CONFLUENCE
ENVIRONMENTAL COMPANY

To: Mr. Tony Kantas, Thurston County Land Planner
cc: ChangMook Sohn, Pacific Northwest Aquaculture LLC

From: Marlene Meaders, Hans Hurn, Chris Cziesla

Date: February 26, 2016

Re: Addendum to Response to Public Comments for the Proposed Geoduck Farm in Dana Passage

Dear Mr. Kantas:

This memorandum provides a review and responses to additional public comments submitted regarding the Pacific Northwest Aquaculture LLC proposed geoduck farm in Zangle Cove (Project). Specifically, this memorandum addresses concerns submitted in an email from Kathryn Townsend to Tony Kantas on February 10, 2016 (Townsend Email), and serves as an addendum to Confluence Environmental Company's (CEC) **Response to Public Comments for the Proposed Geoduck Farm in Dana Passage** memorandum (Response to Comments), dated November 11, 2015.

A Biological Evaluation (BE) for the Project was produced by ACERA in December 2014 for the Project. According to the BE, the proposed geoduck farm would be 1.1 acres ranging from a tidal elevation of -4.5 feet (ft) to +3 ft mean lower low water (MLLW). While the BE indicates that this area is within Zangle Cove, it is more accurately characterized as directly adjacent to or just outside the cove habitat, located on private tidelands of Thurston County Parcel #12911440102. This Project was submitted under a Nationwide Permit 48 (NWP 48) for the federal process and shoreline substantial development permit under the Thurston County (the County) process.

The comments addressed in this memorandum specifically relate to concerns raised in the Townsend email: (1) whether the BE and the Response to Comments were written in accordance with Thurston County Code (TCC) 24.35 of the Thurston County Critical Areas Ordinance; (2) questions regarding potential impacts to eelgrass, and (3) potential impacts to bald eagles. These concerns are addressed below.

BE AND RESPONSE TO COMMENTS

The Townsend email expresses concerns that the following condition from Thurston County to ChangMook Sohn, dated May 28, 2015 (TC Letter) has not been met:

"The biological evaluation must evaluate all potential impacts to fish and wildlife habitat and be written in accordance with TCC 24.35 of the Thurston County Critical Areas Ordinance, as it pertains to fish and wildlife habitat."

The Townsend email goes on to state (CEC notes in bold):

"The Confluence document (11/20/15) **[Response to Comments]**, to our knowledge, is not a biological evaluation on all potential impacts to fish and wildlife habitat, written in accordance with TCC 24.35 of the Thurston County Critical Areas Ordinance. Your letter of May 28, 2015 **[TC Letter]** asked for information on impacts to fish and wildlife habitat that was not included in the original ACERA Biological Evaluation (12/17/14) **[BE]** for this project."

When the ACERA BE was submitted to Thurston County, it was found to lack a thorough effects analysis regarding impacts to both eelgrass and eagles that may occur in the vicinity of the proposed Project area. These deficiencies were discussed in detail in the Response to Comments, which should be considered as an addendum to the ACERA BE. It is our understanding that the BE and Response to Comments meet the requirements as outlined in TCC 24.35, specifically TCC 24.35.290: Fish and wildlife habitat conservation areas – Requirements for critical area reports. Related TCC 24.35.290 Section C: Text is presented here for reference:

> TCC 24.35.290.C Text. The report shall contain the following information, as applicable:
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> 6. Assessment of existing conditions including, as relevant, vegetative types and complexity, hydrology, soil conditions, general site conditions, acreage and identification and characterization of the important wildlife habitat and any other critical areas onsite;
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> 8. Identification of the important habitat area's functions and documentation of fieldwork and literature reviewed pertaining to functional assessments;
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> 9. An analysis of site development alternatives and a discussion of measures proposed to avoid impacts and preserve the important habitat area/buffer and associated functions; and
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> 10. A description of the nature and extent of the proposed use or activity's potential direct or indirect impacts to the important habitat area and associated buffer, including a description of impacted vegetation, hydrology, soil conditions, and other relevant factors.

The Response to Comments addressed the deficiencies indicated by Thurston County in the TC Letter, which were reiterated in the Townsend Email. Summaries of the responses and expanded analysis are offered below.

POTENTIAL IMPACTS TO EELGRASS

Potential impacts to eelgrass are explored in detail in the Response to Comments. Qualified CEC biologists visited the site on June 5, 2015 to conduct intertidal surveys of the Project area and adjacent

areas. CEC also consulted with Pacific Northwest Natural Laboratory for information regarding the eelgrass test plot adjacent to Zangle Cove. The results and analysis of the field visit, document review, and personal communications are summarized in the Response to Comments. Table 1 of that document provides a summary of public comments regarding eelgrass at the site and in the vicinity, as well as a response from CEC biologists. The response follows:

"Based on data collected on June 5, 2015, the distance from the Project area to native eelgrass (330 ft), and lack of evidence that sediment from the proposed geoduck operation could interact with sensitive resources such as native eelgrass, the proposed geoduck farm would not adversely impact native eelgrass in Zangle Cove. In addition, there are no native rooted plants or attached kelp protected under [the Shoreline Master Program] located in the Project area that could be negatively affected by the proposed geoduck operation."

Further detail of eelgrass presence and potential impacts are presented in Section 2.1 of the Response to Comments. CEC biologists mapped small patches of non-native *Zostera japonica* (Japanese eelgrass) near the Project area, which is a species of seagrass not protected under Shoreline Master Programs. These patches were not within the proposed culture area. No other attached macrophytes protected under Shoreline Master Programs were present on site.

Pacific Northwest National Laboratory (PNNL) conducted a test planting of eelgrass (45 m^2) in 2013 (Thom et al. 2014). The location of the test plot, which is in Zangle Cove, is approximately 330 ft from the proposed geoduck culture area. The 2014 report cited by public commenters noted that, "The Zangle Cove plot was on the edge of a sandy alluvial fan, so other parts of the cove may not be as suitable for eelgrass." A large-scale planting was performed for that site in May of 2015 (Borde, pers. comm., 2015). Survival of this larger planting has not been reported. The eelgrass planting area is greater than 300 ft from proposed aquaculture site, providing a large buffer to potential impacts from the proposed geoduck aquaculture operation.

Further detail of eelgrass presence (including a map of the Project area and eelgrass beds), and analysis of potential effects are detailed in Section 2.1 of the Response to Comments.

POTENTIAL IMPACTS TO BALD EAGLES

Bald eagles have been documented near the proposed Project area. Bird entanglement (specifically bald eagle entanglement) was discussed in the Response to Comments in Table 1 (pp. 6 and 8) and Section 2.3 (Potential Risk of Entanglement). The analysis presented in the Response to Comments concluded that the risk of entanglement to bald eagles is insignificant, based on rare evidence of entanglement over decades (40+ years) of shellfish aquaculture history that includes the use of predator exclusion nets. Additionally, a review of Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) Data (WDFW 2016) shows the approximate location of the bald eagle nest and the associated buffers. The Project area lies well outside of the WDFW bald eagle buffer. In fact, Dr. Sohn's parcel is over 140 ft outside of the bald eagle nest buffer at its closest point. Please

note that the edge of the buffer represents 660 ft from the actual nest, which means that the proposed Project would be more than 800 ft from the eagle nest documented by WDFW.

Effects of geoduck farms on the food web, specifically related to birds, are discussed in the Response to Comments Table 1 (p. 8) and Section 2.7 (Cumulative Impacts). Analysis of available literature led to the conclusion that prey resources of eagles would not be significantly affected by the proposed geoduck aquaculture. Modeling results presented in Section 2.7, while not predictive, indicate a positive relationship between in geoduck aquaculture in Central Puget Sound and biomass densities of bald eagles and many of their prey species. An expanded analysis of potential effects to bald eagles is presented below.

Potential Disturbance

There is the potential to negatively affect behavior and foraging opportunities for certain species through alteration of food sources, displacement of foraging habitat, and disturbance (e.g., noise) related to farm activities (Kaiser et al. 1998, Kelly 2001, Connolly and Colwell 2005, Forrest et al. 2009). For species that avoid structure (natural or man-made), the temporary placement of geoduck aquaculture gear for 2-3 years[1] out of a 7-year culture cycle would likely result in displacement. However, that does not necessarily indicate a significant impact on foraging opportunities. "Significant" can be defined as the amount of area that results in displacement compared to the amount of foraging area available. For example, a geoduck plot that encompasses about 0.1 miles[2] of shoreline would not be considered a significant change for a species such as the bald eagle in Western Washington with an average territory radius of 1.6 miles from nest sites.

Because bald eagles are a State Sensitive species in Washington and protected under the federal Bald and Golden Eagle Protection Act, there is an emphasis on ensuring that shoreline activities, in general, do not disturb eagles. The primary buffer from activities that may disturb bald eagles (both from boat use and human entry) is 400 ft from nesting areas (Watson and Rodrick 2000). WDFW studied the response of nesting bald eagles for a two-year period (1993-1994) in relation to recreational pedestrian activity and wildstock geoduck harvest activities within 8 territories in Puget Sound (Watson et al. 1995). Eagles flushed in response to 4 percent of 890 potential disturbances, and only 1 of 34 responses was a result of geoduck harvest activities. Effects to eagle foraging from geoduck harvest activity was considered statistically insignificant at the frequency tested[3], and eagles tended to forage evenly throughout the day with or without a harvest vessel present. Similar effects from commercial geoduck

[1] Flexible mesh tubes are typically used for 3 years, while PVC tubes and predator exclusion nets are typically used for 2 years.

[2] Average territory radius based on Grubb (1980 *as cited in* Watson and Rodrick 2000).

[3] Frequency of geoduck harvest activities tested by Watson et al. (1995) included two weekday bouts when harvest boats were present, followed by two weekend control days when boats were absent, for a total of 296 observational bouts and 1896 hours.

operations are expected. Commercial geoduck operations identify locations of eagle nesting prior to citing new farms, and provide best management practices according to local eagle populations.

Potential for Entanglement

Although entanglement with predator exclusion nets is noted in the literature as a possibility (e.g., Forrest et al. 2009, Straus et al. 2013), there are only rare examples of this occurring. In terms of determining the potential for entanglement, the lack of evidence can be just as powerful as positive evidence. Baynes Sound had 152 acres of predator exclusion nets actively used for Manila clam aquaculture operations in 2001. The estuary is a good example of illustrating lack of evidence, because it is: (1) characterized by extensive, low gradient, intertidal mud and sandflat habitat, (2) a critical staging, breeding, and wintering area for migratory birds, (3) a Pacific herring spawning ground (both herring eggs and the herring are an energy-rich food that attract marine birds), and (4) extensive bird surveys and radio tagging studies were conducted in Baynes Sound from 2001 to 2005 during the peak wintering use by scoters (Lacroix et al. 2005, Žydelis et al. 2009). After at least five years of specifically collecting observations over shellfish beds that contained predator exclusion nets, there were no reports of entanglement by diving ducks.

A series of images that were presented during the public comment period related to potential net entanglement of raptors. The first series shows a live juvenile eagle on top of a predator exclusion net from an incident in 2006. The juvenile eagle had grabbed the predator exclusion net and did not let go. Juvenile eagles have a difficult time releasing their talons until they mature. In this case, recreational kayakers and an adjacent shellfish worker helped the eagle get off the net and moved it to the upper beach under a tree where it later flew away. The WDFW reviewed the incident and concluded that the use of predator exclusion nets does not pose a significant threat to eagles (Huber 2006). The two other photographic examples of geoducks "caught" in predator exclusion nets failed to indicate that the animals were actually entangled and unable to free themselves (one of the two photos notes that the eagle was able to free itself), and no eagle deaths from predator exclusion net entanglement were presented as evidence. Farm management practices, such as ensuring netting is properly secured and conducting frequent monitoring of gear, can effectively mitigate this concern. Although entanglement specifically related to geoduck aquaculture has not specifically been studied in the literature, the fact that shellfish growers in Puget Sound have been using predator exclusion nets for over four decades in intertidal habitats with few documented incidents of entanglement is a good indication of this being an insignificant risk to migrating and foraging birds.

Summary of Effects to Bald Eagles

Based on anecdotal observations and existing literature, marine shorebirds, seabirds, and raptors are known to occur on (or near) similar gear as would be used in geoduck aquaculture without incident. Examples include the increased potential to provide prey opportunities to birds within aquaculture plots (Žydelis et al. 2006, Forrest et al. 2009). Based on over 100 years of aquaculture in Puget Sound, forty plus years of using predator exclusion nets, and observations in and around aquaculture gear, the

potential for entanglement appears to be an insignificant risk with proper farm management. Based on the potential to increase foraging opportunities, there may be a net benefit to bird populations.

CONCLUDING STATEMENTS

We appreciate this opportunity to provide more detailed information. Please do not hesitate to contact us if you require additional information based on what is presented in this addendum.

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