JAMESTOWN S'KLALLAM TRIBE
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June 28, 2019

Pamela Sanguinetti
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Post Office Box 3755
Seattle, Washington 98124-3755

RE: General Response to US Fish and Wildlife Service (USFWS) Comment letter – May 22, 2019 concerning the Jamestown S'Klallam Tribe's application to resume shellfish farm operations in Dungeness Bay

Dear Ms. Sanguinetti:
The Jamestown S'Klallam Tribe (Tribe) believes the health, protection and restoration of the Salish Sea are of paramount importance. The Tribe also believes that a healthy Salish Sea is integral to community well-being. The Tribe is committed to the protection and restoration of Dungeness Bay and its tributaries. Dungeness Bay is the ancestral home of the Jamestown S'Klallam people. By signing the Treaty at Point No Point the S'Klallams ceded millions of acres of land to the United States but reserved all their rights to fishing and shellfishing within our "usual and accustomed" harvest area.

The Tribe has numerous objections to the USFWS comment letter submitted on May 22, 2019. Overall, the letter misrepresents the Tribe's operational plan, is speculative, overstates and misrepresents scientific conclusions from several papers, omits a large body of scientific literature, and does not consider actual observational data.

1. <u>USFWS draws on irrelevant findings and makes misrepresentations</u>. The USFWS update letter appears to be a persuasion piece rather than a thoughtful, neutral consideration of likely effects. The conclusions drawn by USFWS are misleading because most disturbances discussed in these papers, which include low elevation aircraft flights, military training, railroad repair, hunting, sailing, severe weather, and the intentional pursuit of waterfowl to cause birds to flush, are not directly relevant to the proposed aquaculture project. In their examination of scientific literature on human disturbance of waterfowl and shorebirds, the USFWS conflates all disturbances described within their cited literature as though they are relevant to the Tribe's proposed cultivation methods. Each cited scientific paper identifies and examines specific disturbances, but these disturbances generally do not relate well to aquaculture operations. Because disturbances most representative of the Tribe's proposed growing methods are not well highlighted, nor discussed in relation to the Tribe's methods, it is impossible to conclude from this collection of literature what level of disturbance is anticipated, if any. Further, the USFWS completely misconstrues the conclusion of one cited scientific paper and omits or misrepresents

findings from others. These mistakes overstate the possible impact of shellfish aquaculture to the Dungeness National Wildlife Refuge (DNWR).

2. The USFWS did not review the Tribe's proposed operations plan and mitigation measures prior to writing the May 22, 2019 letter (pers. comm. Jennifer Brown-Scott, Jun 6, 2019). This oversight resulted in a misunderstanding of the actual scale and timing of operations, whereby the USFWS letter overstates the Tribe's proposed activity by nearly double. Further, the Tribe's monitoring and mitigation plan defines thresholds for possible impacts, together with proposed responsive actions to avoid and/or reduce impacts to birds at the DNWR, which is not considered in the USFWS comments.

3. The USFWS comment letter fails to present empirical data which show that birds preferentially used the area encompassing the aquaculture site, when it was being farmed.
   Bird use data were collected at DNWR for two distinct periods:
   - Year-round from 1994-1999, when a 20 acre oyster farm was operating.
   - 2013-2015, when the oyster farm was not operating.

   The data reveal that a greater proportion of geese, ducks, shorebirds and seabirds utilized the survey area inclusive of the farm in the mid-1990s – when the oyster farm was operating - than during observations in recent years when the farm was not operating. When the oyster farm was operating, the heaviest concentrations of water birds occurred near the farm. After farming ceased, the heaviest concentrations of birds were located elsewhere (Appendix A: JST technical memorandum – NWR Bird Data, June 2019). These datasets provide no evidence that past oyster farming activities deterred or negatively impacted waterfowl and shorebirds near the project site. Rather, the data indicate that the oyster farming operation may be beneficial to all groups of water birds.

4. The scientific evidence presented by USFWS does not accurately reflect current understanding of bird-shellfish aquaculture interactions. USFWS fails to recognize the Confluence Environmental report (Report) *Shellfish Aquaculture and Bird Interactions* regarding Jamestown's project in Dungeness Bay, and the majority of the references cited within. The Report concludes that negative effects are expected to be minimal at this site due to the limited scale of activities, the limited total area where activities will occur, and the lack of eelgrass forage resources on-site. The report further recognizes that the operational plan and mitigation measures provide avoidance and minimization of impacts to protect marine shorebirds, seabirds, and raptors found on (or near) the proposed farm in inner Dungeness Bay. These findings contradict USFWS's hypothesis that the commercial aquaculture operation will almost certainly have some level of impact on wildlife and habitats year round, and increased impacts to shorebirds and waterfowl during the migration and wintering periods (August 1 - May 14).

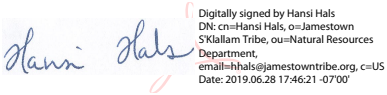
5. The USFWS update letter does not convey a sound understanding of eelgrass biology. Per proposed methods, the Tribe is providing a minimum 25' unvegetated buffer between oyster cultivation and eelgrass. Washington DNR's review of eelgrass metrics associated with important ecological functions and attributes (e.g., seed dispersal, genetic diversity, vegetative reproduction, habitat value, persistence and sediment stability) were the basis of establishing the minimum shoot density threshold of 3 shoots per $0.25m^2$ required for an eelgrass patch to

persist from one season to the next in Puget Sound, as well as the 25 ft. buffer distance for eelgrass conservation (Donoghue, 2012). Sparse shoots that are not a part of contiguous eelgrass areas are considered ephemeral, not indicative of an area's suitability for eelgrass patch establishment.

The Tribe provides further detailed comment as an annotated copy of the attachment to the final USFWS comment letter (May 22, 2019) as Attachment A. The Tribe is also submitting a separate Technical Memorandum examining DNWR bird survey data (Appendix A), relative to the project area to provide basis for annotated comments. The Tribe has enclosed their Monitoring and Mitigation Plan (Appendix B) and General Operational Plan (Appendix C) for ease of reference. Finally, the Tribe has made available the Confluence Report, 2018 Shellfish Aquaculture and Bird Interactions as further basis for the conclusion that there will be minimal adverse impact from the Tribe's proposed operations (Appendix D).

Therefore, the Tribe requests that you weigh the value of USFWS letter in light of the criticism raised and recognize the comments as speculative and not fully informed.

Sincerely,



Hansi Hals
Natural Resources Director

Attachment A: Annotated copy of USFWS May 22, 2019 Attachment

The commercial aquaculture permit application SHR2017-00011 requests placement of 80,000 on-bottom bags and additional on-beach oysters within the highest use area for waterfowl and shorebirds on Dungeness National Wildlife Refuge (Refuge).

JST Response: The DNWR bird survey data does not support that the proposed oyster cultivation area is "within the highest use area for waterfowl and shorebirds on the Refuge" (Figure 8; Appendix A). Rather, the DNWR data indicates that the saltmarsh and lagoon area near Graveyard Spit is the highest use area (Figures 7-10; Appendix A). It is notable that while the oyster farm was in operation, a greater percentage of waterfowl and shorebirds used the tide flat area including oyster farm (Figure 5; Appendix A).

It is our understanding that operation of this commercial enterprise (e.g., setup, maintenance, harvest) will require year-round access. The JARPA did not quantify the number of days or people needed for the operation. SEPA documents estimate that up to 15 people are needed for up to 90 days annually for maintenance and harvest.

JST Response: Operational procedures were presented in the application materials. The actual estimate is 3 to 6 workers for 52 days annually to perform maintenance and harvest.

Additional operational access (e.g., setup, outplanting) does not appear to be addressed in the application materials.

JST Response: Operational procedures were presented in the application materials. Access for set up and outplanting will occur just twice per year, with a crew size of 7 to 15 people on site for 4-6 hours during a single low tide series (~ 1 week). The timing of this larger crew is deliberately aligned with periods of least bird sensitivity, per USFWS April 2018 communication.

The site will be accessed by boat, with an identified landing location in its easternmost corner. We do not have a clear understanding of pest management actions, if any, that would be used on the site (e.g. hazing, lethal control or removal of wildlife).

JST Response: No pest management activities will be undertaken. Any proposed pest management activities would have been explicitly included in the SEPA checklist submitted with the project application.

Dungeness National Wildlife Refuge was established with the purpose of providing "a refuge, preserve and breeding ground for native birds" (Executive Order 2123, January 20, 1915). Tidelands of the second class within the Refuge boundary were conveyed to the United States of America, Fish and Wildlife Service through a permanent easement on May 29, 1943 for the purpose of "establishing and maintaining on these lands as a wildlife refuge." Refuge concerns related to wildlife and habitat impacts from aquaculture in this location have been stated a number of times over the past 40 years. For example, in 1983 the Ecological Services Field Supervisor requested, "harvest only be allowed May 1 – September 30 to avoid the greatest waterfowl concentrations." In 1990, the Refuge Manager requested, "oyster operation(s) be conducted in such a manner as to minimize interference with waterfowl…" Exhibit B of the lease agreement signed in 2007 (20-A13012), recognizes the importance of the area to Brant and the potential for impacts, stating, "Human activity in the area should be limited to May 15 – July 30, when cultivation activities will be least disruptive to the use of the Bay by Brant and other waterfowl." We note that this 2007 lease agreement is currently in holdover status and outlines shellfish activities that are small in scale and primarily experimental in nature.

JST Response: Dungeness Bay, including what is now known as the Dungeness National Wildlife Refuge, is the ancestral home of the Jamestown S'Klallam people, where they have harvested fish, shellfish and wildlife for thousands of years. By signing the Treaty at Point No Point the S'Klallams ceded millions of acres of land to the United States but reserved all their rights to fishing and shellfishing within our "usual and accustomed" harvest area. Tribal commerce and trade was sophisticated at that time (1855). The Dungeness Bay tideland lease is covered by the settlement agreement arising from the Shellfish

Litigation[1], and USFWS is party to that agreement. Further, Washington State retained the right to authorize other uses in its easement granted to the U.S. for the purpose of the Refuge. Since at least 1963, Washington State has authorized shellfish farming as an additional use. USFWS has not provided notice to Washington State that this second use is in conflict with the purpose of the Refuge. Finally, the USFWS has never communicated any observed negative impacts to wildlife from aquaculture activities to the Tribe during its nearly 15 years of shellfish operations from 1990 - 2005.

Due to its importance for migrating and wintering waterfowl and shorebirds, the tidelands encompassing the proposed site have been closed to public use from October 1 – May 15, since 1997 (USFWS 1997). To reduce impacts to habitat and wildlife during May 16 – September 30, only non-wake causing activities are allowed, and a 300-foot buffer is maintained along the shoreline. Adjacent uplands are also closed to public access year round.

JST Response: The tidelands encompassing the proposed site may have been closed to the public since 1997; however, commercial shellfish aquaculture remained active on this site through 2005. USFWS never communicated any negative impacts to wildlife from these activities. The Tribe clearly states in their Monitoring and Mitigation Plan that no-wake speeds will be maintained when accessing the project site. Further, site access will occur through deep tidal channels that already experience seasonal recreational boating activity and year-round commercial fishing activity.

Concerns Related to On-Bottom Structure

We recognize there has been little research on the specific impacts of commercial, on-bottom (i.e. on-beach) or on-bottom bag aquaculture on the bird species found on this Refuge. However, during a five-year investigation of on-bottom bag aquaculture practices, Kelly et al. (1996) found that Dunlin and Western Sandpiper (the two most abundant shorebirds in their study and on the Refuge) ”significantly avoided aquaculture areas” and their ”results suggest a net decrease in total shorebird use of areas developed for aquaculture” in the form of on-bottom bags.

JST Response: Kelly et al. (1996) concluded that dunlin and western sandpiper showed statistically significant reduced abundance on treatment plots which were compromised of both on-bottom bags and bags on racks 0.61 m off-bottom (the analysis did not distinguish between the two cultivation methods and the Tribe is not proposing the use of racks). However, the authors also reported the following regarding response to human activity: “*we observed no movements of shorebirds into or out of our plots in response to human activity and the distributions of shorebirds were <u>not significantly</u> related to the presence of oyster workers on aquaculture plots (ANCOVA; P=0.11, 0.59, 0.89, 0.10, 0.49, 0.68, 0.17 for black-bellied plover, willet marbled godwit, sanderling, western sandpiper, least sandpiper and <u>dunlin</u>*).” The authors also concluded the “*need for further corroboration*” of the results “*using more complete temporal controls*” and emphasized testing of ‘alternative hypotheses’, such as pre-aquaculture habitat/substrate conditions, that could explain factors responsible for differences in shorebird abundance between the treatment and control plots. Hence, upon careful reading of the Kelly et al. study, it would appear the findings were not as conclusive as what USFWS comment may lead the reader to believe. In searching the literature, The Tribe was not able to identify any follow-up studies to corroborate or expand on the findings of Kelly et al. (1996).

On-bottom bags and on-beach oysters could also restrict growth of eelgrass within the proposed site due to ground disturbance from human trampling, the on-bottom bags and the on-beach oysters themselves, depending on density (Tallis et al. 2009, Wagner et al. 2012).

JST Response: Per proposed methods, the Tribe is providing a minimum 25’ <u>unvegetated</u> buffer between oyster cultivation and eelgrass. This buffer exceeds the prescribed conservation measure for shellfish cultivation in Washington State Inland Marine Waters (USACE Programmatic BA, 2015). Hence, all aquaculture activities will occur well outside eelgrass. Further, the Tribe’s proposed aquaculture methods only require an average of one site visit per week of no more than 6 workers for maintenance and harvest thus further limiting the possible impact of trampling.

Eelgrass impacts from on-beach oysters have been observed to exceed the actual cover of oysters even at shell

[1] See, *United States, et al. v. State of Washington, et al.*, No. C70-9213. June 20, 2007. (W.D. Wash.)

cover of less than 5 percent (Wagner et al. 2012).

JST Response: This statement is not relevant to the Tribe's proposed methods, as on-beach oysters will not be spread in eelgrass beds.

The applicant's willingness to provide a 25-foot buffer from eelgrass beds will largely avoid effects to currently identified eelgrass beds; however, a 2016 eelgrass survey jointly conducted by the Refuge and Jamestown S'Klallam Tribe (Tribe) staff identified eelgrass outside of the buffer area. When 1987 eelgrass survey maps (Wilson 1988, unpublished progress report; Wilson and Atkinson 1995) are displayed in GIS, these surveys appear to identify eelgrass (although sparse) within the portion of the site proposed for aquaculture, further documenting the area's suitability for eelgrass growth.

JST Response: The eelgrass buffer area is based on DNR regulatory guidelines informed by eelgrass monitoring activities and review of scientific literature (see Donoghue, 2012 and refrences within). Eelgrass identified outside the buffer area only consists of a few individual plants (~16 shoots from the 2016 joint survey) that do not meet the minimum threshold density set by DNR for avoidance/conservation. Published literature states that a minimum eelgrass density is required to ensure survival and establishment of a permanent patch (Olesen & Sandjensen, 1994; Wyllie-Echeverria & Thom, 1994). The minimum shoot density to delineate the eelgrass bed edge is 3 shoots per $0.25m^2$, and individual shoots that have > 1 m spacing do not meet the definition of an ecologically viable eelgrass. Washington DNR's review of eelgrass metrics associated with important ecological functions and attributes (e.g., seed dispersal, genetic diversity, vegetative reproduction, habitat value, persistence and sediment stability) were the basis of establishing the minimum shoot density threshold of 3 shoots per $0.25m^2$ required for an eelgrass patch to persist from one season to the next in Puget Sound, as well as the 25 ft. buffer distance for eelgrass conservation (Donoghue, 2012). Sparse shoots that are not a part of contiguous eelgrass areas are considered ephemeral, not indicative of an area's suitability for eelgrass patch establishment.

Based on tidal elevation provided in the Department of Ecology and Army Corps of Engineers Joint Public Notice Project Cultivation Map, most of the site also appears to be located within the growth range for eelgrass provided by Mumford (2007). Due to shading (Mumford 2007, Dumbauld et al. 2009) and abrasion of the substrate (e.g., tidal movement and flipping of bags) and trampling by workers tending the 80,000 on-bottom bags, eelgrass would likely be excluded from the areas immediately impacted by these structures and activities. Eelgrass growth in higher tidal elevations, such as on this site, is important because Brant forage almost exclusively on eelgrass and availability is limited during high tides due to the depth at which Brant can forage and eelgrass can grow (Moore and Black 2006, Mumford 2007). However, actions that could reduce impacts to eelgrass from aquaculture structures (e.g., bags) by moving them to a portion of the site outside of eelgrass growth zone, would compound impacts to shorebirds by increasing the proximity of operations to one of their most highly used foraging areas (Kelly et al. 1996, Smit and Visser 1993).

JST Response: We reiterate that no activity will occur in areas that meet the minimum density threshold for a permanent, ecologically viable eelgrass patch. On-bottom bags are already sited outside of the eelgrass growth zone. There has been no activity on the lease parcel for 14 years. If eelgrass were going to expand outside of the area designated for eelgrass conservation, it would have likely already happened as documented recovery (even from mechanically harvested beds) and recolonization occur within a few years or up to a decade (Dumbauld and McCoy, 2015; Dumbauld et al., 2009; Marbà et al., 2004). The Tribe worked with Department of Ecology to create a monitoring and mitigation plan that directly addresses potential impacts to eelgrass. The eelgrass monitoring plan is specifically designed to statistically identify if farm activities impact eelgrass extent or growth and adaptive management actions are outlined to respond to such impacts if any are detected. It is also relevant to note that DNR's review of the scientific literature and available field data explicitly states that "*ephemeral shoots cannot feasibly be monitored for before-after effects analysis*" (Donoghue, 2012).

Concerns Related to Human Disturbance

Since many of our concerns are based on disturbance from human activities occurring on the site, studies assessing disturbance from human uses that are similar to, or are components of, the aquaculture operation provide insight into potential impacts to waterfowl and shorebirds in this high use area. Activities considered

similar to those associated with maintenance of a commercial aquaculture plot include bait digging or clamming (comparable to harvesting "on-beach" oysters), walking on tide flats (walking to and from the main anchorage point and the plot as well as within the plot) and boat access. Because Wigeon, Brant and Dunlin are among the most abundant species using the Refuge, and because Brant and Wigeon rely on eelgrass for forage, we focused on these species when studies provided species-specific impacts.

Impacts of human disturbance on wildlife vary considerably and the wildlife response is complex and dynamic based on species, species assemblages, flock size, activity (i.e. foraging or roosting), tidal stages, different types of disturbance, and time of year (Cayford 1993, Mori et al. 2001, Smit and Visser 1993, Owens 1977). For example, Brant response to disturbance was highest to boat traffic (27 percent of events) and clamming (22 percent) on Humboldt Bay (Henry 1980).

> *JST Response:* Henry (1980) wrote "*In 266 hours of observation, during all tidal levels, 39.9% of the disturbances were by people (mostly clammers), 29.2% by small aircraft (primarily small, propeller-driven planes), 18.3% by boats, 9.1% by loud noises*." Henry, as well as Owens (1970) and Davidson and Rothwell (1993), noted that small boats with noisy outboard motors usually put Brant to flight, whereas larger, slow moving boats put waterfowl to flight much less often. Per the Tribe's mitigation measures, vessels will maintain slow (≤ 5mph), no-wake speed when approaching the farm site and within 200' of shoreline of Inner Dungeness Bay. The motor and hydraulic winch will have noise reduction insulation to keep noise below 50 dB (approximately equivalent to a household refrigerator per internet noise charts). While clamming activities may disturb Brant, the nature of oyster farming activities are focused and confined to a specific harvest area that does not involve workers moving long distances across the beach in search of clams/clamming locations.

In addition, Mori et al. (2001) studied the flushing distance of waterfowl to boats and found the response varied by species (i.e. up to 480 feet versus 300 feet for Wigeon and Mallard respectively), with multi-species flock flushing distance usually driven by the most sensitive species in the flock. They also found the response to disturbance varies by activity, with foraging birds flushing at a greater distance from disturbance than those that are resting. They concluded the behavior of actively foraging birds may be more affected by human disturbance than that of birds at rest, compounding the negative effects of energetically expensive flight with lost foraging time (Mori et al. 2001). This is important from an energetic standpoint, which will be discussed in the next section.

> *JST Response:* USFWS misunderstood the Mori et al. (2001) study or improperly used this citation. First, the flushing distances stated above are incorrect. Mori et al. found that Wigeon had an average flushing distance of 222 ft in single-species flocks and 270 ft in multi-species, and Mallards average flushing distance of 326 feet in single-species flocks and 350 ft in multi-species flocks. Second, Mori et al. did not analyze response to disturbance by activity. The authors grouped waterfowl species into 'resting' or 'foraging' species but did not analyze behavior at the time of flushing. The authors never categorized birds as "actively foraging" and drew zero conclusions about the behavior of actively foraging birds or birds at rest. In the study, a small boat was used to directly approach waterfowl to measure the distance at which waterfowl flushed. There is no connection, not even hypothesized, between small scale aquaculture projects, and negative effects from flushing flight or lost feeding time established in Mori et al. Additional studies note that small, fast or noisy boats tend to flush birds more often than large/slow boats (e.g., Bellefleur et al. 2009, Rodgers and Schwikert 2002, Davidson and Rothwell 1993, Owens 1970). The Tribe proposed mitigation measures to operate farm watercraft at no-wake speeds and reduce motor noise.

Owens (1977) found Brant more sensitive to human disturbance (from bait diggers, people walking out to shellfish beds or moored boats) when foraging at low tides. Furthermore, repeated encounters (two) of people walking toward Brant on eelgrass beds increased the flushing distance to 2,400 feet (Owens 1977).

> *JST Response:* This statement is entirely opposite of Owens' finding, verbatim here: "*When the tide was out, there was a large area in which displaced Brent Geese could resettle, and so feeding could be resumed very quickly. Around high tide however, the available feeding space was relatively crowded and more likely to be disturbed… A significantly greater amount of feeding time was lost per disturbing incident in the six hours around high tide than in the six hours around low tide ($p < 0.001$)*." Owens makes

a final recommendation of limiting hiking at "*high tide in certain areas*" but makes no equivalent recommendation for low tide. The Tribe's proposed aquaculture activity is periodic and largely performed during low tide, meaning farm activities will be concentrated at the time with the least potential impact to Brant feeding time, according to Owens. We would also like to point out that 'walking' in the Owens study was intentionally directed at waterfowl to 'experimentally disturb' Brant to document flushing distances; farm workers will not intentionally disturb Brant. Because oyster farm workers will remain within the harvest area of the aquaculture site, second flushing encounters are also unlikely. Owens further noted that "*Brent Geese were not totally excluded from any large areas with suitable food*" and that "*the effects of a disturbance rarely lasted more than 20 minutes after the disturbance ceased.*" Inner Dungeness Bay is a large area comprised of several hundred acres of Brant foraging habitat; the project site is only a small percentage of this total area.

It is important to note that Brant forage exclusively on eelgrass and, because Brant are dabblers, they are only able to forage on eelgrass within 1.2 feet of the water surface (Moore and Black 2006). This requires them to feed on eelgrass at different tidal elevations as water depths change throughout the day (Lewis et al. 2013, Wilson and Atkinson 1995, Davidson and Rothwell 1993). Therefore, to maintain availability of this temporally limited food resource, it is important to protect foraging areas at varying tidal elevations from disturbance. In addition to impacts to foraging Brant, human disturbance will cause Wigeon foraging on eelgrass beds at low tides to abandon the bed until the next tidal cycle (Fox et al. 1993), and frequent or severe disturbance can cause wildlife to abandon a foraging site entirely (Fox et al. 1993, Smit and Visser 1993).

JST Response: The two explicitly described sources of disturbance in Fox et al. (1993) were railroad repairs and intentional disturbance of wigeon by the authors, neither of which are relevant to the Tribe's proposed aquaculture methods. While other sources of disturbance occurred, Fox et al. did not describe these sources of disturbance, so no conclusions can be drawn about their relevance to aquaculture. Further, because our oyster farm activities are tidally dependent, workers will arrive before low tide and work through the low tide. If workers arrive as the tide is receding when Wigeon are beginning to feed, the disturbance may not result in Wigeon losing the feeding cycle because "*Although sample sizes are small, it would seem that Wigeon disturbed during the early phase of feeding on the bed will swim back into the Zostera feeding area, such that although the percentage of time spent feeding is significantly reduced, feeding does resume"* (Fox et al. 1993). While we recognize that this 'preliminary study' (as explicitly stated in the title) of Fox et al. suggests that disruption to Wigeon feeding could have energetic consequences, the implication that shellfish aquaculture activities would cause abandonment of foraging sites is not supported.

The proposed aquaculture operations, transportation travel paths, and boat anchorage are located within the highest use area for waterfowl on the Refuge and adjacent to eelgrass beds. The boat anchorage area will likely be a hub of activity for workers as they come and go from the site and unload and load supplies, equipment, and oysters. Based on the aforementioned studies, it is likely foraging Brant and Wigeon would flush and potentially abandon eelgrass within and adjacent to the aquaculture site during commercial aquaculture operations in this location. As a result, commercial aquaculture would reduce their access to this important and limited forage resource. It is also likely that waterfowl using the Refuge adjacent to boat travel paths and anchorage sites would be flushed by workers accessing the site during commercial operations.

JST Response: The DNWR bird survey data does not support that "propose aquaculture operations are located within the highest use area for waterfowl on the Refuge" (Figure 8; Appendix A). As discussed above, the "aforementioned studies" do not actually substantiate USFWS's conclusion that aquaculture would reduce access to limited forage resources. We have addressed concerns regarding boat access to the farm site in previous responses.

Shorebirds also display flushing response to activities that are similar to those associated with commercial aquaculture. For instance, Smit and Visser (1993) found Dunlin foraging on the tide flats will flush in response to walkers approaching them by up to 900 feet, creating an "exclusion area," due to disturbance, of 32 acres. They also noted Dunlin will tolerate bait diggers working at the same spot for long periods at much closer distances than walkers approaching them on the tide flat, but did not quantify the distance (Smit and Visser 1993).

JST Response: We present that bait diggers are more representative of oyster farm workers than walkers, due to the focused nature of farm activities and duration at the location. Smit and Visser's review paper is skewed in its representation here - taken directly from the paper: "*Although data on flight distances are available for some tidal flats, it is impossible to give standard figures on this matter. Distances vary between sites and are dependent on earlier experiences (learning) in that particular location*". To reduce potential disturbance, the Tribe has aligned the limited work (twice per year) that requires larger groups of farm workers (7-15 people) with the time frames the USFWS initially stated the wildlife would be least sensitive (April 2018 USFWS correspondence).

One of the few high quality foraging sites for Dunlin in Dungeness Basin is located adjacent to the proposed aquaculture location and within the flushing distances recorded by Smit and Visser (1993).

JST Response: Without knowing the location of this foraging site or its proximity (in measurable units) to the project site, it is not possible to validate the accuracy of this statement. The DNWR Avian Shoreline data shows that the greatest Dunlin numbers area not observed in the immediate vicinity of the farm site (Figure 8; Appendix A). Based on the data made available to the Tribe, there will be zero farm activity in the highest use area for Dunlin. Smit and Visser (1993) reported a wide range of possible flushing distances for Dunlin that largely vary by location and prior interactions. The authors even provided an example of Dunlin habituation where flocks of Dunlin that occurred near areas with a variety of human activities (recreation, bait digging, angling, navy inflatables speeding through the channel, etc.) were "*approached to within 10-20 m or less without any visible disturbance*". We find that the above statement of concern is not well supported by USFWS data and is misleading, per the Smit and Visser review.

Since wildlife cannot distinguish between workers approaching them, or walking in their direction to attend to work or approach a boat, it appears likely that common activities associated with commercial aquaculture will result in flushing Dunlin (and other birds flocked with them) from this important foraging area.

JST Response: Smit and Visser (1993), and the studies within, showed that shorebirds react variably to specific types of human movement. For example, Curlew flushed at an average of 213m from walking people and 140m from egg collectors, and Dunlin tolerated bait diggers at closer, but unspecified, distances than walkers. This indicates that wildlife can distinguish between sources of disturbance and slow, concentrated activities such as bait digging result in shorter flushing distances than the continuous movements associated with walking. We contend that aquaculture activities rely on slow, concentrated movements and will result in correspondingly reduced flushing distances.

Finally, multiple studies have shown that wildlife become more sensitive to human disturbance when compounded by additional external disturbances. Both Owens (1977) and Smit and Visser (1993) noted a heightened response (i.e. more frequent flushing and at longer distances) from Brant and shorebirds to other forms of human disturbance, particularly during hunting season or during instances of cumulative disturbance (i.e. multiple approaches by people walking on the mud flats).

JST Response: Owens (1977) specified that "*experimental disturbance*" by people walking on the mud flat was intentional to displace the geese, which is not indicative of farm crew activity. As stated previously, Owens observed that "*Brent geese were not totally excluded by disturbance from any large areas with suitable food*" and ultimately concludes that typical levels of disturbance would "*probably have been unimportant so as long as adequate food was available on which geese could feed in undisturbed times, and at night*." Hence, given the large amount of available foraging habitat at DNWR compared to the relatively small aquaculture footprint; avoidance of farm activity in eelgrass; and intermittent farm site access, these observation by Owens should be applicable. Smit and Visser (1993) provided examples of birds flushing at extreme and minimal distances, and stated that "*Distances vary between sites and are dependent on earlier experiences (learning) in that particular location.*"

The Tribe has committed to minimizing our own disturbance through methods listed in the mitigation plan, and to monitoring and specific adaptive management measures.

Further, Townshend and O'Connor (1993) found Wigeon abundance and use of sites over the winter months decreased during the hunting season primarily when bait-diggers were present in areas where hunting was prohibited (i.e. refugia from hunting). This is relevant to the development of a commercial aquaculture plot in the highest wildlife use area of the Refuge because there are six public and private hunting areas in and around

the Bay. Since the Refuge is closed to public use during the hunt season, it provides one of the few disturbance-free areas during this time. The existence of hunting outside of the Refuge boundary, coupled with activities associated with commercial aquaculture, will likely increase both the quantity and magnitude of flushing occurrences within the highest use area of the Refuge for waterfowl and shorebirds during the sensitive wintering season.

JST Response: DNWR bird data does not support that the project site is "within the highest use area of the Refuge for waterfowl and shorebirds during the wintering season." Rather, the DNWR data indicates that the saltmarsh and lagoon area near Graveyard Spit is the highest use area (Figures 7-10; Appendix A). It is notable that while the oyster farm was in operation, a greater percentage of waterfowl and shorebirds used the tide flat area including oyster farm (Figure 5; Appendix A). This observation suggests that oyster cultivation activities did not deter or negatively impact shorebirds near the project site. Regarding USFWS's comment on flushing in response to oyster farm workers, we simply reiterate the findings of Kelly et al. (1996): "*we observed no movements of shorebirds into or out of our plots in response to human activity and the distributions of shorebirds were not significantly related to the presence of oyster workers on aquaculture plots*." Therefore, presenting oyster farm worker activity as an activity which will increase quantity of flushing is in stark contrast to this cited paper.

Repercussions of Human Disturbance

Given that disturbance of waterfowl and shorebird species is likely to occur in and adjacent to the proposed commercial aquaculture farm based on the scientific evidence described above, it is important to understand the impact this disturbance would have on these species.

JST Response: The use of 'disturbance' and 'likely' should be defined here. As discussed above, the papers cited by USFWS reflect a wide variety of disturbance sources which are largely unrepresentative of the Tribe's proposed oyster farm activities. We reiterate, the shellfish farm is sited on tideland parcel owned by WA State on which the Refuge holds a Use Easement. WA State has retained the authority to allow other uses that are not in conflict with the Refuge. For more than 40 years, WA State authorized shellfish farming on this site and USFWS never asserted that this additional use was in conflict with the purpose of the Refuge. Further, DNWR data suggests that bird distributions were higher in the tidal mudflat area associated with past oyster farming activities compared to other locations within Inner Dungeness Bay (Figures 4 and 5; Appendix A). It simply has not been demonstrated, in the cited literature nor in the DNWR bird survey data, that the proposed oyster farm and on-bottom oyster cultivation methods will have deleterious impacts to waterfowl and shorebirds.

Reducing or eliminating impacts to these species is important because the Refuge was established and continues to be managed to provide refuge for migratory birds. In addition, impacts to waterfowl and shorebirds on the Refuge could extend to a regional or international scale (K. Spragens, WDFW, pers. comm.; USFWS/WDFW unpublished data). Refuge counts can account for up to 98 percent of Brant and 61 percent of Wigeon in Clallam County during midwinter (USFWS/WDFW unpublished data). The area of the Refuge proposed for commercial aquaculture development is also important statewide, because it is within 1,000 feet of a haul-out and gritting site for Brant during high tides that is adjacent to undisturbed eelgrass beds (K. Spragens, WDFW, pers. comm.). In order to digest their food and gain necessary calcium, Brant must access gritting sites approximately every three days (K. Spragens, WDFW, pers. comm.; Lewis et al. 2013). Gritting sites are limited because Brant are selective of grit characteristics (e.g. calcium content and grain size) and are intolerant of disturbance (Lee et al. 2004). The close proximity of these three habitat components are believed to be the reason for an increase in abundance of Brant observed on the Refuge, a level not observed elsewhere in the state in recent years (K. Spragens, WDFW, pers. comm.).

JST Response: The Tribe is not in disagreement with this statement and recognizes that negative impacts to Refuge resources could scale-up to having regional and/or international effects. However, there has been no evidence provided to demonstrate that the Tribe's proposed methods and/or farm activities would have deleterious impacts to waterfowl and shorebirds on the Refuge. Further, if such negative impacts were to occur as proposed by USFWS, then it is unclear why no impacts resulting from farm activities were documented over nearly a ½ century of commercial oyster farming at this same project location. We would also like draw attention to the DNWR bird data which suggests that Brant were

preferentially distributed within the vicinity of aquaculture site while it was actively farmed, compared to recent year in which it was fallow (Figure 5, MM2 observation site; Appendix A – "Geese" are primarily (~95%) represented by Black Brant).

The Refuge is also important for this species internationally because it supports spring staging Brant that breed in Russia and the Canadian high arctic (K. Spragens, WDFW, pers. comm.). Finally, the south shore of Dungeness Spit immediately adjacent to the project area (i.e. two miles from the base of the spit to Graveyard Lagoon) is one of the few high quality foraging sites for Dunlin in the Dungeness Basin. This species is the most abundant shorebird species on the Refuge during winter and migration (up to 2,000 birds per day).

JST Response: See above responses regarding Dunlin and oyster farm activities. The oyster farm does not span the 2 miles of high-quality foraging area and does not overlap with the highest use area of Dunlin as indicated by the DNWR Avian Shoreline bird data (Figure 9 of Appendix A).

Flushing in response to human activities that are similar to, or are components of, operating a commercial aquaculture project on the Refuge is likely to reduce the time shorebirds and waterfowl spend feeding or resting, and increase energetic demands of flight (Buchanan 2006, Fox et al. 1993, Smit and Visser 1993, Lewis et al. 2013, Moore and Black 2006).

JST Response: This statement is entirely unsubstantiated and using these papers as citations is highly misleading. Moore and Black (2006) never quantified disturbance, never discussed potential changes in feeding habits based on disturbance and never touched on the topic of energetics. Buchanan (2006) stated "*A number of environmental, ecological or human-related factors are thought or known to influence the physical condition of Dunlins… human-related impacts have the potential to disproportionately influence the health of Dunlin populations*." Included in this latter category of human-related potential impacts are: dike building, conversion of estuarine wetlands, environmental contamination (oil spills, agricultural chemicals) and the effects of exotic plant and invertebrate species. Buchanan does not mention disturbance or habitat alteration by aquaculture as important human impacts influencing the health of Dunlin. While Buchanan (2006) acknowledges that an inability of shorebirds to accumulate sufficient fat deposits prior to migration can influence survival, and may reduce reproductive success, no activities remotely similar to the proposed project are mentioned. Similarly, Fox et al. (1993) only describes two largely unrelated disturbances: railroad repairs and intentional disturbance (i.e., hazing) of wigeon.

If the disturbance is severe or regular enough, they could abandon preferred sites (Henry 1980, Fox et al. 1993, Cayford 1993)

JST Response: As discussed prior, Henry (1980) observed response to recreational clamming (not defined by duration or spatial area occupied), small aircraft, boats, loud noises; not aquaculture workers in a defined space. Fox et al. (1993) provided no description of what constituted a disturbance (except a mention of railroad maintenance) and no quantification of what constituted "severe disturbance." The paper does not support that shellfish aquaculture, or any activities associated with shellfish aquaculture, constitute a disturbance frequent or severe enough to result in abandonment of the site. Cayford (1993) is a largely theoretical paper that provided advice on further studies of disturbance to waterfowl, but the author provided no experimental data and draws no conclusions about site abandonment due to disturbance.

Reoccurring, severe, or cumulative disturbance further increases energetic costs to waterfowl and can lead to reduced fitness, decreased productivity, or increased mortality rates (Buchanan 2006, Davidson and Rothwell 1993, Baldassarre and Bolen 1994, Ward and Andrews 1993). During severe winter weather, energy demand for thermoregulation increases, which increases the need to forage (Davidson and Rothwell 1993). When severe weather lasts for a few days or more, and waterfowl and shorebirds are unable to forage or experience additional stressors resulting in flushing, mortality rates can increase (Buchanan 2006, Davidson and Rothwell 1993).

JST Response: Davidson and Rothwell (1993) established no link between shellfish aquaculture and the inability of waterfowl (shorebirds are not discussed in this paper) to forage. The focus of this paper was to review general patterns of recreational disturbance and what activities cause the most serious disturbance to waterfowl (i.e., aircraft, dogs, people "*who don't stay in one place for some time*", high-

speed power craft). While Buchanan (2006) supports the supposition that cumulative disturbance increases energetic costs, none of the disturbance considered by Buchanan (2006) are human presence or aquaculture related activity.

In spring and fall, most waterfowl and shorebirds must gain large stores of fat and protein in preparation for migration (Lewis et al. 2013, Buchanan 2006, Davidson and Rothwell 1993). In some years, if spring snowmelt is late and weather conditions are bad, Arctic-breeding shorebirds and waterfowl need to draw heavily on their stores soon after arriving on the breeding grounds. Therefore, reduced energy stores may affect breeding success or adult survival (Belanger and Bedard 1990, Buchanan 2006, Davidson and Rothwell 1993). Studies have shown that human disturbance during winter and the spring staging period is of particular concern for Brant, because it can negatively affect their ability to build energy reserves for migration and breeding and thus reduce reproductive success (Henry 1980, Lewis et al. 2013, Ward et al. 2005). Davidson and Rothwell (1993) noted impacts on fitness from disturbance during their major molt in fall are high due to increased energy demands for the growth of new feathers. They also note, some waterfowl undergo a flightless molt in fall and become more vulnerable to human disturbance that causes them to move from safe refuges to areas where depredation risk is greater and/or forage is scarcer (Davidson and Rothwell 1993).

JST Response: It remains unclear how these implications of disturbance directly relate to the Tribe's proposed aquaculture project. We do not argue that certain levels of disturbance during sensitive periods could cause harm to certain species of birds; however, it is inappropriate to draw such broad-brush findings from the literature in attempt to indirectly support the supposition that oyster farm activities will negatively impact waterfowl and shorebirds that use the Refuge. Davidson and Rothwell (1993) provided no direct support for the idea that the type of activities associated with the oyster farm would push molting birds from a safe area into an area of greater depredation risk. The proposed aquaculture site is 34-acres (of which a maximum of 20 acres will have oyster bags and only after monitored and phased-in growth after 5 years), on 403 acres of barrier lagoon and mudflat habitats and 239 acres of barrier beach within the Refuge. These 34-acres represent no more than 5% of such habitat in DNWR. Davidson and Rothwell list what recent research showed to be the most common and disturbing anthropogenic activities to waterfowl and shorebirds, stating "*Several studies have now found that the most wide-spread and long lasting disturbance often comes from aircraft, and that the slower the aircraft the worse the disturbance… On the tidal flats, moving people and animals (especially dogs) generally create worse disturbance than people who stay in one place for some time. However, note that even these static types and use can cause major disturbance if they are intensive and/or widespread. From water…close approaches to muddy shores by sailed craft (especially sail-boards) and high-speed powered craft create major disturbance."* These disturbances are not representative of limited entry by aquaculture workers.

Shorebirds share the same basic energetic requirements as waterfowl, with dramatic changes in body mass during their time on the Refuge (McEwan and Whitehead 1984, Buchanan 2006).

Multiple studies have shown that if forage availability is limited, waterfowl and shorebirds will forage at night (Fox et al. 1993, Cayford 1993, Owens 1977). This adaptation is key in tidally influenced areas such as Dungeness NWR, where higher tidal elevations prevail during the day in winter. If nighttime foraging coincides with periods of high human disturbance during periods of high energetic demand (i.e. molt or spring staging), additional mortality or displacement can occur. Almost all winter low tides appropriate for work on the site occur at night, necessitating nighttime access during this period.

JST Response: As discussed previously, Owens (1977) found geese disturbed at low tides (when aquaculture activity would periodically occur) lost less feeding time then geese were disturbed at high tide. The Tribe has not substantiated from the literature cited, or upon further search, that nighttime foraging impacts will be magnified from anticipated daytime impacts.

The scientific evidence presented above suggests that the proposed commercial aquaculture operation will almost certainly have some level of impact on wildlife and habitats year round, and increased impacts to shorebirds and waterfowl during the migration and wintering periods (August 1 - May 14).

JST Response: This conclusion is disputed because the comment letter presents highly speculative impacts, rather than observed and/or proposed method-specific scientific evidence. The comment letter overstates the Tribe's proposed activity by nearly double and fails to recognize the reduced activity during most sensitive periods.

The migration and wintering period is based on unpublished wildlife use data for the Refuge, which we have previously shared with the Tribe, and the following references: Paulson 1993, Wilson and Atkinson 1995, Buchanan 2006, and the Birds of North America Accounts for the primary species that occur on the refuge (Mallard, American Wigeon, Brant, Northern Pintail, Dunlin, Western Sandpiper, Least Sandpiper, Black-bellied Plover, and Sanderling) available online at https://birdsna.org/Species-Account/bna/home.

JST Response: The DNWR Legacy and the Avian Shoreline surveys were used by the Tribe to identify preferential use areas by different categories of birds: ducks, geese, seabirds and shorebirds, within the harbor subregion (Appendix A). Distinct differences in bird habitat use between past and more recent observation are identified. The older Legacy data identifies a greater proportion of geese, shorebirds and seabirds utilized the intertidal mudflat area where the aquaculture site is nearest, compared to more recent observations where the highest bird use is associated with the lagoon/saltmarsh area. This observation is particularly notable for geese which are primarily (≥95%) represented by Black Brant. While shifts in habitat use are identified for Brant, shorebirds and seabirds, both past and recent surveys indicate that the lagoon/saltmarsh area is the preferential use site for ducks. It is relevant to note that the Legacy bird data from the mid 1990's, which indicates that shorebird were preferentially distributed within the project area (Figure 5; Appendix A), was collected when ~20 acres of pacific oyster cultivation was actively occurring at the project site. In contrast, the more recent Avian Shoreline survey data, which shows higher shorebird use outside of the project area, represents a time period when no shellfish cultivation occurred. While it cannot be determined conclusively what caused this shift in habitat use by shorebirds over the two time periods, it cannot be ruled out that the presence of oyster cultivation enhanced shorebird use. At the very least, this observation indicates that oyster cultivation activities did not deter or negatively impact waterfowl and shorebirds near the project site.}

Because of the increased sensitivity of these species during the migration and wintering periods, a general public use closure is in effect on the tidelands October 1 - May 14. These high use areas are also protected from impacts associated with public use of the tidelands by a year-round closure of the adjacent uplands, a 300-foot public use closure of the waters adjacent to the shoreline, low tide water depth limitations, and no-wake regulations.

JST Response: Jamestown acknowledges that a general public closure is in effect at specific times. The farm site is located within a part of the Refuge the public does not have access to, beyond seasonal boating (and for Tribal citizens, tribal fishing). However, the Tribe wishes to distinguish between general public activity and aquaculture operations. General public or recreational activity is unconstrained, in that recreational users may distribute themselves across a wide area, and visitors may arrive at any time, with large numbers at any particular time. In the five years prior to DNWR's Comprehensive Management Plan the reserve received approximately 76,000 to 80,000 visitors per year, illustrating the potential huge amount of activity by recreational users ((USFWS 2013). However, the Tribe's proposed aquaculture activity is constrained both spatially and temporally, whereby a few workers are present on the site on average of once per week for maintenance and harvest activities. Two times per year there will be a larger crew of up to 15 workers. This limited activity should not be considered as similar to recreational activity by volume, space or temporal extent.

We have additional concerns related to commercial aquaculture operations during the fall shorebird migration period (August - October), because the proposed site is immediately adjacent to one of the most highly used shorebird foraging areas in Dungeness Bay (Sanguinetti 2003, Thomas 2005). Commercial aquaculture activities will be concentrated in and adjacent to this high use area and impacts, as described above, are likely

JST Response: USFWS could have used their own bird survey data to provide more insight on this stated concern. The DNWR Legacy data was collected across all seasons from 1994-1999 – a time period when ~20 acres of oyster farming was occurring at the same project site. This data clearly indicates that shorebirds distributions were highest in areas that were within or in close proximity to the active oyster farm site (Figure 5; Appendix A). In contrast, the more recent Avian Shoreline data (2013-2015), shows the highest shorebird use area is not associated with the project area, and represents a time period

when the farm site was fallow. DNRW's own data suggests that oyster cultivation activities did not deter or negatively impact waterfowl or shorebirds near the project site.

Shoreline retrieval of aquaculture gear from August 1 - May 14, and retrieval from growing or standing eelgrass would also cause impacts from human disturbance and/or habitat alteration.

JST Response: Jamestown has communicated directly with USFWS about gear loss surveys and best methods for retrieval. Jamestown is uncertain why this is identified as a cause of impact, given our commitment to work cooperatively with USFWS.

Based on the likely impacts to migrating and wintering shorebirds and waterfowl within the highest use area for these species groups on the Refuge, we recommend that an alternate site be identified in a location that results in less potential impacts to wildlife, is appropriate for commercial aquaculture, and meets the goals of the Tribe.

JST Response: We refer back to our earlier responses regarding the use of the terms 'likely' and 'highest use area'. The Tribe is appreciative that USFWS wishes to see the Tribe meet its goal of resuming shellfish operations.

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