:

> One seismic vessel is proposed for this 2D survey. This vessel will tow a seismic source array and a single 10.5 km long streamer. The seismic vessel will be accompanied by two smaller chase vessels and a supply vessel. The purpose of the chase vessels is to keep vigil and ensure the safety of the streamer, by warning and keeping nearby vessels away from the vicinity of the streamer[1].
>
> WesternGeco's proposed seismic survey area extends from approximately 30 kilometers (km) (~19 miles [mi]) offshore of the southeast coast of Maryland south to 80 km (~50 mi) offshore of St. Augustine, Florida. Survey lines extend northwest to southeast from approximately 300 to 500 km (~186 to 311 mi) offshore over water depths ranging approximately from 20 to 4,700 meters (m; ~11 to 2,570 fathoms). Seismic operations are proposed to cover up to approximately 26,641 km (~16,554 mi) of trackline with an additional 2,734 km (~1,700 mi) of turns and transits. Ninety-seven percent of the 29,375 km (~18,253 mi) distance that includes tracklines, run-out, and ramp-up/run-in would occur within the 200 nautical mile United States

[1] WesternGeco Consistency Certification, p.5

(U.S.) Exclusive Economic Zone. Seismic operations are estimated to occur during 208 days over a period of about one year (allowing for inclement weather days, potential equipment maintenance/repair, and other contingencies)[2].

On March 15, 2019, DHEC informed WesternGeco of the public notice requirement under 15 CFR 930.61 and the SCCZMP document, Chapter V. Section G. This public participation is a required procedural process to afford the general public an opportunity to provide feedback on a proposed activity and any foreseeable coastal effects. This public participation also allows federal and state agencies to provide insight on potential impacts to coastal resources and uses under their authorities. To allow sufficient time for public participation, DHEC and WesternGeco entered into a stay agreement on June 7, 2019. This stay agreement extended DHEC's 3-month review period an additional 25 days and established a new Department decision date of July 8, 2019.

The WesternGeco Consistency Certification was placed on the Department's website and the online ePermitting public notice webpage on May 31, 2019 to provide a 30-day public comment period. WesternGeco published a public notice in The Post and Courier, a newspaper of statewide circulation, on June 1, 2019.

During the public comment period, the Department received 1,720 public comments, those from federal and state elected officials, locally-elected officials who represent coastal cities and towns, the South Atlantic Fisheries Management Council, the South Carolina Department of Natural Resources (SC DNR), numerous public interest organizations, small businesses and private citizens. All 1,720 comments received, communicated opposition to the specific proposed activity of seismic surveying and/or potential future offshore oil and gas development generally. Specific to seismic surveying activity, the basis of comments ranged from objection to physical impacts to the marine environment and endemic species (i.e. marine mammals, commercial and recreational fish, reef fish and sea turtles) to economic impacts associated with potential decline in recreational and commercial fishery abundance. More generally, numerous comments objected to the prospect of offshore oil and gas energy development due to concerns about pollution and degradation of offshore and onshore water quality resulting from spills and leaks, in addition to the cascading impact that degraded water quality from oil and gas development would have on the economic vitality of coastal communities, nearshore fisheries and the tourism-based economy. Comments also raised objection to the development of associated onshore infrastructure that may be necessary to receive, refine, store and transport oil and gas products. Numerous comments articulated support for the development of offshore renewable energy.

**DHEC's Objection to WesternGeco's Consistency Certification with South Carolina's Coastal Zone Management Program Guidelines and Specific Policies**

Based on review of information provided, DHEC objects to WesternGeco's Consistency Certification because the proposed activities are not consistent with the applicable enforceable policies of the SCCZMP. While DHEC previously issued Conditional Coastal Zone Consistency for seismic activities to other companies in 2015, additional scientific research has been conducted and published since that time. DHEC considered this body of literature in its review of WesternGeco's proposed activities.

[2] WesternGeco Consistency Certification, p.2

Legal authorities of the South Carolina's Coastal Zone Management Program reside in the South Carolina Coastal Tidelands and Wetlands Act (S.C. Code Ann. § 48-39-10, et seq.), South Carolina Coastal Division Regulations Chapter 30 (23 A S.C. Code of Regulations, 30-1 to 30-21), and the South Carolina Coastal Zone Management Program document. State policies are provided under S.C. Code Ann. § 48-39-30(B) and include the goals to protect and, where possible, restore and enhance the coastal resources of South Carolina for this and succeeding generations.

In 2014, DHEC made an Unlisted Activities Request to the National Oceanic and Atmospheric Administration (NOAA) to review federal permit applications for seismic surveying to ensure consistency with enforceable policies of the SCCZMP. On November 18, 2014, NOAA concluded that South Carolina had demonstrated that specific seismic surveys occurring in the federal waters offshore of the state may have reasonable and foreseeable effects on coastal uses (commercial and recreational fishing) and coastal resources (sea turtle nesting). Accordingly, DHEC's review of WesternGeco's federal permit application for consistency with the enforceable policies of the SCCZMP is limited to the evaluation of potential effects to these two specific resource categories, utilizing the enforceable policies within SCCZCMP Chapter III, Guidelines for Evaluation of All Projects; Chapter III, Wildlife and Fisheries Management; and Chapter IV, Priority of Uses for Geographic Areas of Particular Concern.

This Objection to WesternGeco's Consistency Certification is based upon review of the proposed activity in reference to the following enforceable policies.

***Guidelines for Evaluation of All Projects: (SCCZMP Chapter III, Resource Policies)***

The Department's review under this section of the SCCZMP is limited to 5 of the 10 guidelines listed below.

1) *The extent to which the project will further the policies of the South Carolina General Assembly which are mandated for OCRM in implementation of its management program, these being:*
    b. *To protect and, where possible, to restore or enhance the resources of the State's coastal zone for this and succeeding generations.*
5) *The extent to which the project includes consideration for the maintenance or improvement of the economic stability of coastal communities.*
7) *The possible long-range, cumulative effects of the project, when reviewed in the context of other possible development and the general character of the area.*
9) *The extent and significance of impact on the following aspects of quality or quantity of these valuable coastal resources:*
        i. *Unique natural areas -- destruction of endangered wildlife or vegetation or of significant marine species (as identified in the Living Marine Resources segment), degradation of existing water quality standards.*
10) *The extent to which the project is in the national interest.*

The Department has addressed Guidelines 1), 7), and 9) in subsequent sections of this letter, as these guidelines broadly contemplate potential effects that may result from the seismic survey activity.

Further, the Department is not asserting whether the seismic testing is within the national interest[3] as this matter is related to debates and challenges within the federal court system. Regardless, the Department asserts that this "national interest" matter would not result in a change to the overall evaluation of the resource specific policies that follow in subsequent sections of this objection letter.

As for Guideline 5), when evaluating the project's consideration for the economic stability of coastal communities, it was determined that South Carolina's coastal communities and broader state economy depend on a healthy, productive and accessible coastal zone. Key maritime economic drivers include tourism, commercial and recreational fisheries, ports and working waterfronts. According to the South Carolina Department of Natural Resources, South Carolina has well-established commercial and recreational fisheries that generate approximately $329 million each year in economic benefit for the state[4]. A National Marine Fisheries Service (NMFS) assessment of the economic contributions of recreational and tournament fishing to the economy of South Carolina in 2011 found that recreational fishing created over 3,300 jobs; $115 million in income; $307 million in sales; and $185 million in value added to the state's gross domestic product[5]. Recreational and tournament fishing in federal waters also contribute to local economies where marinas, charter fleets, restaurant and lodging establishments are concentrated. The commercial fisheries of shellfish, blue crab, shrimp, and offshore finfish have a combined estimated ex-vessel value of $25.37 million and an overall economic effect of over $42 million[6]. According to NMFS, the value of commercial landings within the Area of Interest offshore of South Carolina during 2012 was nearly $12M.[7]

Comments provided by federal, state and local elected officials and other stakeholders raise concerns regarding the potential for future production of oil and gas and the associated potential for degraded water quality resulting from production operations, leaks and spills. Degraded water quality would have a direct impact on near-shore commercial and recreational fisheries (shellfish, finfish, crabs and shrimp) and on beaches that are vital to state and local tourism-based economies. Coastal tourism provides an annual economic contribution of $8.96 billion and supports approximately 99,325 jobs.[8]

***Wildlife and Fisheries Management Policies (SCCZMP, Chapter III Section VII)***

The Department's review under this section of the SCCZMP is limited to the following policy guidelines:

1) *In the coastal zone, including critical areas, OCRM issuance or review and certification of permit applications which would impact wildlife and fisheries resources will be based on the following policies:*

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[3] South Carolina Coastal Zone Management Program, Chapter III Resource Policies, Guidelines for the Evaluation of All Projects 10)

[4] Letter from Lorianne Riggin, Director, Office of Environmental Programs, S.C. Department of Natural Resources to S.C. Department of Health and Environmental Control (June 7, 2019)

[5] Sabrina J. Lovell, et al., The Economic Contribution of Marine Angler Expenditures in the United States, 2011, NOAA Technical Memorandum NMFS-F/SPO-134 (September 2013), available at http://www.st.nmfs.noaa.gov/economics/publications/marine-angler-expenditures/marine-angler-2011.

[6] Willis, D. and Straka, T., The Economic Contribution of Natural Resources to South Carolina's Economy, Clemson University (2016), Accessed from http://www.dnr.sc.gov/economic/index.html

[7] PEIS, *supra* note 17, Tables-72 (Table 4-30)

[8] Willis, D. and Straka, T., The Economic Contribution of Natural Resources to South Carolina's Economy, Clemson University (2016), Accessed from http://www.dnr.sc.gov/economic/index.html

a. *Activities deemed, by OCRM in consultation with the South Carolina Department of Natural Resources, to have a significant negative impact on wildlife and fisheries resources, whether it be on the stocks themselves or their habitat, will not be approved unless overriding socio-economic considerations are involved. In reviewing permit applications relative to wildlife and fisheries resources, social and economic impacts as well as biological impacts will be considered.*
b. *Wildlife and fisheries stocks and populations should be maintained in a healthy and viable condition and these resources should be enhanced to the maximum extent possible.*
c. *Critical wildlife and fisheries habitat should be protected and enhanced to the extent possible.*

On November 28, 2018, the *Biological Opinion on the Bureau of Ocean Energy Management's Issuance of Five Oil and Gas Permits for Geological and Geophysical Seismic Surveys off the Atlantic Coast of the United States, and the National Marine Fisheries Services' Issuance of Associated Incidental Harassment Authorizations* was issued by NMFS. Therein, NMFS examines the potential impact on species and designated critical habitat resulting from pollution, vessel strikes, acoustic and visual disturbance and entanglement. According to NMFS, species and/or habitat not likely to be adversely affected include: Atlantic Sturgeon, Elasmobranchs (Giant Manta Ray and Oceanic Whitetip Shark), Hawksbill Sea Turtle, Atlantic Sturgeon Designated Critical Habitat, Loggerhead Turtle (Northwest Atlantic Ocean Distinct Population Segment), Designated Critical Habitat and North Atlantic Right Whale Designated Critical Habitat. Species and critical habitat likely to be adversely affected include: Blue Whale, Fin Whale, North Atlantic Right Whale, Sei Whale, Sperm Whale, Green Sea Turtle (North Atlantic Ocean Distinct Population Segment), Kemp's Ridley Sea Turtle, Leatherback Sea Turtle and Loggerhead Sea Turtle (Northwest Atlantic Ocean Distinct Population Segment).

Published scientific research literature has been provided and reviewed by DHEC that examines the individual, cumulative and potential cascading effects of acoustic seismic testing on the marine ecosystem, including behavioral and physiological changes in fish and fish populations, fish lifecycle development, reef habitat colonization, zooplankton and dependent forage species in addition to potential unknown vulnerabilities among turtle species. A portion of this research was published after the conclusion of the PEIS and therefore does not inform the Biological Opinion. However, DHEC must consider this body of literature in its analysis to determine the proposed activity's consistency with the enforceable policies of the SCCZMP as they pertain to commercial and recreational fisheries, sea turtles and sea turtle habitat.

***Zooplankton and Forage Species***

McCauley et al. (2017) investigated the impacts of a single airgun (similar to those used in commercial 3D arrays) on the local zooplankton field and demonstrated significant differences in both zooplankton abundance and mortality after airgun exposure. Comparison of control and exposed tows showed a greater than 50 percent decrease in abundance in 58 percent of all

individual zooplankton taxa. The distribution of abundance decreases between exposed and control tows for all taxa. Further, all taxa showed a median decrease in abundance of 64 percent. Additionally, comparison of control tows (e.g., those occurring prior to airgun blasts) between day 1 and day 2 of the study demonstrated a decrease in mean and median zooplankton abundance of 89 percent and 96 percent, respectively. Assessment of mortalities from each day of the study showed two- to three-fold increases across all taxa as compared to controls. Finally, impact ranges (i.e., the distances at which no impact versus varying degrees of impact would be expected) were calculated for both abundance and mortality and were found to be more than two orders of magnitude greater than previously assumed.

The Biological Opinion addresses these research conclusions by first clarifying that "in contrast to the intensive 3-D seismic surveys discussed in McCauley et al. (2017), the proposed seismic surveys are 2-D, and are designed as exploratory surveys, covering a large area in a relatively short amount of time." Further, while the Biological Opinion concedes that the proposed seismic surveys may temporarily alter copepod and zooplankton abundance, it asserts that the overall effect would be insignificant because most copepods would be near the surface where sound from seismic airguns is limited and the high turnover rate of zooplankton and ocean circulation would minimize any effects, particularly in Sargassum habitat.

However, the results of the McCauley study and those of Carroll, et al. (2017)[9] raise additional concerns regarding potential effects on fish eggs and larvae (including those of commercial and recreational fishery groups), given similar sensitivity and size ranges as the zooplankton in the above-referenced experiments. Juvenile recreational and commercial fishery species and other species that forage for higher tropic level fishes depend on zooplankton for their dietary needs. A reduction in the availability of zooplankton across a broad region could potentially lead to cascading impacts within the base of the oceanic food chain, and ultimately on recreational and commercial fish populations. Published scientific research on these topic areas is currently extremely limited, thus increasing the risk associated with seismic surveying on commercial and recreational species, including their foraging needs, at various lifecycle stages.

***Finfish and Billfish***

Fishing offshore of South Carolina extends at least to the edge of the continental shelf. About 75 miles offshore, the Gulf Stream flows north out of the Florida Straits. This warm-water ocean current averages 62 miles in width. The irregular ocean floor offshore of South Carolina, particularly a raised area known as the Charleston Bump, breaks off portions of the Gulf Stream into giant eddies, spinning warm water and the organisms associated with it inshore from the main current.[10] The Charleston Bump, located 80-100 miles southeast of Charleston, contains unique geological

[9] A.G. Carroll, R. Przeslawski, A. Duncan, M. Gunning, B. Bruce, A critical review of the potential impacts of marine seismic surveys on fish & invertebrates, Marine Pollution Bulletin, Volume 114, Issue 1, 2017, Pages 9-24, ISSN 0025-326X, https://doi.org/10.1016/j.marpolbul.2016.11.038.

[10] Programmatic Environmental Impact Statement, Bureau of Ocean Energy Management (BOEM) (March 7, 2014)

features that serve as spawning areas for many commercially and recreationally important species such as the Snapper-Grouper Complex and wreckfish. The PEIS states that the Charleston Bump is the only documented spawning location of wreckfish. Although wreckfish are found all along the east coast, most of the commercial fishery occurs over the Charleston Bump. Commercial species found in the offshore surface waters include king and Spanish mackerel, wahoo, several species of tuna, dolphin (mahi-mahi), sailfish, marlin and swordfish. Some of these fish occur singularly, others in large schools.[11] Additional offshore areas of importance to commercial and recreational fisheries include the Edisto Marine Protected Area (MPA), Northern South Carolina MPA and Charleston Deep Artificial Reef MPA.[12]

In its Consistency Certification, WesternGeco relies on the BOEM PEIS for its analysis on potential impacts to commercial and recreational fisheries. According to WesternGeco, its proposed seismic surveying activities are "expected to be minimal because of (1) the relatively small amount of total effort of the project in the main areas of concern: Northern South Carolina MPA, Edisto MPA, Charleston Deep Artificial Reef MPA and Charleston Bump; (2) coordination with DHEC ORCM (sic), DNR, SAFMC, and fisheries regarding timing of operational activities in Areas of Concern; (3) the project's focus on distances from shore beyond 30 km (~19mi); and (4) the mitigations and conditions that will be included in the operational plan."[13]

According to NOAA, the impacts of seismic surveys to fish catch vary and catch reductions of nearly 70 percent have been found for a period of at least five days.[14] Recent studies by Paxton et al. (2017)[15] conducted in the southeast United States found a 78% decline in snapper grouper complex species abundance during evening hours at a reef habitat site after seismic testing occurred. Notably, the research site was not directly in-line with survey tracks and was located at the greatest distance (7.9 km) among three study sites from the seismic survey track. Acoustic hydrophone data was also collected as part of the Paxton study. Researchers found that noise levels at the reef exceeded 170 dB re 1 µ Pa prior to the collection instruments being overloaded by noise levels. To estimate peak noise levels at the sites closest to the survey track, spherical and cylindrical spreading models were used. Based on a sound source level of 258.6 dB re 1 µ Pa, model results indicated that the received sound levels would have ranged from 202-230 dB re 1 µ Pa. Paxton found that fish detect and respond to seismic noise, reducing aggregation at reef habitats and potentially disrupting important life functions including foraging and mating.

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[11] South Carolina Department of Natural Resources, Marine – Offshore Waters, http://www.dnr.sc.gov/marine/habitat/offshorewaters.html

[12] South Atlantic Fishery Management Council Atlas, http://ocean.floridamarine.org/safmc_atlas/

[13] Letter from Gary Poole, WesternGeco to Elizabeth von Kolnitz, S.C. DHEC (March 12, 2019)

[14] Letter from Jeffrey Payne, Ph.D., Acting Director for NOAA Office for Coastal Management to S.C. DHEC (November 18, 2014)

[15] Paxton, Avery & Christopher Taylor, J and Nowacek, Douglas & Dale, Julian & Cole, Elijah & M. Voss, Christine & H. Peterson, Charles. (2017). Seismic survey noise disrupted fish use of a temperate reef. Marine Policy. 78. 68-73. 10.1016/j.marpol.2016.12.017.

SC DNR also addresses the potential harm posed by seismic surveying activities. SC DNR asserts[16]:

> *The use of G&G surveys may negatively impact a variety of demersal reef fish species located on hard, sandy and soft bottom habitats year-round. Hearing is an important sense used by marine fishes. Many fish use auditory cues in addition to sight and other senses to derive significant information about their surrounding environment.*
>
> *Depending on the intensity of the sound blasts, all organs of the fish may be affected, but it is probable that the swim bladder, vestibular apparatus (semicircular canal system that includes the otoliths), sound producing structure, and gonadal tissues may be particularly vulnerable to damage. In addition, many species (e.g. grunts, groupers) produce sound as part of spawning and social behavior.*
>
> *Sound has been shown to be used by fishes for communication (Myrberg, 1980), navigation, predation, etc. While most fish species can only detect sounds up to 500-1000 Hz, certain species have been shown to exhibit hearing specialization (Mann et al. 2001). Ambient sound levels of 131 dB produced by ships alone have been shown to decrease hearing sensitivities up to 40 dB and reduce the detectability of communication sounds for certain species of marine fishes (Vasconcelos et al. 2007, Codarin et al. 2009). Seismic airguns produce considerable amounts of acoustic energy which have the potential to harm marine fishes. Source level sounds in excess of 230 dB have been recorded for seismic air gun arrays (Cummings, 2003). Acoustic surveys may affect sound reception and sound production by fish and disrupt behavioral interactions.*
>
> *SCDNR conjectures that most fish would not swim out of a testing area when loud sound (blasts) approach, even if acoustic activities are increased gradually. It is possible that larger and faster swimming pelagic species may swim out of the impacted area, perhaps chasing them from feeding grounds, spawning areas, or other important habitats. Elevated sound may also have deleterious effects on survivability and reproduction for certain species (Engas et al., 1996). However, based on staff's general knowledge of fish behavior, as well as video observations, bottom dwelling and reef species (such as groupers, Gray triggerfish, porgies, flounders, rays) and many others, will not swim away if a potential threat approaches. Reef fishes will hide near and within available bottom structure, under ledges or in crevices. Species such as flounders, rays and shrimp will most likely try to avoid loud sound by burying in the sediment. The behavior of many fish species may result in them hiding and staying in place when exposed to loud sound, making them extremely vulnerable for potentially damaging effects of acoustic surveys. In addition, some published information points at possible negative effects to fish larval stages, as well as planktonic prey species. Many reef fish species undergo larval development offshore before settling on*

[16] Letter from Lorianne Riggin, Director, Office of Environmental Programs, S.C. Department of Natural Resources to S.C. Department of Health and Environmental Control (June 7, 2019)

*reefs that they will inhabit for the rest of their lives (McCormick 2002). Research by Tolimieri et al. (2002) shows that these larval fish use sound to find reefs, and that intense offshore sounds may mask reef sounds, preventing larval fish from finding suitable reef habitat.*

Carroll, et al. (2017) conducted an extensive review of literature associated with scientific studies that examined the impacts of low-frequency sound on marine fish and invertebrates, with an emphasis on seismic surveying acoustics.[17] Carroll provides numerous recommendations on the direction of future research and the development of effective mitigation strategies prior to concluding that "[t]here remains a vast gap in our knowledge about sound thresholds and recovery from impact in most fish and almost all invertebrates. Without this information, generalisations (sic) about impacts among taxa, airgun arrays, and regions are not scientifically valid."[18]

Based on its review of the available information, DHEC has determined that the proposed seismic surveying activities pose an undetermined but significant risk to commercial and recreational fish species at various stages of lifecycle development.

***Potential space and use conflicts***

According to NOAA, the space and operational requirements of survey vessels may create potential conflicts with other vessels and uses: [19]

*Vessels towing streamers during seismic surveys follow pre-plotted track lines and have limited maneuverability during data acquisition. Survey operators attempt to keep a zone around the source vessel and its towed streamer arrays clear of other vessel traffic. The size of the area to be kept clear of other vessels is typically 8.5 km (4.6 nautical miles (nm)) long and 1.2 km (0.6 nm) wide, covering a total of 1,021 hectares (2,520 acres) of sea surface. While the U.S. Coast Guard issues a Local Notice to Mariners for areas where seismic surveys will take place, no official exclusion zones are established or enforced. Data acquisition takes place day and night and may continue for days, weeks, or months, depending on the size of the survey area. [20]*

The Department concurs with this assessment and finds that the proposed seismic surveying may temporarily reduce recreational and commercial access to areas within the survey region.

***Coastal Zone Consistency Determination for Wildlife and Fisheries Management Policies***

[17] A.G. Carroll, R. Przeslawski, A. Duncan, M. Gunning, B. Bruce, A critical review of the potential impacts of marine seismic surveys on fish & invertebrates, Marine Pollution Bulletin, Volume 114, Issue 1, 2017, Pages 9-24, ISSN 0025-326X, https://doi.org/10.1016/j.marpolbul.2016.11.038.
[18] Ibid.
[19] Letter from Jeffrey Payne, Ph.D., Acting Director for NOAA Office for Coastal Management to S.C. DHEC (November 18, 2014)
[20] PEIS, *supra* note 17

For reasons examined above, the proposed activity is inconsistent with the specific enforceable policies associated with Wildlife and Fisheries Management contained in the SCCZMP. Despite adherence with the proposed mitigation measures, the seismic activity would pose a potentially significant risk to both the species that comprise commercial and recreational fisheries and the associated state and local economic benefit derived from the resources.

***Geographic Areas of Particular Concern Policies (SCCZMP, Chapter IV Section A,8)***

The Department's review under this section of the SCCZMP is limited to the following policy guidelines associated with Threatened and Endangered Species Habitats:

> *Criteria for Designation*
> *South Carolina Endangered Species are any species of wildlife whose prospect for survival or recruitment within the State are in jeopardy or likely to become so in the foreseeable future. The causes may be: 1) destruction or modification of habitat; 2) species over-utilization for scientific, commercial, or sporting purposes; and 3) other natural or man-made factors. Species on the Federal endangered species lists for native or foreign fish and wildlife are included.*
>
> *Priority of Uses*
> *The following are the uses of priority for all areas identified or designated as critical habitats for threatened and endangered species, beginning with the use of highest priority:*
> 1) *Uses which are compatible with all regulations and management programs developed to protect any designated habitat area under the Federal or State Endangered Species Acts.*
> 2) *Uses which maintain the natural functions of areas identified or designated as critical habitat areas of species listed on the State or Federal threatened or endangered species lists.*
> 3) *Non-structural, non-intensive uses which do not create irretrievable damage to any species listed as a threatened species.*
>
> *Within an area officially designated as a critical area habitat under the State or Federal Endangered Species Acts, uses are prohibited which violate the integrity of the State or Federal legislation.*

There are four species of federally and state protected endangered or threatened sea turtles that occur in South Carolina waters: Green (*Chelonia mydas*), Kemp's Ridley (*Lepidochelys kempii*), Leatherback (*Dermochelys coriacea*) and Loggerhead (*Caretta caretta*). The habitat of these species is defined as a Geographic Area of Particular Concern (GAPC). While DHEC regulates GAPCs, DHEC relies upon SCDNR's expertise to ensure responsible management of sea turtles and their habitats.

In its Consistency Certification, WesternGeco relies on BOEM's Programmatic Environmental Impact Statement (2014) (PEIS) for its analysis on potential impacts to sea turtles. WesternGeco asserts that the PEIS "indicates that seismic surveys are expected to have a negligible to minor impact on sea turtles when appropriate mitigation measures are used." WesternGeco relies on the adoption of the mitigation protocol specified in the Biological Opinion associated with the reduction of impacts to marine mammals as its protocol for mitigation for sea turtles.

***Analysis of Proposed Mitigation for Sea Turtles***

According to the Biological Opinion, neither federal agencies nor permit applicants (including WesternGeco) estimated exposure of ESA-listed sea turtles to seismic airgun sounds associated with the proposed seismic surveys. As such, NMFS conducted its own exposure analysis and determined that the acoustic threshold for harassment of sea turtles is 175 dB re 1 μ Pa.[21] This threshold is consistent with experimental trials conducted by McCauley (2000) in a controlled environment. Nelms, et al. (2015) notes that due to lack of research in unrestricted environments, it is not known what sound threshold exposure or frequencies could cause permanent or temporary hearing loss and physical fitness among turtle species.[22] However, Nelms cites numerous studies that document frequency detection and hearing abilities among sea turtles and the use of these abilities to perceive important biological signals, navigate, communicate, avoid predators and identify nesting beaches. Citing these previous studies, Nelms finds that "acoustic disturbance could potentially lead to exclusion from key habitats, interruption of behaviors, such as those necessary for breeding, foraging or thermoregulation (basking), as well as inciting responses which may compromise their energy budgets, such as changes to foraging duration, swim speed, dive depth and duration and restricting access to the surface to breath (sic)."[23]

The Biological Opinion assumes that mitigation measures associated with marine mammals are applicable and transferable to sea turtles. These mitigation measures include soft start, ramp up, clearance and shutdown, and the use of species observers to identify individual sea turtles within a 500m mitigation zone. For sea turtles, these mitigation measures are not required by NMFS and are voluntary for the applicant. WesternGeco has stated in its Consistency Certification that it will engage in the mitigation measures. However, Nelms, et al. (2015) was unable to locate any studies that evaluated the effectiveness of these mitigation measures for sea turtles. In reference to the proposed 500m mitigation zone, Nelms asserts that the appropriateness of this radius in terms of offering protection to turtles is unknown. Citing a previous study by Weir and Dolman (2007), Nelms states that "defining the radius of a mitigation zone is a fundamental component of the real-time mitigation measures used during seismic surveys, but in most regional guidelines no scientific rationale is provided to support the chosen radius".[24] Nelms asserts that "an appropriate mitigation zone for turtles should take into account data on emitted and received sound levels, turtle hearing ranges and information on the sound levels that are injurious to a sea turtle. However, at present all of this

[21] Biological Opinion on the Bureau of Ocean Energy Management's Issuance of Five Oil and Gas Permits for Geological and Geophysical Seismic Surveys off the Atlantic Coast of the United States, and the National Marine Fisheries Services' Issuance of Associated Incidental Harassment Authorizations (November 28, 2018)
[22] Nelms, Sarah & Dow Piniak, Wendy & Weir, Caroline & Godley, Brendan. (2015). Seismic surveys and marine turtles: An underestimated global threat?. Biological Conservation. 193. 49-65. 10.1016/j.biocon.2015.10.020.
[23] Ibid.
[24] Weir, C.R., Dolman, S.J., 2007. Comparative review of the regional marine mammal mitigation guidelines implemented during industrial seismic surveys, and guidance towards a worldwide standard. J. Int. Wildl. Law Policy 10, 1–27. http://dx.doi.org/ 10.1080/13880290701229838.

information is lacking. Consequently, the mitigation zones adopted for turtles have simply been selected as the same as those used for marine mammals, and their effectiveness for minimizing the potential impacts on turtles from airgun sound is unknown."[25] Further, Nelms notes that there are significant constraints associated with the visual detection of sea turtles, particularly at night, in poor weather conditions and adverse sea surface conditions. Alternative and supplementary detection methods, such as passive acoustic monitoring (PAM) designed for species with vocalizing abilities and night-vision/thermographic imaging technologies are also deemed ineffective due to inherent biological differences between the large, warm-blooded mammals for which these detection methods are designed and those of sea turtles. SC DNR also articulates uncertainty and concern with the appropriateness of transferring mitigation protocols designed for marine mammals to effectively mitigate impacts to sea turtles.[26]

***Coastal Zone Consistency Determination for Geographic Areas of Particular Concern Policies***

DHEC has determined that the proposed activity is inconsistent with the specific enforceable policies associated with Geographic Areas of Particular Concern contained in the SCCZMP. The efficacy of mitigation measures identified by the applicant for the prevention and minimization of effects on sea turtles are unproven and potentially scientifically invalid. The seismic activity, including the proposed mitigation measures, would consist of a man-made, non-structural factor resulting in an intensive use which may cause irretrievable damage to threatened and endangered sea turtle species.

***Conclusion***

Seismic surveying has not occurred in the Atlantic OCS since the 1970s and 1980s. G&G data collected during this period is now considered outdated for the purposes of assessing resource availability for future energy needs, including the evaluation of the Atlantic OCS for inclusion in the Department of Interior Five Year Program.[27] Significant advances in 2D and 3D seismic surveying technology now enable more robust data collection, though "quieting" technologies that reduce seismic surveying noise remain under development.[28] Despite advances in survey technology, significant gaps remain in the scientific understanding of the immediate and long-term effects of seismic exploratory activities on the marine environment and how those effects can be sufficiently mitigated.

A body of scientific literature, a significant portion of which has been published following the completion of the PEIS and Biological Opinion, raises compelling issues regarding the potential

[25] Nelms, Sarah & Dow Piniak, Wendy & Weir, Caroline & Godley, Brendan. (2015). Seismic surveys and marine turtles: An underestimated global threat? Biological Conservation. 193. 49-65. 10.1016/j.biocon.2015.10.020.
[26] Letter from Lorianne Riggin, Director, Office of Environmental Programs, S.C. Department of Natural Resources to S.C. Department of Health and Environmental Control (June 7, 2019)
[27] Atlantic OCS Proposed Geological and Geophysical Activities, Mid-Atlantic and South Atlantic Planning Areas Final PEIS, BOEM 2014 https://www.boem.gov/Atlantic-G-G-PEIS/
[28] Memorandum from Abigail Ross Hopper, Director to Michael Celata, Regional Director Gulf of Mexico Region, U.S. Department of the Interior (January 5, 2019).

impact of seismic survey noise exposure on marine ecosystems, including the health, behavior and abundance of commercial and recreational fisheries and threatened and endangered sea turtle species. This research provides new insight into the physical and behavioral sensitivity that various species have to seismic surveying noise in addition to the identification of critical information gaps and future research priorities. Based on this information, DHEC has determined that seismic surveying activities proposed by WesternGeco may significantly impact the commercial and recreational fisheries that provide substantial economic benefit to the state of South Carolina and its coastal communities.

Further, both the PEIS and Biological Opinion make critical generalizations and assumptions regarding the physiological and behavioral effects of seismic surveying on these resources in addition to the efficacy of applying mitigation protocols associated with marine mammals to the prevention and minimization of effects on threatened and endangered sea turtles. WesternGeco relies on this purported transferability of protocols in its Consistency Certification. However, the scientific basis and demonstrated practical application of these protocols for the protection of sea turtles is generally lacking. DHEC has determined that the mitigation protocols proposed by WesternGeco expose threated and endangered sea turtle species to unknown risk and is therefore inconsistent with the enforceable policies of the SCCZMP.

In conclusion, DHEC finds that the risks associated with 2D seismic surveying to the resources under the purview of the SCCZMP are significant due to the known and unknown physiological and behavioral impacts to individual fish and sea turtles, populations and the ecosystems that support them. Additional research regarding these impacts is needed so that effective mitigation protocols can be developed and validated to ensure adequate protection of fisheries and threatened and endangered sea turtles. Until such time, DHEC must find the federal application for seismic surveying in the Atlantic OCS by WesternGeco to be inconsistent with the enforceable policies of the South Carolina Coastal Zone Management Program.

Pursuant to 15 CFR part 930, subpart H, and within 30 days from receipt of this letter, you may request that the Secretary of Commerce override this objection. In order to grant an override request, the Secretary must find that the activity is consistent with the objectives or purposes of the Coastal Zone Management Act, or is necessary in the interest of national security. A copy of the request and supporting information must be sent to DHEC and the federal permitting or licensing agency. The Secretary may collect fees from you for administering and processing your request.

Sincerely,

Christopher Stout
Coastal Zone Consistency Section Manager

cc: Ms. Elizabeth von Kolnitz, Director, SCDHEC OCRM
Mr. Dan Burger, Coastal Zone Consistency Section Project Manager, SCDHEC OCRM

Ms. Myra Reece, SCDHEC Environmental Affairs
Mr. Brian Cameron, Environmental Scientist, US Bureau of Ocean Energy Management
Mr. Kerry Kehoe, Federal Consistency Specialist, Office of Coastal Management, NOAA