

**Addendum to the Avian Monitoring Plan for Jamestown’s Dungeness Bay Oyster Farm
For Clallam County Department of Community Development
February 24, 2022**

This document serves to identify specific updates and clarifications to the Avian Monitoring Plan (dated June 9, 2021) prepared by the Jamestown S’Klallam Tribe for the U.S. Army Corps of Engineers. These updates are based on technical recommendations by 3rd party environmental and statistical consultant, WEST Inc., as requested by Clallam County Department of Community Development. Additions to the original Plan are identified below and organized by section/subsection.

Plan Summary and Details :

This plan will be tested in the field and is intended to be flexible to adjust to unexpected situations and to best meet the stated goal and monitoring objectives. As such, the first year of data collection will be treated as pilot observations and will be used to determine if adjustment in sampling intensity, sample units and data collection tools are needed. This will help ensure that subsequent years of data collections are consistent and will meet the monitoring objectives.

1. Spatial Sample Units:

a. Site selection.

- iii. The location of each 0.5-acre monitoring plot will be selected randomly within the designated area of each cultivation type: on-bottom bags and beach oysters, between a tidal elevation of +1 ft. and -1 ft. MLLW. Replicate monitoring plots will be separated by a minimum of 50 meters. To ensure that the monitoring plots are not spatially clustered, a spatially balance sampling method will be implemented (as feasible) once the designated on-bottom bag and beach oyster cultivation areas within the lease are established.

2. Monthly Observations:

a. Bird counts and response observations

- i. At least monthly observations (“sampling events”) will be recorded by an expert birder, trained farm worker or Tribal biologist on target bird species (see section 3, Target Birds). To ensure that observers are properly trained, and detection rates are standardized, the Tribe will work with a skilled avian observer during the first year of pilot observations. The skilled observer will serve to:
 - 1. Determine the appropriate level of identification: “target species” vs. “species groups”, under various environmental conditions (e.g., light, weather, seasonal).
 - 2. Prioritize which target species or groups are sampled first if multiple species/groups are present.
 - 3. Train new observers to identify and count target species or groups, and provide consistent training to standardize data collection across observers. Counts will be compared between the skilled observer and trainees to ensure accuracy and consistency.
- ii. Five types of observational data will be collected during each sampling event to acquire the identified Measurement Variables (see section 4: Measurement Variables):
 - 1. Initial observations of the entire lease area will be made to identify overall bird presence and identified by species or bird group.

2. Counts and behavioral observations of undisturbed target waterfowl within the eelgrass conservation area.
 3. Presence/Absence, counts and behavioral observations on undisturbed (prior to on-site arrival of farm workers) target birds within monitoring plots timed with the receding tide and aligned with seasonal presence at the site (Table 1).
 4. Behavioral observations of target bird species in response to oyster farm activities.
 5. Presence/Absence, counts and behavioral observations on target birds within monitoring plots after farm activities are completed.
- iv. Observations within the eelgrass conservation area will be handled separately due to the sensitivity of the area. Rather than collecting observational data within discrete plots, counts and behavioral observations will be made systematically by scanning the entire area within a specified period of time. Because eelgrass observations will be collected using a different sampling methodology, analysis of the data will be handled separately from monitoring plots within the cultivation area. Direct comparisons will not be made.
- xiii. It is recognized that detectability may be influenced by seasonal light conditions (day vs. night) and behavioral responses of birds may be influenced by use of traditional lights at night. As such, the feasibility and accuracy of nighttime observation will be evaluated by the expert observer during the first year of pilot observations. Additional amendments to this Plan will be made to account for changes in sampling methodology (e.g., use of night-vision aids, spotlight with infrared lenses or cameras) and data handling associated with nocturnal observations. For example, it may be identified that analysis of diurnal and nocturnal data must be handled separately to avoid confounding time-of-day effects with seasonal comparisons.

3. Target Birds:

Select bird species and species groups identified for targeted monitoring may be reassessed following recommendations from the expert observer during the pilot year observations. Additional amendments to this Plan will be made to clearly document any changes in target birds.

4. Measurement Variables:

a. *Variables* (additional to those listed in the Plan)

- Start/end time of observations
- Start/end times of target farm disturbances
- Number of farm workers
- Counts of target shorebirds and waterfowl and other birds of interest (e.g., gulls, eagles) within monitoring plots.
- Counts of target waterfowl and other birds of interest within eelgrass conservation area.

*If counts of target birds cannot be accurately obtained due to environmental conditions (weather, light, etc.) then ratio scale data will be collected, including true zero class for presence/absence.

- Behavioral Observations:

- Disorientation in response to farm worker headlamps/lights (Y/N)

b. Data recording

- ii. Initial observations of bird groups/species present within the lease area will be recorded on the first observational pass. Counts of target birds pre-farm activity will be recorded on the second observational pass of the monitoring plots and eelgrass conservation area; behavioral observations will be recorded on a third pass during farm activity and counts of target birds post-farm activity and will be recorded on the fourth pass of the monitoring plots.

5. Adaptive Management and Mitigation Measures:

- a. Tribal staff will work closely with the expert observer to define and identify adverse/negative responses to farm activities. Quarterly reviews of photo records, video observations and field logs will also be reviewed for any apparent negative responses to specific farm activities. Such adverse responses may include, but are not limited to, flushing, running, or diving without resuming pre-disturbance activity; avoidance of critical foraging habitat; and entanglement, injury or death.
- b. Once specific adverse/negative responses are defined, thresholds will be determined for when an adaptive management measure or mitigation action is required. If such negative responses are identified and established thresholds are met, tribal staff will work with farm staff to establish in-season mitigation measures to lessen or eliminate the adverse impact whenever possible.
- c. All implemented mitigation responses will be recorded in the field log (e.g., type of mitigation measure & date implemented) and monitoring activities will continue as described in the Plan to assess effectiveness of the response.
- d. If entanglement, injury or death resulting from a farm activity is identified, the observer will provide immediate notice to Tribal Natural Resources staff who will ensure all reporting requirements are followed in compliance with the terms and conditions of the project permits and lease. Immediate corrective action will be taken to ensure that no further harm will occur.

6. Data Analysis:

a. Quantitative Assessments

iv. Flushing frequency:

- 1. At a minimum, the frequency of flushing will be calculated , both with and without resumption of activity, as a proportion of total observations.
- 2. If deemed feasible through pilot observations, flushing distance will also be measured to compare the degree of disturbance from target farm disturbance.

- v. Nominal data (Y/N and Presence/Absence) collected on behavioral observations will be quantified and summarized by either the species or species group level.

b. Statistical Analysis

The acquired observation data collected from monitoring plots and eelgrass habitat will be carefully reviewed to determine the appropriate analysis to use and assure that assumptions for the selected statistical test are not violated. Examples of the types of analysis that may be implemented include descriptive statistics, Chi-square McNemar Test for repeated measures or generalized linear mixed models (GLMMs).