

FINFISH AQUACULTURE SITE AQUACULTURE STEWARDSHIP COUNCIL REPORT VANTAGE, SECHELT INLET, BC

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SURVEY TYPE: ASC

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PREPARED FOR:

*GRIEG SEAFOOD BC, LTD
#106 3001 IRONWOOD STREET
CAMPBELL RIVER, BC
V9W 5P7*



1310 Marwalk Cres
Campbell River, BC.
V9W 5X1
phone: (250) 287-2462
fax: (250) 287-2452
email: info@mainstreambio.ca
www.mainstreambio.ca



Summary

This document presents the results obtained during attempted sediment grabs during the Aquaculture Stewardship Council (ASC) survey completed at the Vantage finfish aquaculture site operated by Grieg Seafood BC Ltd. in Sechelt Inlet, BC, on April 23, 2020. Attempts to collect sediment and analysis of the data was completed according to the *Aquaculture Activities Regulations* (AAR) and adapted to address Criterion 2.1 and 5.2 of the Aquaculture Stewardship Council (ASC) Salmon Standard.

The Vantage site is considered a hard bottom site for AAR purposes and all AAR locations have previously been confirmed to be hard bottom. Sediment grabs cannot be obtained from these locations. The ASC survey completed on April 23, 2020 focused on attempting to collect sediment at the predetermined ASC sampling locations.

Sediment could not be successfully collected from any of the sampling stations during the survey completed on April 23, 2020 and therefore the associated sediment analysis and testing could not be completed.

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1.0 Introduction

This document presents the attempts to collect marine sediment and the data collected as part of a benthic study completed at the Vantage finfish aquaculture site operated by Grieg Seafood BC Ltd (Campbell River, BC). The Vantage site is located in Sechelt Inlet, BC (Figure 1).

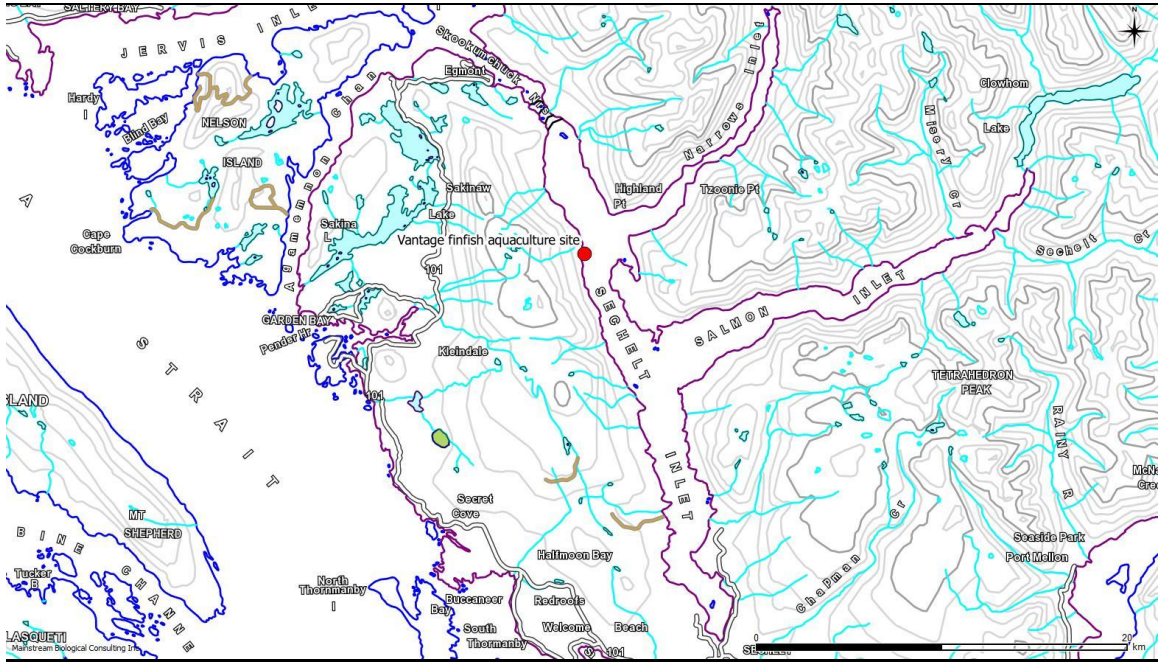


Figure 1: An overview map showing the approximate location of the Vantage finfish aquaculture site (red dot) in Sechart Inlet, BC.

The study was completed by adapting the methodology required for operational monitoring of waste dispersion required under *Aquaculture Activities Regulations* (AAR) and comparing the results with the indicators listed in Criterion 2.1 of the Aquaculture Stewardship Council (ASC) Salmon Standard. Additional analysis of the collected sediment was also completed to address Criterion 5.2 of the ASC.

The purpose of the ASC Salmon Standard is to evaluate concerns of potential environmental impact related to salmon farming. The Standard is based on a combination of requirements and performance levels that must be reached in order to determine if potential impacts are being addressed. Principle 2 of the Standard addresses the “*potential impacts from salmon farms on natural habitat, local biodiversity and ecosystem function*” (ASC, 2012).

This survey was specifically designed to address Criterion 2.1 within Principle 2 of the ASC Salmon Standard which involved the collection of sediment within and outside of the Allowable Zone of Effect (AZE). If collected, sediment was analyzed for redox potential and sulphide levels to evaluate benthic habitat conditions. In addition, if sediment was collected, testing for parasiticide residue in sediment collected at the two reference stations and at the stations outside the AZE was completed to address Criterion 5.2.1 of the ASC.

If sediment was collected an assessment and identification of the benthic organisms present in the sediment was not completed to evaluate for potential impacts to habitat.

biodiversity and ecosystem function, as BC salmon farms have been granted a variance to Indicators 2.1.2 and 2.1.3 and instead rely on the scientifically proven and federally regulated sulfide surrogates (ASC VR224).

2.0 Methods

Sampling had never been attempted at the ASC locations at the Vantage finfish aquaculture. Therefore, the field activities involved the attempted collection of sediment samples for physical and chemical analysis at each of the sampling stations.

2.1 Field Sampling

The locations of sediment sampling stations were provided by Grieg Seafood BC Ltd.

Individual sediment sampling stations were located along three Transects A, B, and C. Stations within the AZE were located 5 m inside the 1 g DEPOMOD contour (Figure 2) for all three transects and also at the perimeter of the containment system for Transects A and B. Stations outside the AZE were located 25 m outside of the 1 g DEPOMOD contour. Additional stations were established at two reference sites within the range of 500 m to 1000 m from the aquaculture containment system as outlined in the ASC Salmon Standard.

Sediment collection was attempted using a Petite Ponar sampler. Three grab attempts were made at each station, with the exception of the 0B station which could not be accessed due the presence of a float house and its associated anchor lines.

The coordinates of the sample locations were recorded using a Trimble GeoExplorer GeoXT (Firmware v1.05) using TerraSync 3.30 software and equipped with an external Hurricane antenna.

Data filters were set to standards recommended by the Resource Inventory Standards Committee (RISC)¹, with at least 15 fixes taken per location, using satellites greater than 15 % above the horizon with signal to noise ratios (SNR) greater than 40 and a horizontal dilution of precision (HDOP) of five. The GPS data was corrected post-mission with Pathfinder Office v5.40 software using data from the Naniamo base station (NANO).

The Trimble antenna was attached to the grab davit and positional fixes were obtained while the grab was completing the estimated bottom third of its descent. Positional fixes were completed when the grab was on the bottom and the drop line was as close vertical as possible.

¹ Integrated Land Management Bureau. 2008. Province of British Columbia Standards, Specifications and Guidelines for Resource Surveys Using Global Positioning System (GPS) Technology. Release 4.0d.

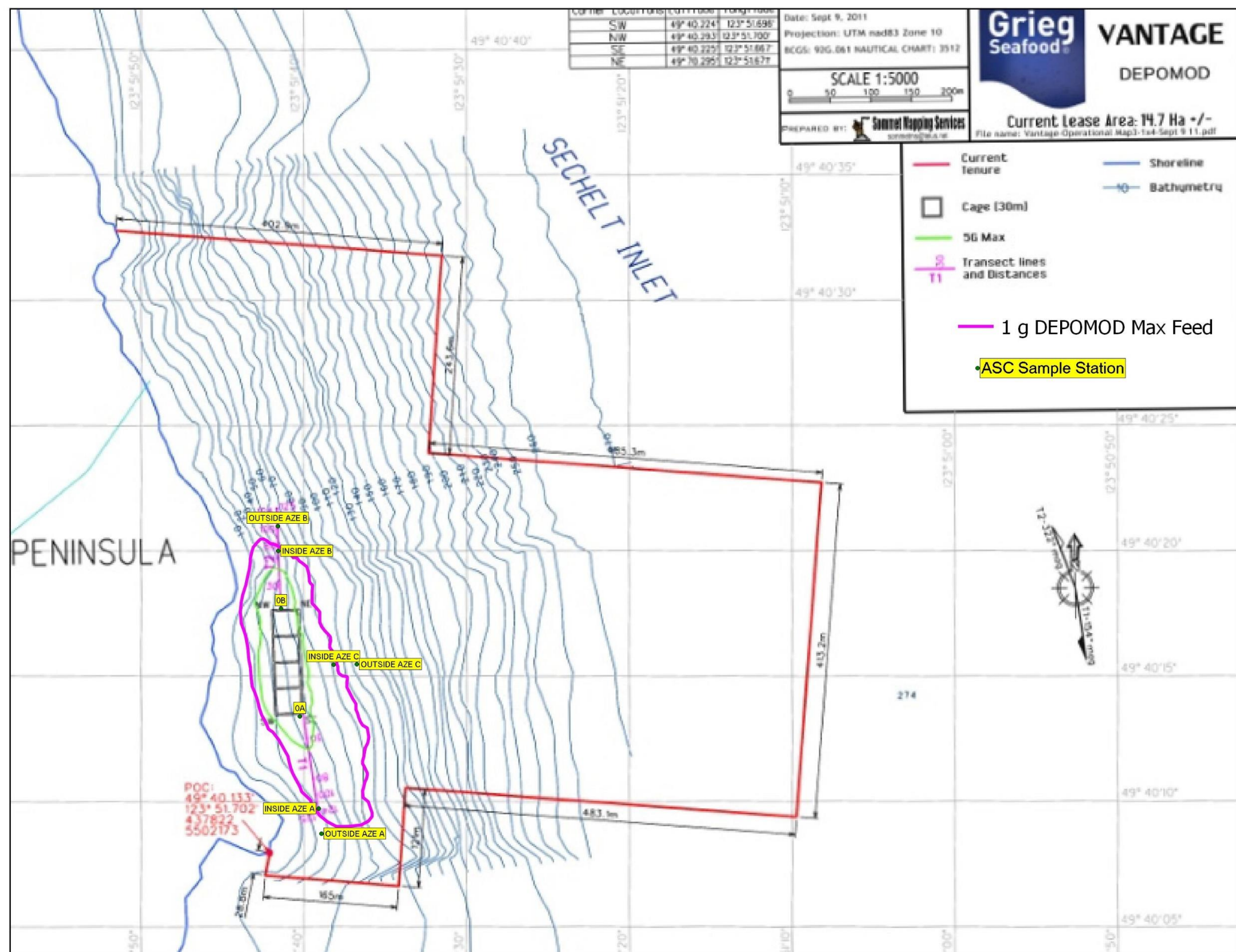


Figure 2: The locations of the sampling stations for the ASC survey at the Vantage finfish aquaculture site in relation to the pen system and surrounding area on April 23, 2020.

The time at which each grab was attempted and physical characteristics of the collected sediment were recorded. A digital photograph of each attempted grab was also taken. As per Indicator 2.1.1, levels of free sulphides and redox potential of each sediment sample were measured in the field using an Orion A324 meter and the appropriate ISE probes if sediment was obtained. A digital thermometer was used to measure the temperature of any collected sediment.

As per Indicator 5.2.1, portions of the grab samples collected at the stations outside the AZE on Transects A, B and C as well as the reference stations were retained for analysis if sediment was obtained. Any retained samples were stored at 4° Celsius and transported to SGS Canada Inc for analysis for emamectin benzoate and florfenicol.

2.2 Data Analysis

In order to evaluate if the benthic conditions at and near the Vantage site met the requirements of Criterion 2.1 of the ASC Salmon Standard, if sediment was obtained the data collected was compared to required levels for indicators of potential finfish farm impacts. These indicators represent a combination of chemical and biodiversity measurements to evaluate the status of benthic health, biodiversity and ecosystem function and to detect potential impacts related to the salmon farm operation. The indicators considered for this assessment are summarized below in Table 1.

If sediment was obtained, additional analysis of parasiticide residue was completed to fulfill the requirement for monitoring of these chemicals but there is no required level presented in the ASC to compare these results to.

Table 1: Summary of indicators of benthic health, biodiversity and ecosystem function that were considered during the evaluation of the Vantage finfish aquaculture site. The indicators have been adopted from Criterion 2.1 of the ASC Salmon Standard.

Criterion Number	Indicator	ASC Salmon Standard Requirement
2.1.1	Redox potential in sediment outside the AZE ¹ .	>0 millivolts (mV)
2.1.1	Sulphide levels in sediment outside the AZE.	≤1500 microMoles / L (µM)

1: AZE = Allowable Zone of Effect

3.0 Results and Discussion

Representative photographs of grab attempts at each sampling station are presented in Appendix 1. Sediment could not be successfully obtained at any of the ASC sampling stations during the survey on April 23, 2020. The results and location of each attempted grab are presented in Table 2.

Grab attempts could not be made at the 0B station as a float house and its associated anchors blocked access to the sampling station location.

3.1 Redox Potential and Sulphide Levels

As sediment could not be obtained at any of the sampling locations the results of redox potential and sulphide testing at the stations outside the AZE could not be analyzed to help evaluate if the Vantage facility was meeting the Criterion 2.1.1 of the ASC Salmon Standard.

3.2 Parasiticide Residue

Analysis of the sediment collected from the stations outside the AZE on Transects A, B, C and the two reference stations for emamectin benzoate and florfenicol was not completed as sediment could not be obtained at any of the ASC sampling locations.

Table 2: The location and result of each attempted grab at the Vantage site during the ASC survey completed on April 23, 2020.

Station	Grab Attempt	Latitude	Longitude	Depth (m)	Distance from Site (m)	Comment
0A	1	49 40.22272	123 51.67387	39.3	0	Skiff of sludge, mussel shell, piece of wood, abundant fish feces.
0A	2	49 40.22264	123 51.67375	39.3	0	Empty.
0A	3	49 40.22265	123 51.67381	39.3	0	Three mussel shells.
Inside AZE A	1	49 40.16253	123 51.64725	35.5	116	One piece of brown algae.
Inside AZE A	2	49 40.16210	123 51.64962	34.8	116	Empty.
Inside AZE A	3	49 40.16157	123 51.65276	34.7	116	
Outside AZE A	1	49 40.14561	123 51.64858	23.2	147	One piece of cobble.
Outside AZE A	2	49 40.14460	123 51.65658	22.7	147	One moon jellyfish.
Outside AZE A	3	49 40.14552	123 51.64816	25.1	147	Skiff of shell hash.
0B	0	-	-	-	0	House and anchors preventing access to station.
Inside AZE B	1	49 40.33268	123 51.68965	24.3	72	Two moon jellyfish.
Inside AZE B	2	49 40.33298	123 51.68782	23.6	72	Green sea urchin.
Inside AZE B	3	49 40.33094	123 51.69758	24.0	72	1 cm of sand.
Outside AZE B	1	49 40.34735	123 51.68847	37.9	102	One hydroid.
Outside AZE B	2	49 40.34586	123 51.69871	38.9	102	Skiff of sand and three pieces of gravel.
Outside AZE B	3	49 40.34642	123 51.69579	40.7	102	Four green sea urchins.
Inside AZE C	1	49 40.25998	123 51.63127	75.7	41	One brittle star.
Inside AZE C	2	49 40.25817	123 51.63082	74.7	41	One piece of cobble.
Inside AZE C	3	49 40.25978	123 51.63126	74.7	41	Four brittle stars and two green sea urchins.
Outside AZE C	1	49 40.25876	123 51.60454	106	71	Two pieces of cobble.
Outside AZE C	2	49 40.25634	123 51.60428	106	71	1 cm of gravel with a skiff of mud. Not sufficient for sampling.
Outside AZE C	3	49 40.25878	123 51.60456	1066	71	A dozen pieces of gravel.

4.0 References

- Aquaculture Stewardship Council. 2012. ASC Salmon Standard Version 1.3. Available online: www.asc-aqua.org.
- Salas, F., Patrício, J. and Marques, J.C. 2006. Ecological Indicators in Coastal and Estuarine Environmental Quality Assessment - A user friendly guide for practitioners. Imprensa da Universidade de Coimbra.

Appendix 1 – Sample Photographs



Photo 1

Typical grab result at the 0m station on Transect A at the Vantage site on April 23, 2020.



Photo 2

Typical grab result at the station inside the AZE on Transect A at the Vantage site on April 23, 2020.



Typical grab result at the station outside the AZE on Transect A at the Vantage site on April 23, 2020.



Photo 4

Typical grab result at the station inside the AZE on Transect B at the Vantage site on April 23, 2020.



Photo 5

Typical grab result at the station outside the AZE on Transect B at the Vantage site on April 23, 2020.



Photo 6

Typical grab result at the station inside the AZE on Transect C at the Vantage site on April 23, 2020.



Photo 7

Typical grab result at the station outside the AZE on Transect C at the Vantage site on April 23, 2020.