

Vector Survey 2023 – Cruise Log



<u>Dates -</u> May 17th to June 8th, aboard the Coast Guard Ship Vector <u>Location</u> – Central Coast (Figure 1).

<u>Partners/Collaborators</u> – DFO, Gitga'at, Haisla, Metlakatla, Lax Kw'Alaams, Ocean Diagnostics <u>Survey Tools</u> - Intertidal Boat, SBE-55 rosette eDNA equipment, underwater cameras, Beach Seine, drones

Description

This collaborative survey will assess intertidal and subtidal habitats and species from the North and North Central Coast of British Columbia. We will also assess species diversity in deep fjords of Douglas, Ursula and Gardner Channels. Findings will support marine conservation initiatives and contribute to long-term monitoring.

Objectives

- 1. Conduct intertidal fish and invertebrate surveys including aquatic invasive species using standard and novel technologies such as environmental DNA and drones.
- 2. Conduct marine debris surveys and clean-ups.
- 3. Conduct opportunistic surveys of bird and terrestrial mammal use of intertidal habitat using wildlife cameras.
- 4. Collect water samples for eDNA and microplastic analysis.

<u>Methods</u>

Beach Seine eDNA surveys

The focus of this survey method is to collect data on composition of nearshore fish assemblages identified using traditional seine-net capture method.

eDNA surveys

Environmental DNA (eDNA) extracted from seawater to be used to collect baseline biodiversity data at our intertidal and beach seine sites. Water samples were also taken at depth (10m off bottom) at sites within Rockfish Conservation Areas and Marine Conservation Targets zones to collect baseline diversity using the ECO SBE-55 rosette sampler. CTD, O2 and fluorometer sensors were also attached to rosette. Nutrient profiles were also conducted at 6 depths at various sites in Ursula Channel and Gardner Canal.

Intertidal Biodiversity Surveys

The purpose of this survey is to conduct comprehensive intertidal biodiversity and habitat assessments of rocky and soft sediment intertidal beach habitat. Epifauna (i.e. organisms that live on the surface), infauna (i.e. organisms that live within the sediment) were surveyed (at

soft sediment sites) along with substrate composition. This survey supports a long-term goal to obtain baseline information on biological and habitat characteristics of intertidal habitat across the coast of BC in support of marine conservation, marine spatial planning and emergency response planning.

Drone Surveys of Beaches

Drone surveys will be completed at beach to obtain information on habitats with these intertidal areas

Baited Remote Underwater Video System (BRUVs)

Stereo baited underwater cameras were used to assess subtidal fish diversity in the vicinity of our intertidal sites. We deployed three BRUV units at least 300m apart for 1.5 hours. The stereo system of cameras allows for analyses of fish size and we will also calculate relative abundance and fish diversity.

Zooplankton

One bongo net pull was deployed at a long-term zooplankton site in the MCT zones in Douglas Channel on Leg 1.

Daily Log:

- Leg 1 May 17 May 28
- Leg 2 May 28 June 8

May 17	Loaded at PBS, Nanaimo. Left PBS around 19:00 en route to Wright Sound.
	Stayed on outer coast until Aristizabal Island to save time.
May 18	Continued transit from previous day. Complete FAM with CCG second office
	Sebastian. Science crew prepped field gear and organized lab. Seas rolly at
	times so worked a split shift.
May 19	First Intertidal day - Vector arrived at first site (Gil Rock) at 3-4am from long
	transit from PBS (~33 hours total). Intertidal team left Vector in two boats (Red
	Ape and Palmira) at 0500 to sample Gil Rock site. Red Ape crew (Michelle,
	Kaylee, Cynthia, Cole, and Shannon) did drones surveys and intertidal while
	the Palmira (Amy, Sharon, Emily) did BRUVs, and seine at eelgrass meadow at
	bay just north of intertidal site. Main site was rocky, but around the point was
	a nice eelgrass bed. Two fish seines, caught Dolly Varden. 3 Bruv were
	deployed and we all returned to Vector by 13:20. Rest of day washing gear,
	filtering water samples, downloading and backing up data, and prepping for
	next day.
May 20	Intertidal Day 2 – departed Vector at 0500 on two boats, Palmira and Red Ape.
	Arrived at site (NW Farrant Island) at 5:20. Red Ape crew (Michelle, Shannon,

	Kayleigh, Cole and Cynthia) left first and were unpacking when Palmira (Emily, Sharon, Amy) arrived. NW Farrant site not suitable for seining so we went around the Bay to a nice eelgrass site. We decided to BRUV first and then seine as tide was still going out and we wanted a better substrate to seine (mud and cobble beach). We set three BRUVs, at least 300m apart. BRUV site one was on the edge of eelgrass, 2, was near a wall and 3 was near a wall around a corner from a bedrock point. We anchored both boats. Did two seine sets, lots of nice fish. Picked up BRUVs and returned back to boat (Red Ape crew finished at same time) and both on board Vector by 12:45 and did fire/abandon ship drill at 1pm.
May 21	Intertidal Day 3 - departed Vector at 5:45 on Palmira (Emily, Sharon and Amy) and Red Ape (Michelle, Kayleigh, Cole, Cynthia, Shannon). Arrived at third intertidal site, Minnis Bay at 6:10. Completed intertidal survey, drone survey, eDNA, debris survey, seine, and 3 BRUVs. Michelle and Cole left on Red Ape at 11;30 from beach pick up CCG deckhand (Simon) to service a wildlife cam, take a generator and service a weather station/satellite camera in Grenville channel near Zalinksi wreck. The rest of the science crew were at beach until 12:45ish and we met the Vector at the mouth on Minnis Bay and then traveled to Grenville to meet Michelle, Cole and Simon. They returned to the boat by 17:45.
May 22	Intertidal Day 4 – departed Vector at 6:30 on Palmira and Red Ape. Heading to Kishkosh Inlet site (810637). Kishkosh is very shallow, so we BRUVed at Mouth of Kishkosh Inlet (MMI) and then went in and seined across from the intertidal site to avoid disrupting the intertidal team. Once seine finished we helped intertidal team with the quadrats. We had to leave with Cole and Cynthia at 2 to get back to ship to test CTD rosette at 15:00. Had issues with arming the CTD, troubleshooted for a few hours, eventually Cynthia figured out it was baud rate at which the CTD communicates with the Rosette. We couldn't communicate with the CTD with the ECO so connected directly to the CTD. Luckily she knew how to troubleshoot it. We also found out that the seabird software works best with the IMRP toughbook. If you see gibberish, it could be a comm port problem (connected to wrong port) so just go to menu and choose another port. Rest of Science crew returned to Vector by 15:30pm. For the afternoon, we filtered water, downloaded data and prepped for the next day.
May 23	Intertidal Day 5 – departed Vector at 7:15. Went to MKIkI inlet but it was too steep to do a beach survey (and we BRUV'd it yesterday) so we went to backup site 8654029, called the site W Hawkesberry Isl. Creek. Completed an intertidal survey, drones, marine debris, BRUVs, water sampling and beach seine. We picked up BRUvs and got back Vector at 14:00, intertidal team finished the debris survey and got back at 15:00. We tested two programs and test casts and all worked well after some initial issues.
May 24	Water sampling from Vector- Day 2 – Red Ape left at 07:30 (Michelle, Sharon, and Kayleigh) to pick up wildlife cams and help CCG with crew change in

	Hartley Bay. The rest of science crew remained on board the Vector to
	complete Rosette- CTD sampling. Collected seawater samples from 6 sites in
	Verney passage and Wright Sound and one in Ursula Channel (N14, N13,
	18Ver, 9Ver, 5Ver, 12Urs). We started at 8:30 and finished last eDNA water
	collection at 16:00 and were still cleaning/filtering samples in lab until
	19:00pm. Also did nutrient cast and zooplankton bongo net (UC43 nut, UC43-
	bongo) after dinner. Transited at night to head of Gardiner Canal.
May 25	Water sampling from Vector – Day: started at 7:00, first cast at 7:15.
,	Completed 7 eDNA water collection sites and two nutrient profile casts up
	Gardiner Canal. Sampled water for eDNA analyses at 20Gar, 3Gar, 6Gar,
	13Gar, 4Gar, and 16Dev. Set 3 BRUVs and 3 water samples at 19Gar from
	Palmira. Sharon, Shannon and Michelle went out in morning to set BRUVs and
	do Niskin line sampling, and came back for lunch. After lunch. Michelle.
	Shannon and Kayleigh tested the mircoplastics sampler from the Palmira.
	Anchored in Gardiner Canal overnight.
May 26	Water sampling from Vector – Day 3: Launched Palmira (Michelle, Sharon and
	Kayleigh) to do Niskin line and BRuvs at Danube Bay (2019 site) and 2Urs. Vector
	doing rosette water sampling and nutrients at 11Ver, 14 Ver, and then sites down
	Ursula Channel. Completed 2 eDNA casts and one nutrient profile before lunch.
	Palmira came back to boat to deliver eDNA water samples and get their packed lunch
	before heading off again to pick up wildlife cameras at Kishkosh (saw bears!) and
	backup site 8654029. We did last cast, N12 (repeat from last year, but we did
	bottom and 90m cast) after dinner. Finishing work at 20:00pm. Picked up Palmira and
	crew at 20:30 from getting wildlife cams and transited to Prince Rupert.
May 27	Transited to Prince Rupert overnight. Deployed both boats for nearshore
	sampling and equipment testing. The Palmira crew (Amy, Shannon and Emily)
	deployed 3 BRUVs and collected water at 6 sites using the niskin lines, from
	Flora Bank. The Red Ape crew (Michelle, Cole and Cynthia) tested a ADCP
	(current meter). The ACDP worked well and Michelle felt it would be a very
	useful tool for the IMRP program to detect snapshot currents around oils spills
	in real time. Two science crew stayed aboard the Vector to fix the seine net
	and complete data downloads. Both boats returned to Vector at 12:30 and the
	crew organized and cleaned gear for the next science crew. The Vector tied up
	to Seal Cove for the rest of the day.
May 28	End of Leg 1 - Science crew change – Emily, Michelle, Cole, Cynthia and Sharon
	left Vector at 06:30 to take the shuttle to Terrace. Amy, Shannon and Kayleigh
	stayed on board. The next science crew flew into Prince Rupert arriving around
	15:30. Kayleigh and Shannon tested the Ascension microplastics sampler. The
	Vector anchored at the Kinahan Islands.
May 29	Dive skiff left the ship at 0730 to do microplastics sampling at Philips point,
	returned for fire drill at 1230 and then went to Prince Rupert Harbour to
	sample in the afternoon and returned to the ship at approximately 1930. The
	ship sampled 6 eDNA stations in Gull Rocks South RCA and over sponge reefs

	in southern Chatham Sound (SpongeReef8, 18Gul_RCA, 19Gul_RCA,
	20Gul_RCA, 22Gul_RCA, 23Gul_RCA) and returned to anchor at the Kinahan
	Islands.
NA- 20	
May 30	Dive skift (Palmira) left the ship at 0700 (Sarah, Sarah, Kayleigh) and did
	microplastics sampling at the end of Tuck Inlet and Osborn Cove, charging the
	Ascension at the Seal Cove CCG station. The ship transited to northern
	Chatham Sound and sampled 3 eDNA stations over sponge reefs and within
	the Hodgson RCA (SpongeReef11, SpongeReef15, 9Hod_RCA) and then
	launched the Red Ape (Shannon, Kathryn, Carrie) to sample 2 shallower sites
	in the Hodgson Reefs RCA (6Hod_RCA, 7Hod_RCA) while two personnel (Amy,
	Cindy) remained on the Vector to finish water filtration. Conditions did not
	allow for small boat sampling for one site (10Hod_RCA) so the Red Ape
	returned to the Vector. The Vector anchored by Tugwell Island. Dive skiff
	returned around 1900.
May 31st	Dive skiff (Palmira) left the ship at 0700 (Sarah, Sarah, Kayleigh) and did
	microplastics sampling in Metlakatla Passage and Prince Rupert Harbour. The
	ship sampled 6 eDNA stations over the sponge reef in northern Chatham
	Sound and the Gull Rocks North RCA (SpongeReef1, SpongeReef2,
	SpongeReef6, 16Gul_RCA, 17Gul_RCA, 21Gul_RCA) and then launched the Red
	Ape (Shannon, Kathryn, Carrie) to complete small boat sampling of the final
	station (10Hod_RCA) while two personnel (Amy, Cindy) remained on the
	Vector to finish water filtration. Dive skiff returned to the ship at 1700 to
	Kinahan Islands and began transit to Devlin Bay in Caamano Sound.
June 1st	Both Dive skiffs left the boat around 0530. One skiff went to Goodacre point
	to scout the target site and a backup site and deployed some bruvs at
	Goodacre and some wildlife cameras at beach nearby (that wasn't a selected
	site or backup). The other skiff checked out the Gillespie channel site (too
	steep) and the backup site where one wildlife camera was set up. They then
	continued on to Oswald Bay where two additional sites were scouted and
	wildlife cameras set up. The first skiff returned to the Vector near Goodacre pt
	where the skiff was loaded on the ship and the second skiff was unable to
	unload due to unsafe conditions and returned to Devlin Bay where they
	eventually unloaded when the Vector returned.
June 2nd	Left at 0500 and surveyed backup site that we called Thumb Cove, did eDNA,
	intertidal biodiversity survey, bruvs and beach seining. Returned to the ship in
	Devlin Bay around lunch and 2 eDNA sites sampled in 2022 were repeat

	sampled in Caamano sound in the afternoon (S05, S09). Attempted to anchor
	in Oswald Bay but it was too swelly so returned to Devlin Bay.
June 3rd	Left at 0500 and surveyed backup site north of Goodacre Point, did eDNA,
	intertidal biodiversity survey, bruvs and beach seining. Went back to Oswald
	Bay to retrieve wildlife cameras since we won't be able to survey the sites due
	to weather. Vector headed to Borrowman Bay to anchor.
June 4th	Left at 0500 and attempted to go to Kettle Inlet but it was too swelly so
	headed to Meiss Passage. Did eDNA, intertidal biodiversity survey, bruvs and
	beach seining and returned to Vector anchored in Borrowman Bay.
June 5th	Left at 0500 and surveyed Kettle Inlet, did eDNA, intertidal biodiversity survey,
	bruvs and beach seining, moved to anchorage in Parkers Passage.
June 6 th	Left at 0615 and surveyed North Rennison Island, did eDNA, intertidal
	biodiversity survey, bruvs and beach seining, moved to anchorage at Baker Pt.
	Also retrieved wildlife camera in Meiss Passage.
June 7th	Left at 0700 and surveyed Baker Pt, did eDNA, intertidal biodiversity survey,
	bruvs and beach seining, moved to anchorage at Baker Pt. Also retrieved
	wildlife camera on North Rennison. Returned to ship at 1330 and began
	transit to Port Hardy.
June 8th	Arrived in PH around 0600, after many, many offload plans we got a dock
	space b/c a safety boat for Van Isle 360 didn't show up. Finished offload by
	approximately 1030-1100am.



Photos from Leg 1. Top left to right: Gil Rock Intertidal site, Kayleigh conducting a quadrat survey, NW Farrant Island eelgrass meadow we seined, SBE-55 sampling in Verney Passage, eDNA water sample filtrations set up, Niskin bottles on rosette ready to go.



Figure 1 – Leg 1 Intertidal sites – at all sites we conducted, drone surveys, debris survey, intertidal biodiversity, Baited Remote Underwater Video surveys, beach seine, and eDNA water collection. At a subset of sites, wildlife cameras were set for 2 nights.



Figure 3. Leg 1 – eDNA water sampling sites. At all sites 3L of water were collected at depth (10m above bottom) and at surface (2m) and filtered for eDNA analyses. Samples will be run for fish and invertebrate diversity. Five sites were not sampled – 23Gar, 1 Gar, 24 Gar, 7Dev and 21Urs.



Figure 4 – Leg 2 water sampling sites, plus Flora Bank sites sampled on May 27 as part of Leg one.



Figure 5. Snapshot of currents at Flora Bank using new ACDP.

2023 Intertidal Survey Sites



Fig 6. Leg 1 and 2 Intertidal survey sites