Clayoquot Sound Weather Station Field Report

(CruiseID: 2023-063)

Glenn Cooper June 2023

Overview:

In collaboration with Cermaq, a meteorological network was established in the Clayoquot Sound in December of 2017, and were last serviced in January 2023. Figure 1 shows present operational and historical weather station sites.

From Jan. 16th to 22th 2023 (CruiseID: 2023-015), Kenny Scozzafava and I visited the area to finish the installations in the northern region, installed a remote station in Herbert Inlet (Binns), as well as serviced the southern region stations. We were unable to install a station on the Bawden farm as the site was still under construction and was to have the number of pens expanded.

Since the last visit, I was advised of changes to the some of the sites: Bawden farm was now operational, Plover weather station had endured significantly damage and site might be shutting down. On June 5th, Colin Webber and I returned to Clayoquot sound with the OSD small vessel Doug Anderson, to deal with these issues as well as collect physical oceanographic data and zooplankton samples, which were collected on January's trip.





Field Objectives:

- 1. Re-establish online weather stations on Cermaq Bawden farm.
- 2. Either repair or remove the weather station on Plover based on the farms future operations.
- 3. Service and download internally logged data from Herbert Inlet land based weather station, named Binns station.
- 4. Perform maintenance and repairs on all the Northern and Southern region farm weather stations.
- 5. Perform CTD casts at Dr. Cheryl Greengrove's (University of Washington Tacoma) historical sampling sites using an RBR CTD with a dissolved oxygen, fluorometer and turbidity sensor.
- 6. Collect zooplankton samples using a SCOR net at the following sites: Bedwell 2, Herbert 3, Shelter 4, Tofino 2, and Warren Bay.

Objective Results:

 <u>Bawden:</u> A new Davis Vantage Pro2 weather station (S/N: BF220209093) was installed on the farm. In conversation with the site manager, Tony Zheng, they are still in the permitting process to extend the farm by 2 more cages but this was the case when I was last visited the site. It was unclear if this would happen so we decided to go ahead and install the weather station at the end of the system anyways. No repeater was necessary as the signal strength was good enough. Anemometers was orientated to True North.

Station Name	Latitude	Longitude	Notes
			Installed (ID#1) and online June 7, 2023 @ 12:35
Bawden	49° 18.5346	126° 0.4206	PST.

- <u>Plover:</u> The weather station was severely damaged. The anemometer was completely missing, and the front panel door was completely torn off, and in it's place was a taped on Zip Lock bag. Surprisingly David Guhl, site manager, seemed unaware of the significant damage to the weather station. David mentioned that the site was shutting down, they were getting a new system and barges. The site would be operational again around Nov. 2023. With that information we completely recovered all the components from the site.
- 3. <u>Binns Station</u>: Downloaded data and performed a quick analysis to confirm everything was working properly. WittyPi light was blinking and last download had occurred at 00:05 on the day of site visit. Replaced ISS battery, new desiccant, checked and adjusted guy wires, and cleaned solar panel.
- 4. No issues with Northern Region weather station sites. All anemometers were still orientated to True North. However there were issues with Southern region stations:

- 4.1. <u>BareBluff</u>: Site to be moved from present location to McIntyre Lake location in the coming months (Figure 1). To avoid damage and incorrect data collection, weather station and 1 meter sea surface temperature probe were removed. Weather station is presently stored in the barge's Acid Silage room. Console and data logger were left in the office but disconnected from internet and power so not to upload erroneous data.
- 4.2. <u>Bedwell</u>: I was surprised to find that the Bedwell farm was no longer there but had been moved to the other side of Bedwell Sound and now at the West Side site. I was not informed of this and thus we found the anemometer orientation to be at 117^o True. Need to determine when this occurred and flag the data accordingly.
- 4.3. <u>West Side:</u> Station converted over from Bedwell to West Side @ 12:15 local time. Anemometer orientated to True North. Lat: 49° 16.741, Long: 125° 49.730. ISS battery replaced. Confirmed online and uploading data as West Side.
- 4.4. <u>Fortune:</u> No issues found with site. Replaced ISS battery and confirmed online and uploading data upon departure. Pens maybe extended but date uncertain.
- 5. A total of 46 CTD casts were completed using a RBR Maestro CTD (s/n 208765) with a Fluorometer (Chlorophyll a Turner Cyclops 7F s/n 2110792), Dissolved Oxygen sensor (JFE Advantech Rinko III BT s/n 0447), Turbidity Sensor (Seapoint s/n 208765). CTD site locations are listed in Table 1 and also shown in Figure 5. CTD sampling locations are based on Cheryl Greengrove's (University of Washington) sites who has been collecting both physical and chemical data from these sites since 2011.
- 6. Zooplankton samples were collected from the deepest locations in Shelter, Herbert, Bedwell, Warn and Tofino Inlets, using a 60cm in length SCOR net with a 250um mesh size. All casts were a vertical net tow and samples preserved in 10% buffered formalin (Table 1 net). Samples were returned to IOS and will be processed by the OSD Ecology group.

Table 1. CruiseID 2023-063 CTD and SCOR net sampling sites.

	Cast					
Cast Date	Time		Event			
(UTC)	(UTC)	Event#	Туре	Station Name	Latitude	Longitude
2023-06-07	23:02:17	1	CTD begin	Sydney head	49.50250	-126.29247
2023-06-07	23:11:36	2	CTD begin	Sydney1	49.48743	-126.28457
2023-06-07	23:23:08	3	CTD begin	Sydney2	49.46973	-126.27511
2023-06-07	23:35:47	4	CTD begin	Sydney 3	49.43753	-126.25907
2023-06-07	23:43:17	5	CTD begin	Sydney 4	49.42679	-126.24362
2023-06-08	00:09:19	6	CTD begin	Sydney shelter confluence	49.39943	-126.24376
2023-06-08	00:19:11	7	CTD begin	Sydney 5	49.37129	-126.24416
2023-06-08	00:29:52	8	CTD begin	Shelter mouth	49.39859	-126.21552
2023-06-08	00:41:20	9	CTD begin	Shelter 6	49.38943	-126.18563
2023-06-08	00:52:26	10	CTD begin	Shelter 5	49.39401	-126.16218
2023-06-08	01:01:37	11	CTD begin	Shelter Millar confluence	49.40064	-126.13657
2023-06-08	01:10:36	12	CTD begin	Shelter 4	49.41337	-126.12975
2023-06-08	01:29:05	13	Net begin	Shelter 4 SCOR net	49.41354	-126.12986
2023-06-08	02:00:13	14	CTD begin	Shelter 3	49.42383	-126.10778
2023-06-08	02:12:15	15	CTD begin	Shelter 2	49.42524	-126.08541
2023-06-08	02:24:00	16	CTD begin	Shelter 1	49.42785	-126.05412
2023-06-08	02:33:38	17	CTD begin	Shelter head	49.43965	-126.04636
2023-06-08	18:46:54	18	CTD begin	Herbert head	49.40893	-125.90692
2023-06-08	18:57:54	19	CTD begin	Herbert 1	49.39259	-125.93871
2023-06-08	19:10:40	20	CTD begin	Herbert 2	49.36082	-125.94497
2023-06-08	19:25:24	21	CTD begin	Herbert 3	49.32800	-125.97769
2023-06-08	19:38:22	22	Net begin	Herbert 3 SCOR net	49.32807	-125.97800
2023-06-08	20:04:39	23	CTD begin	Herbert Mouth	49.31280	-126.01244
2023-06-08	20:27:20	24	CTD begin	Millar Channel North	49.38039	-126.08565
2023-06-08	20:46:42	25	CTD begin	Millar Channel South	49.33707	-126.06832
2023-06-08	21:01:16	26	CTD begin	Herbert Mouth South	49.29589	-126.03610
2023-06-08	21:14:12	27	CTD begin	Herbert sill	49.26030	-126.03797
2023-06-08	21:22:39	28	CTD begin	Herbert Russell Channel Confluence	49.23592	-126.03172
2023-06-08	21:42:04	29	CTD begin	Hecate Bay	49.23583	-125.94036
2023-06-08	21:53:20	30	CTD begin	Cypress bay	49.24928	-125.87509
2023-06-08	22:17:53	31	CTD begin	Bedwell mouth	49.35238	-125.78815
2023-06-08	22:26:44	32	CTD begin	Bedwell 1	49.33574	-125.80478
2023-06-08	22:38:50	33	CTD begin	Bedwell 2	49.29751	-125.81100
2023-06-08	22:47:41	34	Net begin	Bedwell 2 SCOR net	49.29769	-125.81104
2023-06-08	23:08:52	35	CTD begin	Bedwell mouth	49.27038	-125.82119
2023-06-08	23:25:07	36	CTD begin	Warn Bay	49.23744	-125.75737
2023-06-08	23:38:13	37	Net begin	Warn Bay SCOR net	49.23768	-125.75780
2023-06-09	01:14:42	38	CTD begin	Fortune channel	49.18554	-125.76251
2023-06-09	01:33:38	39	CTD begin	Tofino Browning passage	49.11950	-125.79771
2023-06-09	01:43:35	40	CTD begin	Tofino Browning passage 2	49.12966	-125.84604
2023-06-09	01:51:33	41	CTD begin	Tofino Browning passage 3	49.14176	-125.87599

2023-06-09	21:46:14	42	CTD begin	Tofino head 1	49.22775	-125.59826
2023-06-09	21:56:13	43	CTD begin	Tofino 1	49.20858	-125.61033
2023-06-09	22:08:52	44	CTD begin	Tofino 2	49.19581	-125.64917
2023-06-09	22:18:36	45	Net begin	Tofino 2 SCOR net	49.19604	-125.64900
2023-06-09	22:45:23	46	CTD begin	Tofino 3	49.18177	-125.64749
2023-06-09	22:55:45	47	CTD begin	Tofino 4	49.16121	-125.66474
2023-06-09	23:08:31	48	CTD begin	Tranquil head	49.19638	-125.67450
2023-06-09	23:17:42	49	CTD begin	Tranquil mouth	49.16553	-125.69035
2023-06-09	23:26:00	50	CTD begin	Tofino 5	49.15091	-125.69326
2023-06-09	23:35:10	51	CTD begin	Tofino 6	49.13430	-125.71646
2023-06-09	23:46:29	52	CTD begin	Tofino 7	49.12571	-125.76437
2023-06-09	23:55:17	53	CTD begin	Tofino Browning passage 1	49.11922	-125.79738
2023-06-10	00:04:31	54	CTD begin	Tofino Browning passage 2	49.12965	-125.84601
2023-06-10	00:12:19	55	CTD begin	Tofino Browning passage 3	49.14166	-125.87619

Problems and Concerns:

We encountered several significant problems on this mission but were still able to complete all of the work objectives.

The first major and potentially serious issue encountered was the discovery of the Anderson's trailer back right bearing and axile were completely destroyed. Most likely this would have catastrophically failed on transit to Tofino. Luckily this was identified just as we were leaving the IOS compound so no damage to personal or equipment occurred. This delayed the trip by a day as we tried to get the trailer fixed but due to the extend of the damage this was not going to occur in a timely fashion. Fortunately the trailer for the OSD Pinniger boat could accommodate the Anderson and so it was used for the rest of the trip.

Three days before our departure to Tofino, a forest fire broke out along Highway 4 near Cameron lake. We were able to get through, but while working in Tofino, the forest fire spread resulting in a concern of the highway's slope stability. Thus the Province closed the highway and an alternate route was opened which utilizing logging roads to Cowichan Lake. This was now the only way to get back to the eastern side of Vancouver Island. It was not reasonable nor advisable to tow the boat along this alternate route. Fortunately David Spear found a solution. He was able to find a contact at the DFO Port Alberni office which allowed us to store the boat and trailer in their compound until Highway 4 reopened.

Once again we have run into issues with Cermaq fish farms either being moved or shut down, as well as one weather stations being severely damaged. Rarely am I notified of these changes or events. Unfortunately this results is either erroneous or a loss of data. In contrast, the remote self logging weather station in Herbert Inlet had performed flawlessly albeit a rather new station.

Conclusions and Acknowledgements:

Surprisingly all of the mission objectives were met even with the challenges encountered. Meteorological data in being collected in both the northern and southern regions of the sound and the mission further increased the amount of physical oceanography data collected within the region. Furthermore we were able to collect zooplankton samples for the Ecology group for a second time.

I would like to thank both Commanding Officers of the Tofino Canadian Coast Guard base for allowing us to dock our boat at their wharf. This saves us considerable amount of time not having to launch and recover the boat each day.

Thanks of Eric Zimmerman at the Port Alberni DFO site, for allowing us to store the boat and trailer while Highway 4 was closed due to the Cameron Lake forest fire. Thank you David Spear for providing ground logistics support in finding a solution to this problem.

Thank you Colin Webber for all your hard work and assistance before, during and after the mission. Also thanks for recovering the Anderson from Port Alberni and enduring all of the challenges that you encountered on your return to IOS.